

Availability of Essential Medicines and Drugs for treatment of chronic disease in the pharmacies of Nepal during COVID 19 Pandemic

Koirala B^{*1}, Bhatta N², Bogati S³, Panthi S⁴, Rauniar GP⁵ and Sharma SK⁶

¹Associate Professor, Clinical Pharmacology and therapeutics, BPKIHS, Dharan, Nepal

²Medical officer, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal

³Medical officer, Kolhabi primary Health center, Kolhabi, Bara, Nepal

⁴Medical officer, Fikkal Primary Health Center, Fikkal, Illam

⁵Professor and Head, Clinical Pharmacology and therapeutics, BPKIHS, Dharan, Nepal

⁶Professor, Internal Medicine, BPKIHS, Dharan, Nepal

Abstract

Background: The world is experiencing the worst pandemic of recent time. Hospitals are allowing only limited patients in the OPDs. The patients with various chronic diseases are asked to stay in home and are advised to continue taking the prescribed medicines. This study is planned to assess the availability commonly used drugs in pharmacies.

Objectives: the objective of this study was to analyze the availability of drugs for chronic disease and essential medicines in Pharmacies.

Methods: The Performa was given to pharmacies around various hospitals of different provinces via medical officers working there. The filled Performa was collected and drug was considered available if it was present in pharmacy at that time. Along will availability of drugs, total number of brands available was also recorded.

Results: Total of 58 pharmacies from the entire province was included. Nine pharmacies from province one, 6 pharmacies from province two, 11 pharmacies from Bagmati province, 9 pharmacies from Gandaki provinve, 12 pharmacies from Lumbini province, 2 pharmacies from Karnali province and 9 pharmacies from Sudharpachhinm Pradesh were included. Among drugs used in chronic diseases, Amlodipine (94.8%) Metformin (93.1%), Losartan (93.1%), Atorvastatin (93.1%) and Glimperide (89.7%) were most commonly available drugs in various pharmacies. Among other Essential drugs Paracetamol (100%), Metronidazole (100%), Amoxicillin (100%), Diclofenac (96.6%), Azithromycin (96.6%), Cetrizine HCL(94.8% %), Albendazole (94.8%), were most commonly present. Highest number of brands available in a pharmacy was of Amlodipine (n=30) followed by losartan (n=20), Telmisartan (n=20), Metformin (n=20), Glimipiride (n=20) and Paracetamol (n=20).

Conclusion: Most of the drugs used for chronic diseases and the essential drugs were available in the pharmacies however more extensive studies including larger number of pharmacies is necessary.

Keywords: Pandemic; Chronic disease; Essential drugs; Availability.

*Correspondence Info:

Dr. Bhawesh Koirala
Associate Professor,
Clinical Pharmacology and therapeutics,
BPKIHS, Dharan, Nepal

*Article History:

Received: 11/03/2022

Revised: 21/04/2022

Accepted: 25/04/2022

DOI: <https://doi.org/10.7439/ijbr.v13i4.5723>

QR Code



How to cite: Koirala B, Bhatta N, Bogati S, Panthi S, Rauniar GP and Sharma SK. Availability of Essential Medicines and Drugs for treatment of chronic disease in the pharmacies of Nepal during COVID 19 Pandemic. *International Journal of Biomedical Research* 2022; 13(4): e5723. DOI: 10.7439/ijbr.v13i4.5723 Available from: <https://ssjournals.com/index.php/ijbr/article/view/5723>

Copyright (c) 2022 International Journal of Biomedical Research. This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

1. Introduction

COVID-19 pandemic has affected a lot of aspects of human life. In response to the COVID-19 pandemic, a country-wide lockdown started in March 2020 in Nepal.[2] The pharmaceutical sector which is an important part of the global economy has been heavily influenced by the pandemic.[3] Almost all countries irrespective of income

status experienced drug shortage raising a global concern that demanded urgent exploration. Drugs that are liable to shortage include a variety of drugs like essential life-saving drugs, oncology medicines, antimicrobial drugs, analgesics, opioids, cardiovascular drugs, radiopharmaceutical, and parenteral products. The chance of shortage of sterile injectable products was greater as compared among all

pharmaceutical dosage forms.[4] Even before the pandemic, the manufacturing factories were working at their full capacity and used to manufacture drugs just at the time of requirement; this vulnerability of the manufacturing factories was exposed and highlighted by the pandemic. Certain essential drugs like those used in the critical care unit were in shortage even before the COVID-19 pandemic making the shortage heighten during the pandemic.[5]

Nepal and India's pharmaceutical industries depend heavily on China for raw materials. Additionally, a large portion (80%) of Nepal's pharmaceutical formulations is imported from India. Hubei was one of the major suppliers of raw materials to both nations before the pandemic; after it was impacted by COVID-19, it disrupted the import of raw materials to both countries. Further, the Indian Government banned the supply of essential drugs to Nepal with the motive of preventing drug shortage in its own country. This created a major shortage of drugs supply in Nepal. Additionally, drug supply within Nepal was also interrupted which led to unfortunate events like a rise in maternal mortality due to postpartum hemorrhage as a result of hindrance in disruption of misoprostol through female community health volunteers. Quality of care at both local and international level was compromised as a result of this pandemic's effect on the global medical supply chain. Therefore, we aimed to explore the status of essential drug shortages during the COVID-19 pandemic in different healthcare sectors from the perspective of pharmacies in Nepal.

2. Methods and Methodology

This was a questionnaire-based cross-sectional study that assessed the availability of various drugs in the pharmacies over duration of 3 months during the COVID-19 pandemic in Nepal. Ethical approval was obtained from the Ethical Review Board of the Nepal Health Research Council and Institutional Review Committee of B.P. Koirala Institute of Health Sciences (BPKIHS), Dharan, prior to the conduction of the study.

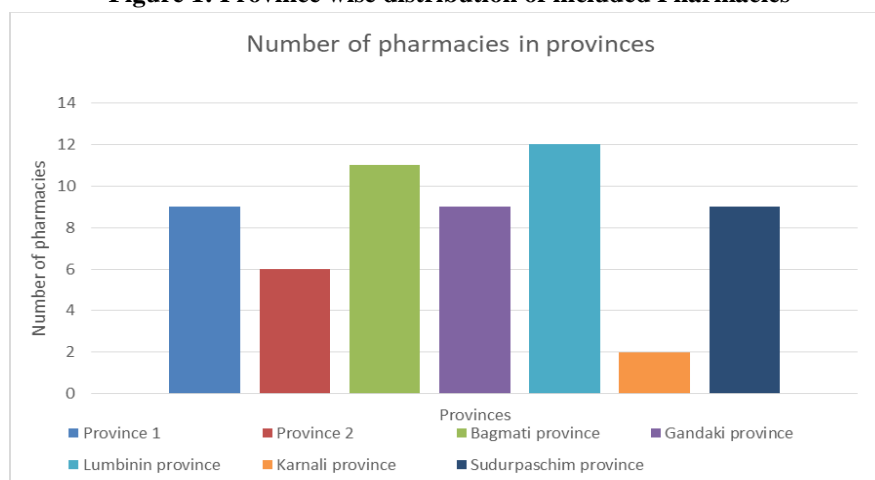
The study considered a 95% Confidence interval and 80% power to estimate the sample size. For this purpose, the study considered 66% availability of Bisoprolol in the pharmacy. Keeping allowable error as 20% of the prevalence and non-response bias of 10%, a sample size of 58 was calculated.

To assess and analyze the availability of essential medicines and drugs for chronic diseases in the pharmacies during COVID-19, a questionnaire was developed that included the general information about the pharmacies and the list of essential medicines enlisted by the government of Nepal as well as commonly used drugs for hypertension, diabetes and other cardiovascular conditions.[15,-17,19,20] Thus a total of 116 drugs were included in the questionnaire. The questionnaire was given to the pharmacies around various government hospitals of different provinces via medical officers working there. The pharmacies were selected based on the purposive sampling method. Only registered pharmacies willing to take part in this study were included. Informed consent was obtained from the pharmacists or pharmacy staff before the data collection from the pharmacies. A pretesting of the questionnaire was done among 5 pharmacies whose response was not included in the final dataset. The drug was considered available if it was present in the pharmacy at the time of filling out the questionnaire. Along with availability of drugs, a total number of brands available, dosage form, strengths available (mg/ μ g/international units), its availability in fixed-dose combination and date of expiry (latest lot) were recorded. All the filled questionnaires were collected, and the data were entered in Microsoft Excel and analyzed using appropriate statistical tests using SPSS software.

3. Results

Pharmacies included from provinces one, two, Bagmati, Gandaki, Lumbini, Karnali and Sudurpashchim provinces were 9, 6, 11, 9, 12, 2 and 9 respectively. (Figure 1)

Figure 1: Province wise distribution of included Pharmacies



Commonly available drugs used for chronic diseases were Amlodipine, Metformin, Losartan, Atorvastatin, Glimepiride, Aspirin, Furosemide, Propranolol, Atenolol and Enalapril. (Table 1)

Table 1: Commonly available Drugs used for Treatment of Chronic diseases

Drugs	Availability (%)
Amlodipine	55(94.8%)
Metformin	54(93.1%)
Losartan	54(93.1%)
Atorvastatin	54(93.1%)
Glimepiride	52(89.7%)
Aspirin	48(82.8%)
Furosemide	47(81%)
Propranolol	43(74%)
Atenolol	43(74%)
Enalapril	42 (72.4%)

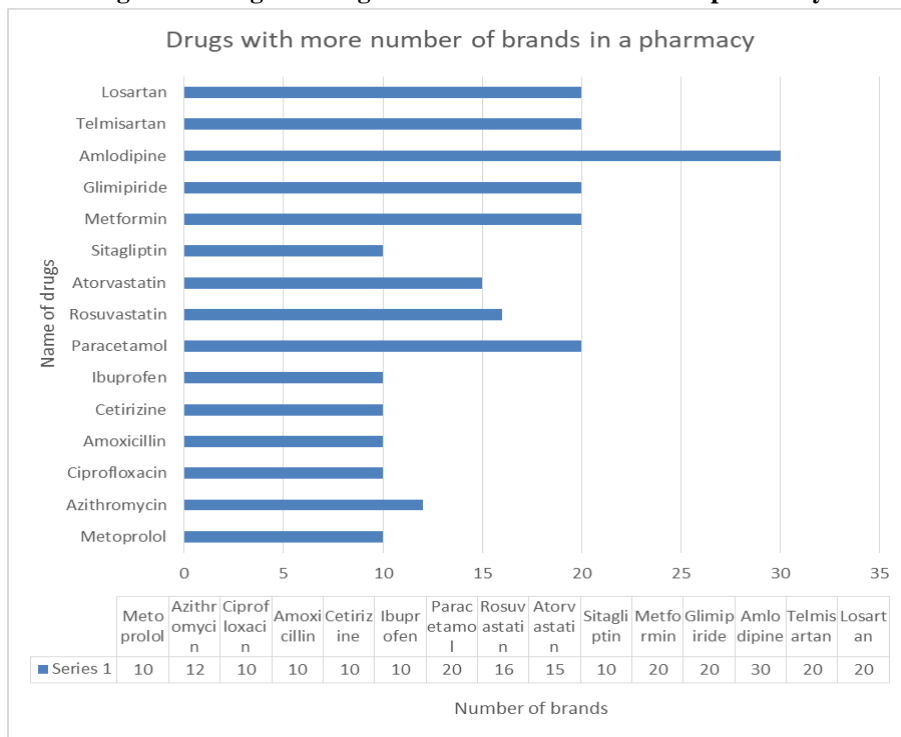
Commonly available essential drugs were Paracetamol, Ibuprofen, Diclofenac, Cetirizine, and Metronidazole. (Table 2)

Table 2: Commonly available Essential Medicines

Drugs	Availability (%)
Paracetamol	58(100%)
Ibuprofen	53(91.4%)
Diclofenac	56(96.6%)
Cetirizine HCL	55(94.8%)
Metronidazole	58(100%)
Tinidazole	54(93%)
Amoxicillin	58(100%)
Ciprofloxacin	54(93%)
Azithromycin	56(96.6%)
Fluconazole	51(87.9%)
Folic Acid	53(91%)
Vitamin B complex	53(91.4%)
ORS	49(84.5%)
Hyoscine butyl bromide	50(86.3%)
Aluminum Hydroxide+ Magnesium Hydroxide (Antacid)	51(87.9%)

Drugs with higher number of brands available in pharmacy were Glimepiride, Sitagliptin, Ibuprofen, Rosuvastatin, and Metoprolol. (Figure 2)

Figure 2: Drugs with a greater number of Brands in a pharmacy



Solid dosage form (Tablets/capsules) was the commonly available dosage form. (Table 3).

Table 3: Dosage Form

Dosage Form	Number (N)
Solid Dosage Form	
Capsule/Tablets	2684
Powder	53
Liquid Dosage Form	
Injections	628
Syrup/Suspensions	211
Drops	57
Aerosols	12
Gel/Ointments/Lotions/Creams	385

Out of 58 pharmacies, only 35 pharmacies responded for the availability of fixed drug combinations in their pharmacies. In those responding 35 pharmacies, a total of 473 fixed combinations were present. Ibuprofen was the most common drug available as **Fixed Drug Combination (FDC)** followed by paracetamol, folic acid, metformin, and losartan. (Table 4)

Table 4: Commonly available Fixed Drug Combination

Drugs as FDC	Number (Out of 35 responding Pharmacies)
Ibuprofen	27
Metformin	24
Paracetamol	24
Folic acid	24
Metronidazole	22
Losartan	21
Ferrous sulphate	19
Vitamin B complex	18
Amoxicillin	17
Amlodipine	14
Spiroonolactone	13
Glimepiride	12
Sitagliptin	12
Chlorpheniramine	12
Cloxacillin	11
Furosemide	11

Out of 58 pharmacies, 3 pharmacies did not respond on the availability of the drugs before lockdown which were currently unavailable. Of all the drugs currently unavailable, 218 of them were available before lockdown.

4. Discussion

Our study included response from 58 pharmacies in Nepal. Some drugs were in limited supply in Indian pharmacies, with the majority of the shortages affecting anti-malarial medications (70.3%) out of which antimicrobial agents were most affected.[11] During the COVID-19 pandemic, several nations experienced a shortage of chloroquine and hydroxychloroquine as a result of increasing demand.[12] In addition, during the period of COVID-19 pandemic, shortage of sertraline and midazolam were also noted because of the increased demand for antidepressant medications to control stress.[13] When asked about the type of pharmaceuticals in short of supply, the majority of the participants reported both imported and locally manufactured pharmaceuticals (85.7%), while the remaining 14.3% reported only imported pharmaceuticals were in short of supply. Around 85.7% of the participants reported both imported and domestically manufactured drugs were in low availability while 14.3% said solely imported pharmaceuticals were in short supply. Drugs for chronic diseases were the most frequently reported group of medications in short supply 35(55.6%).[4] In the Lisbon study paracetamol and ascorbic acid showed similar trends of a very substantial increase in supply compared to the first week of data collection. While the maximum proportion of sales for those drugs, as for the total market, occurred in the week the WHO declared COVID-19 a pandemic. Then onwards shortages and sales started to decrease and had stabilized by the end of April, although ascorbic acid's shortages didn't return to normal values.[14] A Study on drug availability for the treatment of chronic diseases in the public health care system in Brazil showed mean availability of medicines ranging from 83.3.5 to 97.6%.[16]

An analysis of the PURE study showed the availability of two or more classes of blood pressure-lowering drugs lower in low-income and middle-income countries (except for India) than in high-income countries. The proportion of communities with four drug classes available was 94% in high-income countries (108 of 115 communities), 76% in India (68 of 90), 71% in upper-middle-income countries (90 of 126), 47% in lower-middle-income countries (107 of 227), and 13% in low-income countries (nine of 68). The proportion of households unable to afford two blood pressure-lowering medicines was 31% in low-income countries (1069 of 3479 households), 9% in middle-income countries (5602 of 65 471), and less than 1% in high-income countries (44 of 10 880). Participants with known hypertension in communities that had all four drug classes available were more likely to use at least one blood pressure-lowering medicine (adjusted odds ratio [OR] 2.23, 95% CI 1.59–3.12; $p < 0.0001$), combination therapy (1.53, 1.13–2.07; $p = 0.054$), and have their blood pressure controlled (2.06, 1.69–2.50; $p < 0.0001$) than were those in communities where blood pressure-lowering medicines were not available. Participants with known hypertension from households able to afford four blood pressure-lowering drug classes were more likely to use at least one blood pressure-lowering medicine (adjusted OR 1.42, 95% CI 1.25–1.62; $p < 0.0001$), combination therapy (1.26, 1.08–1.47; $p = 0.0038$), and have their blood pressure controlled (1.13, 1.00–1.28; $p = 0.0562$) than were those unable to afford the medicines.¹⁵ Most of the drugs used for chronic diseases were readily available in the pharmacies, availability for most of the drugs ranging from 79-90%. These findings were like those conducted in Brazil.[16] Further our findings are consistent with the PURE study.[15]

Moreover, a study conducted in Zambia [20], drug availability was assessed as the percentage of pharmacies where the medicine was found at the time of the survey and as mean percentage availability across the basket of selected antidiabetics and antihypertensives. In addition, the mean percentage availability of all survey medicines was calculated for each pharmacy. Following the approach of previous studies [21-23], 5 categories were established to classify availability: absent (0%), very low (<30%), low (30-<50%), fairly high (50-<80%), high ($\geq 80\%$). This study showed overall mean availability across the baskets of antidiabetics and antihypertensives was low (30-<50%) in all provinces. Regarding the availability of individual medicines, high-level availability ($\geq 80\%$) in all provinces was found for 2 generic antidiabetics and 9 antihypertensives. The majority of the remaining medicines were available at low (30-<50%) and very low (<30%) levels. Individual medicine availability was further found to vary with medicine forms. Anti-diabetic and antihypertensive drugs were commonly available in the

pharmacies in our study which is similar to like that of studies conducted in Zambia.[20] Further a study conducted in Kerela also showed that antihypertensive drugs were among the commonly available drugs in the pharmacies.[17]

Research done in six low- and middle-income countries with the aim of knowing the availability and affordability of selected essential medicines for chronic disease has given us some insight regarding the availability of selected essential medicines in our country. In low-income countries like Nepal, government-supplied medicines through the Ministry of Health and Population are free in the public sector but because no one makes sure about the availability of such essential medicines all around the year in such settings, at the time of unavailability of such selected medicines public facilities obtain medicines from other sources (e.g. community drug treatment program) and then sell them to patients. Although the predominant type of products available in the public sector were generic medicines the total availability of medicines in the public sector was considerably lower compared with the private sectors. The patients of Nepal had to pay 66.3% higher prices in the private sector compared to the public sector. Data from 41 public outlets and 44 private outlets of Nepal had shown poor availability of certain key medicines (in any dose) used for chronic diseases. Drugs like hydrochlorothiazide, Angiotensin-converting enzyme (ACE) inhibitors, Benzathine benzyl penicillin and statins had poor availability while streptokinase was rarely available in the public and private sector of Nepal. The median availability of essential medicines for chronic diseases in six low- middle-income countries was less than 7.5 %.[18]

So we can say that the drugs used in chronic diseases, especially anti-diabetics and antihypertensive drugs were commonly available in the pharmacies even in this period of the pandemic. Most of the essential drugs were also commonly available in pharmacies. Drugs like paracetamol, amoxicillin, metronidazole were present in 100% of the pharmacies. Most of the other commonly used essential drugs were also commonly available in most of the pharmacies. These findings are similar to research done in six low and middle-income countries including Nepal.[4] Further the study done in Nepal showed the availability of essential drugs upto 88.5 % which is consistent with our study.[19] Similarly, 218 different drugs which were available before the pandemic were not available at the pharmacies in our study.

5. Conclusion

Most of the drugs used for chronic diseases and the essential drugs were available in the pharmacies however more extensive studies including larger number of pharmacies are necessary.

Acknowledgements

We would like to acknowledge Dr. Rajkumar Gajmer, Dr. Amrit Devkota, Dr. Anubhav Paudel, Dr. Amrit Jaishi, Dr. Bharosha Bhattarai, Dr. Suresh Dahal Dr. Bhmesh Kafle who help in collecting the data from various provinces in Nepal without whom this study could not have been completed. I would also like to thank all the participating pharmacies. Further I would like to acknowledge Dr. Shristi Nepal who helped us during editing.

References

- [1]. Rewari BB, Mangadan-Konath N, Sharma M. Impact of COVID-19 on the global supply chain of antiretroviral drugs: a rapid survey of Indian manufacturers. *WHO South-East Asia J Public Health*. 2020; 9(2): 126–133. doi:10.4103/2224-3151.294306
- [2]. Pradhan, Tika R (21 July 2020). "Government decides to lift the four-month-long coronavirus lockdown, but with conditions". *Kathmandu Post*. Archived from the original on 22 July 2020. Retrieved 22 July 2020.
- [3]. Aljadeed, R.; AlRuthia, Y.; Balkhi, B.; Sales, I.; Alwhaibi, M.; Almohammed, O.; Alotaibi, A.J.; Alrumaih, A.M.; Asiri, Y. The Impact of COVID-19 on Essential Medicines and Personal Protective Equipment Availability and Prices in Saudi Arabia. *Healthcare* 2021, (9): 290. <https://doi.org/10.3390/healthcare9030290>
- [4]. Shukar S, Zahoor F, Hayat K, Saeed A, Gillani AH, Omer S, Hu S, Babar-U-D, Fang Y and Yang C (2021) Drug Shortage: Causes, Impact, and Mitigation Strategies. *Front. Pharmacol.* 12:693426. doi: 10.3389/fphar.2021.693426
- [5]. Drug shortage a call- <https://doi.org/10.18553/jmcp.2020.26.8.945>
- [6]. "Nepali economy starts to feel the pinch as coronavirus spreads". *Kathmandu Post*. Archived from the original on 31 March 2020. Retrieved 11 March 2020
- [7]. Regulatory & Market profile of Nepal- <https://pharmexcil.com/uploads/countryreports/Nepal.pdf>
- [8]. Nepal's essential drug supply to last three months <https://thehimalayantimes.com/business/nepals-essential-drug-supply-to-last-three-months>
- [9]. Shortages of a Lifesaving Medication Threatened Mothers in Nepal. <https://www.directrelief.org/2021/02/shortages-of-a-lifesaving-medication-threatened-mothers-in-nepal-direct-relief-is-sending-34000-doses/>
- [10]. Kaakeh R, Sweet BV, Reilly C, et al. Impact of drug shortages on U. S. health systems. *Am J Health Syst Pharm*. 2011;68(19):1811-19

- [11]. Katie J Suda, Lauri A Hicks, Rebecca M Roberts, Robert J Hunkler, Linda M Matusiak, Glen T Schumock, Antibiotic Expenditures by Medication, Class, and Healthcare Setting in the United States, 2010–2015, *Clinical Infectious Diseases*, 2018; 66, (2): 185–190, <https://doi.org/10.1093/cid/cix773>
- [12]. Erickson TB, Chai PR, Boyer EW. Chloroquine, hydroxychloroquine and COVID-19. *Toxicology communications*. 2020 Jan 1; 4(1):40-2.
- [13]. Shukar S, Zahoor F, Hayat K, Saeed A, Gillani AH, Omer S, Hu S, Fang Y, Yang C. Drug shortage: causes, impact, and mitigation strategies. *Frontiers in pharmacology*. 2021; 12.
- [14]. Morales-Paredes CA, Rodríguez-Díaz JM, Boluda-Botella N. Pharmaceutical compounds used in the COVID-19 pandemic: A review of their presence in water and treatment techniques for their elimination. *Science of the Total Environment*. 2021 Dec 30: 152691.
- [15]. Marjan W Attaei, Martin Mckee et al. Availability and affordability of blood pressure-lowering medicines and the effect on blood pressure control in high-income, middle-income, and low-income countries: an analysis of the PURE study data. *The Lancet/Public-health*. 2017 Sep; 2: e411-18.
- [16]. Brazil -Ana Paula Helfer, Aline lins Camargo et al. Affordability and Availability of Drugs for Treatment of Chronic Diseases in the Public Health Care System. *Rev Panam Salud Publica*. 2012 Mar; 31(3):225-32.
- [17]. Lekshmi S, G.P. Mohanta et al. Study on Availability and Affordability of Anti-Hypertensive Medicines In The State of Kerala. *Intl Journ of Phar and pharmaceutical sci*. 2014 Sep; 6(10): 364-69.
- [18]. Mendis, S., Fukino, K., Cameron, A., Laing, R., Filipe Jr, A., Khatib, O., Leowski, J. and Ewen, M., The availability and affordability of selected essential medicines for chronic diseases in six low-and middle-income countries. *Bulletin of the world health organization*, 2007; 85(4): 279-288.
- [19]. Amrit Devkota, Anubhav Paudel, Bhawesh Koirala et al. Price Variation and Availability of Free Medicine for Non-communicable Diseases. *J Nepal Health Res Counc*. 2018 Apr; 16(39):118-23.
- [20]. Andrea Hannah Kaiser, Lindsey Hehman et al. Availability, prices and affordability of essential medicines for treatment of diabetes and hypertension in private pharmacies in Zambia. *Plos One*. 2019 Dec; 14(12): e02261-69.
- [21]. Gelders S, Ewen M, Noguchi N, Laing R. Price, availability and affordability. An international comparison of chronic disease medicines. Geneva; 2005.
- [22]. Gong S, Cai H, Ding Y, Li W. The availability, price and affordability of antidiabetic drugs in Hubei province, China. *Health Policy Plan*. 2018;33:937–47
- [23]. Yang H, Dib H, Zhu M, Qi G, Zhang X. Prices, Availability and affordability of essential medicines in rural areas of Hubei Province, China. *Health Policy Plan*. 2010; 25(3): 219–229.