

Bridging The Skills Gap: Market-Relevant Skill Development Programmes in Nepal's Health Sector

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Abstract

Council for Technical Education and Vocational Training is an autonomous body that produces basic to mid-level technical human resources and is responsible for overseeing Technical and Vocational Education and Training in Nepal. This study aims to explore the potential new courses for PCL/Diploma level in the health sector. A qualitative research design was employed to identify new areas. Participants were selected based on their experiences in the health sector in both Nepal and abroad. A total of 25 in-depth interviews, and two interactive meeting events were conducted, and thematically analyzed. The health courses identified for PCL/Diploma level within the health sector were: nursing, general medicine, Ayurveda, food science, and water, sanitation and hygiene, physiotherapy and rehabilitation, laboratory, health education and health promotion, medical records and data, health and social care, and radiotherapy. Courses identified as being in higher demand in Nepal and were: renal dialysis, radiotherapy, prosthetics and orthotics, audiology and speech language therapy, transfusion and blood banking, medical transcript, geriatric care, school nurse, palliative care, telemedicine and telehealth, cancer care, OT/anesthesia assistant, IVF and reproductive medicine, Panchkarma, herbs and shrubs, WASH and hospital hygienist, occupational therapy, health and social care, and data and medical records. All these courses, however appealing and demanding in the market, need to be approved for registration and licensing from the relevant professional councils in Nepal. Before commencing the new

programmes/courses, they should be assessed and interacted with the stakeholders, regulatory bodies, and even the general public.

1. Introduction

With the changing environment in a global and local context, the health needs of the people have also changed. Obviously, people expect quality healthcare services from trained and skilled human resources. In a Nepal, it is almost impossible to provide healthcare services by specialists, especially in remote and rural areas (Bhusal et al., 2022). Therefore, skilled and mid-level human resources for health are essential to address the population's health needs. The Council for Technical Education and Vocational Training (CTEVT) is responsible for producing mid-level skilled human resources in Nepal (Department of Health Services, 2025).

The CTEVT was established in 1989 as the national governing body for the Technical and Vocational Education and Training (TVET) sector in Nepal. It is mandated to produce basic, middle, and higher-level technical human resources essential for the country's development. In 2025, 17 courses related to the health sector were available at the Proficiency Certificate Level (PCL) or Diploma level, of which 14 courses were currently in operation under CTEVT. These courses have a duration of three years, and completion of the School Education Examination (SEE) is the minimum entry requirement [Council for Technical Education and Vocational Training (CTEVT), 2025].

Previously, pre-diploma level CTEVT health programmes, including Community Medicine Assistant (CMA), Auxiliary Nurse Midwife (ANM), Lab Assistant, Assistant Ayurveda Health Worker (AAHW), and Community Amchi Assistant, were also in operation (Basnet et al., 2023). Despite the existence of several sanctioned posts within the governmental health system, all such health-related courses below Diploma level were discontinued in the early 2020s, following the new National Medical Education Act, 2019 (Nepal Law Commission, 2019, p. 12). These human resources for health (HRH) played a significant role in delivering healthcare in remote and rural areas of Nepal. The associated posts were highly valued by the general public, particularly in outlying and remote areas. Currently, people aspiring to become healthcare technicians can only enroll in Diploma-level programmes. Still, student enrollment in such health-related programmes has been comparatively higher than in other sectors, such as engineering, agriculture, and hospitality (CTEVT, 2025). Furthermore, some basic- and middle-level sanctioned positions in the government health system remain vacant.

1.1 Modern Medical and Health Profession in Nepal

After the establishment of CTEVT in 1989, all technical and vocational courses up to PCL/Diploma level came under its jurisdiction. Like other countries, Nepal's economy is gradually recovering from the COVID-19 pandemic, and hence requiring identification of the new/emerging sectors/sub-sectors. Developing market relevant skill development training programmes is one of the key responsibilities of CTEVT. Currently, CTEVT is offering 50 Diploma-level (3-year) curricula, 25 pre-diploma-level (18-month) curricula, 8 apprenticeship (24-month) curricula, and 280 short-term vocational curricula in various sectors. Some may need to be reformed to make them more relevant to current industry demands. Although CTEVT has been updating its curricula, the scope of such reforms has been limited (CTEVT, 2025).

A thorough study is crucial to identify market-relevant skill development programmes (Adhikari et al., 2023), especially when changing patterns of diseases, affect the health needs of the population. This study aimed at identifying market-relevant skill development programmes at diploma level that could help create a skilled workforce in the health sector.

1.2 Review of Relevant Policies and Documents

In Nepal, Nursing was formally started in 1956 under the Ministry of Health. CTEVT began offering the PCL Nursing programme in 1999, taking over from universities and expanding its reach through affiliated institutions. CTEVT has so far developed 17 different health-related courses at PCL or Diploma level. Table 1 lists the PCL/Diploma level courses offered by CTEVT (2025).

Table 1 PCL/Diploma level health related courses offered by CTEVT

Courses	Course Introduced / Revised	Entry Requirement	Duration	Certificate
PCL in Homeopathy	2009	SLC/SEE	3 Years	PCL
PCL in General Medicine	2024	SLC/SEE	3 years	PCL
Diploma in Pharmacy	2021	SLC/SEE	3 Years	Diploma
PCL in Ophthalmic Science	2024	SLC/SEE	3 Years	PCL

Courses	Course Introduced / Revised	Entry Requirement	Duration	Certificate
PCL in Medical Lab Technology	2024	SLC/SEE	3 Years	PCL
PCL in Diagnostic Radiography	2024	SLC/SEE	3 Years	PCL
PCL in Nursing	2018	SLC/SEE	3 Years	PCL
PCL in Dental Science	2020	SLC/SEE	3 Years	PCL
PCL in Medical Science [Ayurveda]	2004	SLC/SEE	3 Years	PCL
PCL in Acupuncture, Acupressure, and Moxibustion	2021	SLC/SEE	3 Years	PCL
PCL in Physiotherapy [Medical Science]	2019	SLC/SEE	3 Years	PCL
PCL in Ayurveda Pharmacy	2018	SLC/SEE	3 Years	Diploma
Diploma in Dental Laboratory Technology	2017	SLC/SEE	3 Years	Diploma
Diploma in Yoga and Naturopathy	2024	SLC/SEE	3 Years	Diploma
PCL in Midwifery	2023	SLC/SEE	3 Years	PCL
Conversion Course for Dental Hygienist to Dental Science	2016	Dental Hygienist Pass	2 Years	PCL
PCL in Amchi Science [Dura-pa/Bum-Zi Tradition]	2024	SLC/SEE	3 Years	PCL

Source: CTEVT, 2025, p. 79.

As of April, 2025, there were 39 different types of health professionals registered with the Nepal Health Professional Council (NHPC). In total, 162,058 professionals were registered. Interestingly, some Diploma/PCL level health courses are not currently in operation in Nepal. As of 2023/24, 13 different programmes were in operation, while others have been approved but have yet to start (CTEVT, 2025).

According to the Economic Survey 2023/24, there were 215 hospitals, 201 primary health centres, 3,820 health posts, 426 Ayurveda clinics and 3,196 sub-health post/basic health service centres. Moreover, as of mid-March 2024, there were 16,541 hospital beds, 6,201 doctors, 27,698 Nurses/ANMs, 684 Kaviraj, 693 Vaidya, 15,987 health assistants/AHWs and 51,423 female community health volunteers working under the Ministry of Health and Population (Ministry of Finance, 2024).

Similarly, some health professionals completed their PCL/Diploma level studies in health sectors abroad and subsequently registered with NHPC. Most of them were from India, and a smaller number from Singapore. According to the records of Curriculum Development and Equivalent Division, CTEVT, 495 individuals had applied for an equivalence certificate through an online application portal in the year prior to May 2025. Over a third [37.78%] of the total applicants had applied for PCL/Diploma in Medicine/Health Assistant, followed by Pharmacy [25.05%], Nursing and Midwifery [10.91%], and other categories (Records of Curriculum Development and Equivalent Division, CTEVT based on online application from 8/2/2023 to 5/14/2025).

Every healthcare professional should be registered in one of the professional health-related councils, such as the Nepal Medical Council, NHP, Nepal Pharmacy Councils, Nepal Nursing Council, or Nepal Ayurveda Council. Without registration with such councils, an individual cannot provide healthcare services, not even counseling and guidance. These professional bodies also prescribe a code of conduct, ethics, and morality to the professionals regarding their professional role in providing healthcare services. They also regulate, standardize, enforce code of conduct, monitor, and provide professional development for the healthcare services while providing them (Nepal Nursing Council, 2019).

1.3 Population Dynamics

The shape of the population has changed from a pyramid to a balloon, which indicates ageing population in Nepal (World Health Organization [WHO], 2025b). It can be expected that people's health needs will also change, and they will be more likely to face geriatric problems, given that the life expectancy at birth was 65 in 2000 and 75 in 2021. Such a change suggests that, after 25 years, geriatric care-related HRH will be greater in demand. Planning for healthcare professionals should consider these facts such as trends of diseases, population dynamics and expectations of people and health needs of the people and country. On the other hand, artificial intelligence (AI) has also influenced the medical and health sectors, some jobs might be replaced by AI technology, such as using robots in surgery and operations, disease diagnosis, and the calculation of medicine provided to patients (WHO, 2025b).

1.4 Global Burden of Diseases

Diseases due to lifestyle and behaviour are on the rise across the world, where cancer is among the top killers, according to 2022 data, 20 million new cases were diagnosed, and nearly half (9.7 million) of them died due to cancer. It is anticipated that 35 million new cases will be diagnosed every year by 2050 (American Cancer Society, 2025; Bray et al., 2024; WHO, 2025a). In addition, one third (32%) of global deaths were from cardiovascular diseases (CVDs) globally in 2019. Data show that almost three out of four deaths due to CVDs occur in low- and middle-income countries (LMIC) (WHO, 2021).

Similarly, cases of diabetes are increasing rapidly in the LMICs, from 200 million to 830 million from 1990 to 2022. Diabetes causes further complications such as eye problems, kidney problems, and heart disease. Comorbidity with diabetes appears to be more complicated and even fatal (WHO, 2024). Almost nine percent of adults (20-79 years) reported diabetes and claimed almost seven million deaths in 2021. The International Diabetes Federation estimates 643 and 783 million cases by 2030 and 2045 respectively; most of these will be in the LMICs (WHO, 2024). Moreover, over 700 million people are estimated to have chronic kidney diseases (CKD). It is estimated that one in three and five patients with diabetes and hypertension have CKD in high income countries (Francis et al., 2024).

The growing trends of non-communicable diseases (NCDs) and comorbidity globally, mostly in the LMICs. These lifestyle related diseases required behavioural modification to prevent them. To cope with the growing burden of NCDs, specialized care is essential to treat people. Therefore, technical education programmes and training should consider the global disease pattern, and academic institutions for human resources of health should consider the global demand for healthcare services.

1.5 Changing Pattern of Diseases

Globally, the disease pattern has changed from communicable to non-communicable or behavior-centric health problems. Previously, more healthcare resources were used for the treatment and management of communicable diseases but the scenario has been changed. Now, globally NCDs are increasing, such as heart-related diseases, CVDs, respiratory and lung-related diseases, kidney-related diseases, and cancer (Nepal Health Research Council et al., 2021).

NCDs are a serious concern throughout the globe and are more serious in the South East Asian Region, with an estimated two-third (64%) of the total deaths attributed to NCDs. The deaths claim almost half of the people from socially and economically productive age groups: 30-70 years. A national representative survey conducted in 2019 showed that among people aged 15-69 years, 24.3%, 24.5% and 5.8% were overweight, high blood pressure/medicated, and high level of blood sugar/medicated respectively (Dhimal et al., 2020). It indicates that NCDs are increasing and concerned authorities should be prepared to overcome the potential situation in future (Nepal Health Research Council et al., 2021, p. 25).

Considering these facts, the CTEVT has been implementing several programmes to produce mid-level human resources for health, as well as other sectors. These courses are considered classical and need to be updated in accordance with the health needs of people within the global and national context. However, studies on these areas seem scant. The study, therefore, aims to explore the potential new courses for PCL/Diploma level in the health sector that would be relevant in the national and global context (Bourgeault et al., 2010).

2. Methods

The study employed a participatory and outcome-oriented qualitative approach (Creswell & Creswell, 2023; Grønmo, 2020) to identify market-relevant skill development programmes in emerging productive sectors (Rapport, 2004). A desk review of the documents, reports, and relevant policies was conducted to provide contextual insights, while primary data were collected through interviews, and two group meetings (Saldana, 2011). Purposive sampling was employed to ensure in-depth data from diverse participants, different regions, and skill areas (Seawright, 2016). Qualitative data was collected through in-depth interviews (IDIs) and key informant interviews (KIIs) (Merriam & Tisdell, 2016). This narrative inquiry analysed participants' views and perception towards the national and global situation of human resources for health (Creswell, 2009, Denzin et al., 2019).

2.1 Study Setting and Research Participants

Geographically, the study covered both hill and terai regions with a range of participants (Table 2) from Kathmandu, Kaski, Rupandehi, and Chitwan district. Nursing professionals, healthcare professionals, public health experts, officials from equivalence section of CTEVT and representatives from health professional councils, researchers, academics, former employees of Ministry of Health and Population, and hospital managers/directors, municipal health section heads, etc. were included as research participants (Merriam & Tisdell, 2016). Moreover,

five participants were selected from foreign countries: the UK, the USA, Australia, New Zealand, and Canada to identify the potential job markets (areas) beyond Nepal.

Table 2 Number and type of research participants

Sources/Type of Data	District (Mode)	Number	Remarks
In-depth Interviews	Kathmandu, Chitwan, Kaski, Rupandehi (Online/Physical)	8	Hospital Managers (2), Medical Superintendents (2), Health Professionals (4)
In-depth Interviews	Kathmandu, Chitwan (Online and Physical)	8	Entrepreneurs (Shareholders, Investors) Private Sectors: Private Clinics, Private Hospitals and Consulting Agencies
In-depth Interviews	International (Online)	5	Participants resided in UK, USA, Australia, New Zealand and Canada [NRN or Nepali]
Key Informant Interviews		4	Public Health Experts, Curriculum Development and Equivalence Division, CTEVT, Different Health Related Councils
Interactive Meeting [IM]	All Nepal (Online/Physical)	2 Events	Different stakeholders including educators, journalists, health professionals, and Professors

Altogether 25 interviews and two interactive meetings with the business community and professionals involved in health sectors were conducted [Table 2]. Participants were selected purposively who have health related knowledge and were involved in health profession either as a health/medical profession or as working in a managerial position in a health-related institution and profession.

2.2 Sources of Data

There were two types of data sources. The primary sources of data were research participants and data were collected by interviewing or discussing through physical and online modes, as available and applicable. Altogether 37 people with 21 in IDIs, four people in KIIs, and two events of interactive meetings (seven and five members in each event) participated either online or person. Secondary data were obtained from different institutions, mostly records of institutions such as NHPC, Nepal Nursing Council, and CTEVT. This helped understand the primary sources.

2.3 Data Collection Tools

Guidelines for IDI and KII were used to collect the data. They were developed after reviewing the existing literature and consulting with health professionals. Before the first interview, these guidelines were pre-tested in a similar study setting and reviewed by experts (Lincoln, 2019).

2.4 Data Collection

Data were collected by researchers and CTEVT staff. Before collecting the data, a one-day orientation programme was conducted for the researchers to ensure accurate and systematic data collection. Due to the nature of data, the researchers directly engaged study participants and built rapport to capture detailed insights (Flick, 2018). This approach ensured a comprehensive understanding of the programme's impact while maintaining data integrity and contextual relevance. Participants' responses were recorded using recording devices upon their consent and permission (Fox et al., 2023). Data collection began on 4th May and completed on 14th June, 2025.

2.5 Data Analysis

All recordings were listened to, reviewed and next key concepts were noted. All significant information resulted in a code along with verbatim quotes. Similar codes were merged to make a sub-theme, next the data were integrated by sub-themes (Creswell & Creswell, 2023).

2.6 Ethical Considerations

Participants were volunteers and all were informed about the research objectives and their rights and roles. Verbal consent was taken before the interview, discussion and recording. Ethical aspects of research, such as respect for participants, beneficence, and justice, were maintained throughout the research process (American Psychological Association, 2020). The Research Committee of CTEVT reviewed and approved the research proposal on 31st March 2025 (2082-12-18 BS). No personal identities were disclosed in any reports. All official procedures were followed before data collection, such as an official letter being handed over to participants and offices/organizations, and permission to conduct an interview/discussion.

3. Findings

Based on the interviews, discussion, and interaction with research participants, the following new areas have been explored in the Diploma level health sector in Nepal.

3.1 Nursing Sector

Nursing is one of the major pillars of any healthcare system. Various areas of nursing were explored in the study. One participant expressed, *'the pattern and dynamics of the population has been changed and the different types of health needs are being demanded'* [IDI (15), Nursing Professional]. Another said, *'trend of diseases pattern has been changed where declines of communicable diseases while behavior or lifestyle related non-communicable diseases are raised, so HRH should be managed accordingly'* [IDI (9), Nursing Professional]. The following emerging areas for PCL or Diploma level programmes within the nursing sector have been identified: (1) Child Health; (2) Intensive Care Unit [ICU]/Critical Care Unit; (3) Mental Health; (4) School Health; (5) Operation Theatre/Anesthesia; (6) Dialysis; (7) Geriatric; (8) Ophthalmology; (9) Palliative Care; (10) Autism Care; and (11) Alzheimer's /Dementia Care.

In connection with these nursing areas, participants expressed that the patterns of diseases and patients' expectations had been changed. One of the research participants expressed that special nursing services were required for emergency services and cancer treatment, which necessitated specialized care. *'Nuclear family and geriatric care centres are increasing in that case, geriatric nurse may fit to care the elder people, so geriatric nurse course should be initiated'*, one of the nursing professionals expressed:

Emergency nursing and ICU nursing are also important. Because, if you look at the ratio of NCD cases, including accidents and injuries, which are increasing day by day, ICU...nurses would be well-equipped to handle such cases. Cancer care specialization is another potential area of growth for the nursing job market. Because if we look at it from a long-term perspective now, globally, cancer care is very important. This falls under rehabilitative care, which also includes palliative care. I know, we don't have a palliative care course in Nepal. And people who have completed a palliative care course, with the right human resources, have a vast and maximum global scope for the job market [IDI (6), Assistant Professor, Nursing].

Other participants expressed that Alzheimer's disease, Parkinson's disease, and dementia were increasing, and these needed special care that a general nurse might not provide properly, requiring a specialized nurse for quality services. General nurses may not be able to handle these diseases since they need special care and they used to have multiple diseases or co-morbidity.

Now, so far, we do not have nursing human resources in Ayurveda. Ayurveda nursing. And because there are no nursing human resources in Ayurveda. So, there is a scope of Ayurveda nursing. In Ayurveda hospitals, under the Department of Ayurveda, and Alternative Medicine, a nursing course under Ayurveda and Alternative Medicine is essential. Now, in the federal structure, there are the Nardevi Hospital and Teaching Hospitals. Then, in the provincial structure, there are provincial hospitals, and then district Ayurveda hospitals as well... previously they were health centres, now they are gradually being expanded as hospitals where there is a scope of Ayurveda nurses [IDI (2), Director, Ayurveda Hospital].

3.2 General Medicine

Along with nurses, another major component of the healthcare system is the health assistant in general medicine. Still in remote and even urban areas, healthcare depends upon the health assistant in general medicine. There are several sanctioned posts of health assistants in general medicine in the government health system, such as Health Posts, Primary Health Centres, Urban Health Clinics, District Hospitals, Provincial Hospitals, Central Hospitals, and several departments and sections of the Ministry of Health and Population, and the Department of Health Services. One of the interviewees expressed:

Health Assistant was fit for all healthcare systems from first aid, emergency to community health. The situation has now been changed, and specialization is required in the health sector. Therefore, the course should be revised as per the demand of the patients and the people. Different types of knowledge and skills are required as per the nature of diseases, so demand-based education and training should be provided to the healthcare professional [KII (1), Member, NHPC].

In the qualitative data, the general medicine for PCL or Diploma level have been identified: (1) Emergency Care and Medicine, (2) Operation Theatre [OT]/Anesthesia Assistant, (3) Home Health Aide, (4) Telemedicine and Telehealth, (5) Diploma in Cardiology Technology, (6) Dialysis Technology, (7) Diploma in Cancer Care, (8) Diploma in In vitro fertilization [IVF] and Reproductive Medicine, (9) Diploma in Sport Medicine.

One of the research participants [KII(3)] expressed that, in Nepal, where there is great diversity with mountains, hills, plains, and scattered settlements, it is not a situation where doctors are accessible everywhere. For this, a health worker or a health assistant, by staying in a remote area, can provide health services in consultation with a doctor. Therefore, Diploma courses like telemedicine and telehealth can also be beneficial for Nepal.

Some participants also highlighted that the prevalence of CVD is increasing, and now listed as a top killer worldwide. Therefore, cardiology and related human resources are crucial in managing. In locations and contexts, where a cardiologist may not be available, a junior assistant can handle certain tasks if such types of human resources are available. ECG, EEG and cardiology technology-related courses could be more saleable degrees, and they can also support the cardiologist. For example, one interviewee expressed; *'Cardiac technology, and dialysis technicians are some charming subjects for the PCL/Diploma level since heart-related and kidney-related patients are increasing day by day'* [IDI (8), Hospital Manager].

'One out of six people is observed to be infertile globally', a public health expert expressed. He further remarked, 'infertility is increasing, so IVF centres will be increasing, so HRH for IVF centres will be in demand in the near future, so we have to think about that way'. Support staff are required for IVF and reproductive care centres, hence IVF - related courses can be introduced at the PCL/Diploma level.

3.3 Ayurveda Sector

Ayurveda is one of the most traditional healthcare systems. It has a long history and several treatment systems within Ayurveda are still famous worldwide. A research participant [IDI (12)] expressed that the government has initiated *Nagariak Aarogya Kendra* [NAK] in each municipality. For this purpose, an additional Ayurveda Nurse and Health Assistant for Panch Karma could contribute to the NAK.

In a significant public health initiative highlighted in this year's budget, the Government of Nepal has successfully established Citizen Health Service Centres across all 753 local bodies. To ensure these centres operate effectively, they will be staffed by mid-level health professionals. This approach creates crucial roles for both traditional Ayurveda practitioners (Kaviraj) and modern nursing staff, blending established and contemporary medical expertise at the community level. It will be more dedicated to senior citizens. [KII (2), NHPC Member].

There are some courses that CTEVT could offer at PCL/Diploma level in the health sectors within Ayurveda stream: (1) Ayurveda Nursing, (2) Diploma in Panch Karma, (3) Diploma in Herbs and Shrubs: [Identification, Collection, Storage, Marketing], (4) Diploma in Spa Bath and Natural Healing, (5) Diploma in Natural Therapy [Bee, Leech].

People still believe in Ayurveda especially when allopathic healthcare systems do not work. Several traditional medicines, including Ayurveda, which are on the increasing trend. The Hospital Director stated *'Till date, there is no Ayurveda Nurse course in Nepal, which is actually important to treat in the Ayurvedic medicine, which might be different from the allopathic care system'*. He further added:

There are many treatment systems for non-communicable diseases within Ayurveda, such as 'Panch Karma' which is known as 'half of all treatment', 'Kshar Sutra' 'Bee and Leech Therapy'. Panch Karma includes Vamana (Therapeutic Emesis), Virechana (Purgation), Basti (Medicated Enema), Nasya (Nasal Administration), Raktamokshana (Bloodletting). These courses need special education and training that can be taught at the PCL/Diploma level. Mud Therapy, oil baths, steam baths, etc., are some common therapies within Ayurveda. So, these therapies are popular, and patients are also satisfied with these treatment systems and can be offered as academic courses at the PCL/Diploma level. Moreover, the Government of Nepal has announced to introduce the 'Nagarik Aarogya Kendra' at local municipalities, and these professionals may be deployed there [IDI (18), Hospital Director, Ayurveda].

Nepal is rich in natural herbs and shrubs that are used for treatment in Ayurveda. However, these plants are being wasted due to the lack of knowledge about its application and use among most people. Therefore, the PCL/Diploma course in Herbs and Shrubs is a saleable course in the context of Nepal. This course can be made for the cultivation, processing, storage, and marketing of herbs, plants and shrubs. A research participant *highlighted that this course would helpful to contribute to the national economy after trading the natural herbs and shrubs* [IDI (13), Campus Chief (Ayurveda)].

3.4 Food, Water, Sanitation, and Hygiene

Water and food-borne diseases are more common among communicable diseases. It is estimated that more than two-thirds of the infectious diseases are caused by contaminated water. Therefore, a water quality checker could

be a popular job in Nepal, where there is still a lack of safe drinking water. Sanitation and Hygiene is another potentially desirable area within community and hospital settings.

...cleanliness is more than wiping the floor in the hospital. Due to the lack of proper sanitation and hygiene Hospital acquired infections have been rising in the context of Nepal. Therefore, water, sanitation and hygiene-related courses are essential not only in the hospital but also in other settings like public places such as industry, schools, bus parks, and airports. On the other side, medical waste and other wastes have become a 'headache' for local authorities and hospitals. Converting 'dirt to dollar' is quite a demanding job across the country and globe so such types of courses should be offered even at PCL/Diploma level and higher level. [IDI (7), Hospital MD]

Several areas within WASH include: (1) Diploma in WASH and Water Quality Management, (2) Diploma in Food Processing and Quality Control, (3) Diploma in Sanitation and Hospital Hygiene, (4) Diploma in Nutrition and Dietetics, (5) Diploma in Healthcare Waste Management, and (6) Diploma in Food Quality Inspection. Besides these, some participants have expressed a desire to introduce new courses related to water, sanitation and hygiene, and food and water quality inspectors. One of the research participants expressed:

In Nepal, restaurants, hotels, cafes, and resorts are mushrooming, but there is no food quality inspector. We could not eat if you see the kitchen there. Therefore, a food quality inspector is essential to monitor and regulate such types of institutions. Another similar technical resource is essential for fast food inspectors and water quality inspectors as well.... [KII (14), Professor/Public Health Expert]

3.5 Physiotherapy and Rehabilitation

Health is eclectic in nature. Multiple factors are associated with health and wellbeing. The Health Service Act 1997 has recognized only three types of health services under the act. They are: *Allopathic Medical System, Ayurveda Medical System, and Homeopathic Medical System*. There are several traditional healthcare systems as per the culture and society, and are still popular within the community such as *Naturopathy, Unani, Acupuncture*. Based on the interaction and discussion with the participants, several areas have been identified within physiotherapy and rehabilitation: (1) Diploma in Audiology and Speech-Language Pathology, (2) Diploma in Prosthetic and Orthotics, (3) Diploma in Community-Based Rehabilitation, and (4) Diploma in Occupational Therapy (OT), (5) Diploma in Yoga and Rehabilitation, (6) Diploma in Occupational Health and Safety.

Every occupation has its own hazards so special care and support are required for that occupation therefore, a specific course is needed for each job, according to a senior public health expert [IDI (16)]. He further remarked, '*skilled human resources have earned (sufficient) money Nepal and abroad*'. Another participant expressed:

We have Audiology and Speech-Language Pathology courses at Bachelor's Degree but none of these courses is available at PCL/Diploma level, therefore, we need to design Audiology and Speech-Language Pathology course for PCL/Diploma level which is very important course while patients related to human communication and auditory-related disorder are increasing [KII(2), NHPC].

3.6 Laboratory

With the increasing population of senior citizens, their health needs are also increasing. Visiting the hospital, nursing home, registering, waiting for consulting doctors, and again waiting for the report of diagnostics are common annoying processes within the hospitals. Senior citizens can have difficulty following all the rigorous processes to receive healthcare services. '*If there is a provision for a sample taken from the senior citizen at their home, it would be much better*,' a participant expressed [IDI (19), Hospital Manager]. Following areas have been identified after interacting with the research participants. Relevant areas within laboratory are: (1) Diploma in Transfusion and Blood Banking, (2) Diploma in Community Lab Technician, (3) Diploma in IVF Assistant, and (4) Diploma in Organ Transplant

The WHO estimates that nearly one in six people have experienced infertility globally. It is in the increasing trend, therefore, HRH for this sector would be essential globally and assist in IVF, so that they could support the doctors, as one participant highlighted [IDI (11), Nursing Academics]. General lab technicians/assistants are working in the Blood Bank, '*actually special skilled human resources are essential at the Blood Bank since it is very sensitive work, therefore a special course is required to work in the Blood Bank*', a participant replied [KII (4), Former Employee, MoHP].

3.7 Health Education and Promotion

With lifestyle-related diseases increasing, it is said that '*you are responsible for your health*' or '*your health your responsibility*'. Most NCDs are related to lifestyle, behaviour, and personal habits.

We have to think broadly about health literacy at multilevel and with health and non-health participation for health and wellbeing. I think low numbers of hospitals and high numbers of health promotion related events and programmes through individual realization and government support. We further think beyond SDG which might be vision 2050. This type of country's vision is possible through wellbeing and happiness. Curative health care

services are needed when diseases occur but the essential things are to work on primary level of prevention through health literacy and specific protection. This is possible by a health promotion approach. Health promotion as a means of new public health approach which is now a proactive and dynamic discipline which is more about making people productive and keeping them healthy for the nation. It is just not a matter of health education....[IDI (9), NRN, Australia]

Some areas have been identified within the health promotion and education sectors from the qualitative data: (1) Diploma in Health Education and Promotion, (2) Diploma in Fitness and Health Promotion, (3) Diploma in Health Service Marketing, (4) Diploma in Digital Health and Health Literacy, (5) Diploma in Health Psychology, and (6) Diploma in Health Counselling and Guidance.

There is a need for specialized HRH to work beyond clinical treatment to provide health education, public awareness, and prevention in the community. One participant argued:

We realized the importance of health education during the COVID-19 pandemic. Most people neglect health education and counseling, but it is very important; moreover, it is mostly used for preventive and promotive health services. On the other hand, health service marketing is another essential aspect of healthcare services. It helps to sensitize the people. Counseling and guidance play a crucial role in health promotion. These courses can be introduced at PCL/Diploma level, [IDI (5), Public Health Professional].

3.8 Medical Records and Data

Globally, policies are formulated based on the evidence which is called evidence-based policy. Evidence is key to change and revise the policies, programmes and strategies. Therefore, evidence based on fact is vital for healthcare planning and intervention. The number of hospital beds, and doctors, nurses and other health workers are based on statistics or medical records. *'Severity and magnitude of diseases, human resources planning are generally based on the medical records so it is very important for resource allocation', a participant indicated [IDI (4), Employee, Health Section, Municipality]*. Some of the major health programmes related to medical records and data identified from the study: (1) Diploma in Data and Medical Records, (2) Diploma in Medical Transcription, and (3) Diploma in Health Information Management System.

A diaspora expert highlighted the need of medical transcriptionist course.

Behind each major medical choice is a complete patient history, and the medical transcriptionist is the one who ensures that the history is correct. They have for their job sitting and closely listening to doctors' and physician's history, taking and an interaction with the patients to simple check-up notes and to talk that into distinct, written words. Although it might sound like just typing, the career is more of a quality assurance specialization. Today, a lot of it is editing text generated by speech recognition software, catching the subtle errors in medical terms and context that may escape a machine. It requires more than just nimble fingers; it requires a solid knowledge of medical terms, anatomy, and pharmacology for a variety of specialties. They edit these records under deadline to meet stringent industry standards and manage a steady stream of reports. Above all, they are guardians of patient privacy, handling sensitive information with utmost discretion per the law. In effect, a medical transcriptionist creates the accurate, legally acceptable documentation that is the absolute cornerstone of safe patient care and effective healthcare operations. Therefore, medical transcription is also not an easy job for the international market in the health industry [IDI (8), NRN, UK].

3.9 Health and Social Care

Health and social care is one of the most sought-after subjects in the global job markets. 'Individuals completed health and social care are more likely to get paid jobs anywhere but more in the UK. Australia, Canada and New Zealand, they can get more pay even than university faculty', a participant expressed [IDI (6), Non-Resident Nepalese, New Zealand]. In the same way, till the date there is no sanctioned post for hospital manager within the government hospitals but it is essential. Therefore, health and social care, caregiver, and hospital and healthcare management could be another area of convergence for the health sector at the PCL/Diploma level. Several courses are identified within the area are: (1) Diploma in Health and Social Care, (2) Diploma in Care Giver, and (3) Diploma in Hospital and Healthcare Management.

3.10 Radiotherapy and Radio Diagnostics

Compared to the HA and Nursing courses, Radiography and Radio Diagnostics are less saleable courses in the context of Nepal, but they are equally important; however very limited seats are allocated for Radiography within the government hospitals and other health institutions. Participants identified the followings two areas: (1) Diploma in Radiotherapy, and (2) Diploma in Medical Physics.

One of the research participants expressed:

I see many people are dropping out in the radio diagnostics course. For example, if someone studies pharmacy, they can also set up their own clinic. And if someone has studied to be a Health Assistant, they can also go for

government jobs by competing in the Public Service Commission. A Health Assistant is a workforce that goes down up to the local level. However, for radiographers, there is currently no situation where they can go to the local level. Very limited opportunities are there..... [IDI (12), Hospital Manager]

Covering all the concerns, one participant stated:

'...there are significant human resources gaps in a variety of crucial disciplines because there aren't enough national academic programmes, even though the council registers about 39 courses, with the most common professions being radiography, medical laboratory science, and general medicine (health assistants). Important fields like anesthesia and renal dialysis currently lack official licensure and legal stability as they rely on informal, non-accredited training rather than formal courses. In addition, there is a serious lack of qualified speech and hearing specialists, a workforce that is urgently required to help the increasing number of autistic children. Additionally, there are very little or no national products in fields like radiotherapy, operation theater technology, and prosthetics and orthotics. While phasing out outdated courses, it is crucial to work with colleges to create new and more in-demand academic courses for these in-demand professions in order to address the global labour market in the health sector. This would make sure that Nepal can produce a trained and licensed workforce to address its urgent healthcare needs and provide practitioners the professional credibility they deserve...[KII (1), NHPC Member].

The primary and secondary data combined resulted in some emerging areas within the health sector for PCL/Diploma level as presented in Annex A [Table 3].

4. Discussion

Skills development for job creation is a major concern for developing countries like Nepal, where one out of five people live below the poverty line and struggles for subsistence (Ministry of Finance, 2024). Previous studies have suggested introducing green technical and vocational education and training, such as environmental health-related courses and environmentally friendly pharmaceutical machinery applications; however, these courses have not yet been introduced yet (Central Department of Economics, 2022). Now, new courses should be taught from this angle too to protect the ecosystem and earth.

Various courses have been identified, of them, some are additional courses within the courses and others are new that have not been introduced yet in the context of Nepal such as Diploma in ASLP (Audiology and Speech-language Pathology), Orthodontics and Prosthetics, Renal Dialysis, Medical Transcription though these courses are being offered in many countries. The global situation of morbidity and changes in the population pattern demand several healthcare professionals. The HRH should not be jobless and immediately employed in the labour market. The gap between the curriculum and the actual needs of the hospital and health sector needs to be bridged. It seems that emphasis should be placed on producing the HRH that is in demand both in Nepal and abroad (Amity University, 2025).

Health Assistant in general medicine, pharmacy, and nursing seem to be the most attractive course within the PCL/Diploma level health-related courses (CTEVT, 2025). As per the report of CTEVT, there were 5527 students enrolled in General Medicine [HA] followed by Pharmacy (4530), Nursing (2439), and Medical Lab Technology (2633) and Radiography (609) at PCL/Diploma level in the fiscal year 2023/24 (CTEVT, 2025). According to the annual of report CTEVT, 42,711 individuals completed PCL of Nursing followed by General Medicine (22,217), Medical Lab Technology (12,800), Pharmacy (12,702), Radiography (4,392), Dental Science (2,716), and Ophthalmic Science (2,512) from CTEVT by the fiscal year 2023/24 (CTEVT, 2025, p. 83). It shows that students are attracted to such programmes. There are several sanctioned posts of HA at Health Post, Urban Health Clinic, Primary Health Centres, and different levels of hospitals within the governmental healthcare system. Similar trends were observed in other professions, such as nursing and medical lab technology, though the post might be less than general medicine (Department of Health Services, 2025).

4.1 New Programmes for Emerging Areas in Health Sectors

Several programmes are identified in the health sectors though these may require further study to introduce the courses. Our analysis identified new areas in the nursing sector. An OT/Anesthesia Nurse, Geriatric Nurse, Dialysis Nurse, and ICU/CCU Nurse are some essential disciplines within the nurse programme since the increase in diseases related to operation, dialysis, geriatric, and critical care (Sergi et al., 2019; World Economic Forum, 2025). Although these are the identified subjects for potential development, it is essential to conduct a comprehensive feasibility survey prior to implementing any subjects. Such an assessment will help determine the practicality, sustainability, and long-term impact of each initiative. Without this crucial step, programme execution may face unforeseen challenges that could compromise its success.

4.2 Need for New Programmes in Emerging Health Sectors

The medical and health sectors have come a long way in their journey (Amity University, 2025). Innovation and development in medicine, treatment mechanisms, equipment, and diagnostics have made living longer easier. Nepal cannot be an exception from these contexts (da Silva & de Lima, 2021; Dixit, 2005).

The health and wellbeing landscape has been drastically changed. We're moving beyond the single-approach model and into the era of personalized medicine, digital therapies, and preventive care. The data and technology-fueled pace of transformation is creating new and intriguing industries, but also highlight a sharp gap: our models of education and training are failing to keep up (World Economic Forum, 2025).

Our antiquated medical education of decades past requires revision. It is a time to think of the emergence of health informatics and AI-based diagnostics (Xue et al., 2024). Today, doctors and nurses need more than just clinical knowledge; they also require a degree of data literacy to interpret algorithmic suggestions and manage electronic health records effectively. Similarly, the telemedicine and remote monitoring boom requires digital communication skill, data security expertise, and virtual patient interaction abilities—proficiencies that did not even appear on the horizon a decade past. This is where the need for new, agile programmes comes in. We cannot simply tack on a 'tech module' to an existing curriculum. It needs to develop entire new disciplines. Imagine bespoke degrees in Genomic Counseling that integrate genetics with ethics and communication, or Digital Health Design studies that integrate clinical acumen with principles of user experience (Bhushan et al., 2024).

4.3 Sanctioned Post and Fulfillment

Though, there are several health professionals registered in the respective councils. Most of the HRH are concentrated in the Kathmandu valley and urban areas. There were only 18.7% of sanctioned posts for paramedics fulfilled in Urban Health Centres (UHCs) while there was no sanctioned post of nurses at UHCs. In the same way, 75.7% and 74.3% sanctioned posts of paramedics and nurses were fulfilled respectively within the government healthcare system in 2021 (Department of Health Services, 2025). It shows that there are still several positions lacking for nurses and paramedics within the governmental healthcare system. Several posts have not been created under the Ministry of Health and Population. On the other side, HRH are geographically mal-distributed, with several posts still vacant in rural and remote areas (Central Department of Economics, 2022; Ministry of Finance, 2024). Moreover, there were 80.2%, 11.4%, and 8.4% of HRH working at the local, provincial and federal levels, respectively (Ministry of Health and Population, 2021). Therefore, more emphasis should be given to the local level; considering the local demand for healthcare, healthcare-related courses should be taught.

4.4 Strengths and Limitations

The study has several strengths and limitations. Well-experienced research participants from diverse fields including abroad, an experienced research team, the number of research participants, and coverage of all areas within the health sector are some strengths of the study. Whereas, some of the study's limitations include the absence of analysis of political, economic, social, technological, legal, and environmental external factors and stakeholders' analysis, the lack of extended engagement because of resource limitations, the selection of only the PCL/Diploma level, the absence of priority settings that include obstacles to implementing the courses, and the absence of a feasibility study that included the distribution of HRH by provinces, rural versus urban, and geo-belts.

5. Conclusion and Recommendations

Various programmes and subjects were identified through intensive discussion and interactions with the research participants and by reviewing the existing policies and strategies. Majority of the new areas are related to nursing, general medicine, food and WASH, physiotherapy and rehab, laboratory, health education and health promotion, medical records and data, health and social care, radiotherapy. Of them, PCL/Diploma in renal dialysis, radiotherapy, prosthetics and orthotics, audiology and speech-language pathology, transfusion and blood banking, medical transcript, telemedicine and telehealth, cancer care, geriatric care, school nurse, palliative care, OT and anesthesia, IVF/reproductive medicine, WASH and hospital hygienist, health and social care, data and medical records are some common courses that can be introduced soon.

Regardless of their attractiveness and marketability, these courses need to be promoted regularly and advocated for registration and license from related professional and regulatory bodies. Prior to starting new programmes or courses, stakeholders, regulatory agencies, the general public, and civil society should all be informed and involved in the discussion. All these courses should have basic eligibility criteria for admission and provide a clear way to study higher education opportunities in the relevant subjects.

Although several programmes have been identified at the PCL/Diploma level, they also require feasibility study before starting. Technical human resources should not be jobless. Strong political commitment is needed for licensing and registration with professional organizations to place skilled HRH in both public and private sectors. Some programmes may need only a small number of personnel, while others may be in high demand.

Therefore, human resources planning is crucial before launching the programme. Nepal's health workers perform a wide range of duties, including health assistants who provide various health services, especially in remote areas. In such cases, there should be clear job descriptions and a code of conduct for healthcare professionals.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design:** Acharya, Devkota, Adhikari, **data collection:** Acharya, Adhikari, Thapa; **analysis and interpretation of results:** Acharya, Devkota, Bagale, van Teijlingen, Thapa; **draft manuscript preparation:** Acharya, Devkota, Adhikari, van Teijlingen. All authors reviewed the results and approved the final version of the manuscript.*

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Annex A

Table 3 Potential new areas of study for the emerging healthcare sector and entry requirement

Sector/Area	Subject/Course [PCL/Diploma Courses]	Entry Requirement	Eligible for Higher Degree
Nursing	Child Health Nurse	10 th Grade or SEE	Bachelor of Nursing, Bachelor in Relevant Subject
	ICU/CCU Nurse		
	Mental Health Nurse		
	Dialysis Nurse		
	School Health Nurse		
	OT/Anesthesia Nurse		
	Geriatric Nurse		
	Ophthalmic Nurse		
	Palliative Care Nurse		
	Autism Care Nurse		
Alzheimer's Disease and Dementia Care Nurse			
General Medicine (Health Assistant)	Emergency Care and Medicine	10 th Grade or SEE	Bachelor of Public Health, Bachelor in Relevant Subject
	OT/Anesthesia Assistant		
	Home Health Aide		
	Telemedicine and Telehealth		
	Cardiology Technology		
	Dialysis Technology		
	Diploma in Cancer Care		
	Diploma in IVF and Reproductive Medicine		
Diploma in Sport Medicine			
Ayurveda	Ayurveda Nurse	10 th Grade or SEE [Nagarik Aarogya Kendra][Identification, Collection, Storage, Marketing]	Bachelor in Relevant Subject
	Diploma in Panch Karma		
	Diploma in Herbs and Shrubs		
	Diploma in Spa Bath and Natural Healing		
	Diploma in Natural Therapy [Bee, Leech]		
Food, Water and Sanitation, and Hygiene	Diploma in WASH and Water Quality Management	10 th Grade or SEE	Bachelor in Relevant Subject
	Diploma in Food Processing and Quality Control		
	Diploma in Sanitation and Hospital Hygienist		
	Diploma in Nutrition and Dietetics		

Sector/Area	Subject/Course [PCL/Diploma Courses]	Entry Requirement	Eligible for Higher Degree
	Diploma in Healthcare Waste Management Diploma in Food Quality Inspection		
Physiotherapy and Rehabilitation	Diploma in Audiology and Speech-Language Pathology Diploma in Prosthetic and Orthotics Diploma in Community Based Rehabilitation Diploma in Speech and Hearing Diploma in Occupational Therapy Diploma in Yoga and Rehabilitation Diploma in Occupational Health and Safety	10 th Grade or SEE	Bachelor of Audiology and Speech-Language Pathology [BASLP], Bachelor in Relevant Subject
Laboratory	Diploma in Transfusion and Blood Banking Diploma in Community Lab Technician Diploma in IVF Assistant Diploma in Organ Transplant	10 th Grade or SEE	Bachelor in Relevant Subject
Health Education and Health Promotion	Diploma in Health Education and Promotion Diploma in Fitness and Health Promotion Diploma in Health Service Marketing Diploma in Digital Health and Health Literacy Diploma in Health Psychology Diploma in Health Counselling and Guidance	10 th Grade or SEE	Bachelor in Relevant Subject
Medical Records and Data	Diploma in Data and Medical Records Diploma in Medical Transcription Diploma in Health Management Information System	10 th Grade or SEE	Bachelor in Data Science, Bachelor in Relevant Subject
Health and Social Care	Diploma in Health and Social Care Diploma in Care Giver Diploma in Hospital and Healthcare Management	10 th Grade or SEE	Bachelor in Health and Social Care, Bachelor in Relevant Subject
Radiotherapy and Radio Diagnostics	Diploma in Radiotherapy Diploma in Medical Physics	10 th Grade or SEE	Bachelor in Relevant Subject