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"Assistive Technology and Its Status In Nepal."

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Abstract:- One billion people, or 15% of the world's population, experience some form of disability. In Nepal, the average percentage of people with disabilities in Nepal is 2.3%. Due to their disability, they cannot perform normal day-to-day activities like others, and most are unaware of Assistive Technology (AT) 's benefits. AT: products, equipment, and systems that enhance learning, working, and daily activities for persons with disabilities. Previous research has limited chiefly their research to explain. However, in this paper, we include the status of assistive Technology in Nepal, which will give an overall view to the public about it. We used data that we gathered from the recent statistics and users of AT in Nepal as well as providers, and we visited the different districts of Nepal, which will give the most accurate status in Nepal. We found that only 5% of the population with disabilities in Nepal are using AT; others are not using them due to lack several things like: Awareness, Knowledge, Affordability, and many others. So, we concluded that these problems could only be solved when awareness programs and production were done at the government level. From this work, we aim to raise awareness of AT and continuously survey its status in Nepal to look closely at its growth. Also, we want to reach authorized personalities and want to let them know the importance of Assistive Technology.

I. INTRODUCTION OF ASSISTIVE TECHNOLOGY

Assistive Technology maintains or improves an individual's functioning and independence to facilitate participation and enhance overall wellbeing. Many persons with disabilities rely on AT services to carry out their daily activities. Assistive Technology has enormous potential for reducing difficulties faced by persons with disabilities (PWDs) in their day-to-day lives. AT opens up opportunities that are closed to PWDs without AT services. Access to AT services is a fundamental human right, which the UN guarantees through its Convention on the Rights of Persons with Disabilities (UNCRPD), a legally binding document describing the disability in a rights-based approach. The UNCRPD is considered a solid human rights instrument that mandates the right of PWDs to have equitable access to mainstream programs, social protection programs, and disability-specific programs such as rehabilitation and AT. The UNCRPD has been ratified by Nepal, India, and Bangladesh, committing by the respective Governments to ensure the availability of AT services to those who need AT.

The World Health Organisation (WHO) defines AT as "Assistive Technology is an umbrella term covering the systems and services related to the delivery of assistive products and services. Assistive products maintain or improve an individual's functioning and independence, thereby promoting their wellbeing. Hearing aids, wheelchairs, communication aids, spectacles, prostheses, pill organizers, and memory aids are all examples of assistive products". The use and benefit of these devices vary from person to person based on their aspirations and individual characteristics.

II. HISTORY OF ASSISTIVE TECHNOLOGY

The term "Assistive Technology" (AT) has been widely used over the years and within various domains. One of the first official definitions of AT was included in the Technology-Related Assistance for Individuals with Disabilities Act, which was first passed in 1988, reauthorized in 1994, and repurposed in 1998. According to the Act, AT identifies any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, used to increase, maintain, or improve the functional capabilities of individuals with disabilities. Additionally, there is an emphasis on the term AT service, which refers to any service that directly assists an individual with a disability in selecting, acquiring, or using an AT device.

As technology has become one of the primary engines for economic activity, education, and innovation, the substantial progress made in the development of AT has significantly benefited individuals with disabilities of all ages. Such devices and adaptations have increased individuals' involvement in society and reduce expenditures associated with education, rehabilitation and training, employment, residential living, and independent living. With the implementation of the 1994 act, followed by the 1998 act, other concepts were added to the definition of AT. The revised definition from the 1998 act provided a broader concept of AT, which included a more comprehensive range of applications and potential users.

AT was not merely used to augment capabilities for individuals with disabilities but also could support other persons, including family members and caregivers, to perform daily contextual tasks associated with instrumental activities of daily living, including education, work, and social and cultural life [3]. Six years later, the Assistive Technology Act of 2004 amended the previous Act of 1998 by embracing the definition of AT as a service of expanding access to technology, including electronic and information technology, to individuals with disabilities.

Reading through these definitions, AT's broader meaning and scope are clear: to deliver a product and service to support people with different capabilities and help improve their overall living conditions. Work resulting from the World Health Organization's Global Collaboration on Assistive Technology (GATE) and the Global Research, Innovation and Education on Assistive Technology (GREAT) aimed to maximize the impact of AT in enabling participation as a holistic understanding of the value and meaning of AT for the individual, focusing on the person first, then considering its conditions and context. The

advancement of the scope of AT over the past three decades highlights a significant evolution of the definitions and applications of products and services in the AT domain by embracing a range of people with different capabilities who could benefit from them. In recent years, more technologies have been developed, and certain ones initially developed for specific users, including individuals with mild or moderate impairments, or older adults, evolved as augmentative products for mainstream users.

A question arises by looking at this evolution of the definitions and applications of AT. What trends and applications of AT can be identified across the scientific literature to provide evidence of the growth of AT as devices that foster accessibility and empower users with different abilities? In this paper, we aim to identify the trends in the evolution of the meaning, purpose, and applications of AT to define perspectives of AT that consider current trends. Through a systematic literature review, we aim to develop evidence-based knowledge of the past and current views on AT and identify a scenario that will support AT to become an accepted, mainstream term to allow for a decreased stigmatization among individuals that use a variety of assistive devices.

III. STATUS OF ASSISTIVE TECHNOLOGY

Assistive technology enables people to live healthy, productive, independent, and dignified lives and participate in education, the labor market, and civic life. Assistive technology reduces the need for formal health and support services, long-term care, and the work of caregivers. Without assistive technology, people are often excluded, isolated, and locked into poverty, thereby increasing the impact of disease and disability on a person, their family, and society

Today, only 1 in 10 people in need have access to assistive technology due to high costs and a lack of awareness, availability, trained personnel, policy, and financing.

A. Who can benefit from Assistive Technology?

People who most need assistive technology include:

- People with disabilities,
- Older people,
- People with noncommunicable diseases such as diabetes and stroke,
- People with mental health conditions, including dementia and autism,
- People with gradual functional decline.

B. Health, wellbeing, and socioeconomic benefits:

Assistive Technology can positively impact the health and wellbeing of a person and their family, as well as broader socioeconomic benefits. For example:

- Proper use of hearing aids by young children leads to improved language skills, without which a person with hearing loss has severely limited educational opportunities and employment opportunities *(1)*.
- Manual wheelchairs increase access to education and employment while reducing healthcare costs due to a reduction in the risk of pressure sores and contractures.
- Assistive Technology can enable older people to continue to live at home and delay or prevent the need for long-term care *(2)*.
- Therapeutic footwear for diabetes reduces the incidence of foot ulcers, preventing lower limb amputations and the associated burden on health systems *(3)*.

C. The unmet global need for assistive technology:

Across the globe, many people who need assistive technology do not have access to it. Examples of the unmet global need for assistive technology include:

- Two hundred million people with low vision do not have access to assistive products for low-vision.
- Seventy-five million people need a wheelchair, and only 5% to 15% of those in need have access to one.
- Four hundred sixty-six million people globally experience hearing loss. Hearing aid production currently meets less than 10% of the global need.
- Massive workforce shortages in assistive technology: over 75% of low-income countries have no prosthetic and orthotics training programs. Countries with the highest prevalence of disability-related health conditions tend to have the lowest supply of health workers skilled in providing assistive technology (as low as two professionals per 10 000 population).

Low affordability in low-income countries is a primary reason people in need do not possess assistive products.

D. Policy

Very few countries have a national assistive technology policy or program. In many countries, access to assistive technology in the public sector is poor or non-existent. Even in high-income countries, assistive products are often rationed or not included in health and welfare schemes, leading to high out-of-pocket payments by users and their families. For example, it is a standard policy in many European countries for the state to provide older people with only one hearing aid. However, most people with age-related hearing loss require two hearing aids to function. In most south Asia countries, assistive technology is non-existence.

E. Products

The assistive products industry is limited and specialized, primarily serving high-income markets. There is a lack of state funding, nationwide service delivery systems, user-centered research and development, procurement systems, quality and safety standards, and context-appropriate product design.

F. Provision

In high-income countries, services are often stand-alone and not integrated. People are forced to attend multiple appointments at different locations, which are costly and add to the burden on users, caregivers, and health and welfare budgets. In many low- and middle-income countries, national service delivery for assistive products does not exist. Those who can afford them buy assistive products direct from a pharmacy, private clinic, or workshop. People from the poorer sectors of society must rely on erratic

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donations or charity services, which often focus on delivering large quantities of low-quality or used products. These are often inappropriate for the user or the context and lack mechanisms for repair and follow-up. A similar scenario is also common in emergency response programs.

G. Personnel

Trained health personnel are essential for the proper prescription, fitting, user training, and follow-up of assistive products. Without these critical steps, assistive products are often of no benefit or abandoned, and they may even cause physical harm (as is the case of providing wheelchairs without pressure relief cushions for people with spinal injury).

H. Assistive technology within universal health coverage:

The 2030 Agenda for Sustainable Development places good health and wellbeing at the center of a new development vision. It emphasizes universal health coverage (UHC) to ensure sustainable development for all so that everyone everywhere can access the health services needed without facing financial hardship. Universal Health Coverage can be advanced only if people can access quality assistive products when and where they need them. Addressing the unmet need for assistive products is crucial to achieving the Sustainable Development Goals, providing UHC, and implementing the UN Convention on the Rights of Persons with Disabilities, ratified by 177 countries. 'Leaving no one behind' means ensuring that people with disabilities, the older population, and those affected by chronic diseases are included in society and enabled to live a healthy and dignified life.

IV. FIELDS OF USE OF ASSISTIVE TECHNOLOGY

Assistive technology is used in many fields; every field needs this technological advancement. However, more specifically worldwide, it is being used in the following areas:

- Transportation
- education
- communication
- Physical wellbeing
- Other activities:

A. Transportation:

AT(Assistive technology) such as canes, wheelchairs, walkers, and crutches can be essential for enhancing the lives of persons with mobility issues and supporting independence and mobility. Studies conducted in developed countries show that AT use can increase participation in social activities. Such participation correlates with high quality of life. Nevertheless, individuals with mobility issues may face difficulties adapting to elements of AT, from the characteristics of the devices(e.g., weight or size) to physical environment barriers(e.g., access to public transportation, difficulty maneuvering in private and public spaces) to reluctances to use them due to negative social perceptions. There are also financial barriers to purchasing these devices, and in many environments, patients and their families bear the high costs of acquiring them. Finally, using devices may encourage older adults to enter spaces they would not otherwise, leaving them vulnerable to crime.

B. education:

Technology has opened many educational doors to children, particularly children with disabilities. Alternative solutions from the world of technology accommodate physical, sensory, or cognitive impairments in many ways. Much of the daily technology was developed initially to assist persons with disabilities. Curb cuts at streetcorners and curb slopes, originally designed to accommodate people with orthopedic disabilities, are used more frequently by families with strollers or grocery carts than by persons with wheelchairs or walkers. The optical character reader, developed to assist individuals unable to read written text, has been adapted in the workplace to scan printed documents into computer-based editable material, saving enormous amounts of data entry labor. Technology can be a great equalizer for individuals with disabilities that might prevent full participation in school, work, and the community. This is most evident in the case of individuals with mobility, hearing, or vision impairments but is also true for individuals with limitations in cognition and perception. With technology, an individual unable to speak can communicate with spoken language. Using a portable voice synthesizer, a student can ask and respond to questions in the "regular" classroom, overcoming a physical obstacle that may have forced placement in a special segregated classroom or required a full-time instructional aide or interpreter to provide "a voice."

Improvements in sensor controls enable subtle motor movements to control mobility devices, such as electric wheelchairs, providing independent movement through the school and community. Text and graphics enhancement software can enlarge sections of a monitor enough to be seen by persons with vision impairments. Text can be read electronically by a digitized voice synthesizer for a person who is blind. For persons with hearing impairments, amplification devices can filter extraneous noise from the background or pick up an FM signal from a microphone on a teacher's lapel. Word processing, editing, spellchecking, and grammatical tools commonly found in high-end software facilitate the inclusion of students with learning disabilities in regular classrooms by allowing them to keep up with much of the work. Not inconsequentially, the children often feel better about themselves as active learners. Technology provides more powerful and efficient tools to teachers working with children with disabilities. These tools enable teachers to offer new and more effective means of learning while individualizing instruction to the broad range of student learning needs. Educators are using computers to deliver and facilitate learning beyond drill and practice, provide environments that accommodate learning, and ensure enhanced and equitable learning environments for all students.

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C. communication:

With the development of digital and wireless technologies, more and more devices are becoming available to help people with hearing, voice, speech, and language disorders communicate more meaningfully and participate more fully in their daily lives. What types of assistive devices are available?

Health professionals use a variety of names to describe assistive devices:

- Assistive listening devices (ALDs) help amplify the sounds you want to hear, especially where there is a lot of background noise. ALDs can be used with a hearing aid or cochlear implant to help a wearer hear certain sounds better.
- Augmentative and alternative communication (AAC) devices help people with communication disorders to express themselves. These devices can range from a simple picture board to a computer program synthesizing speech from text.
- Alerting devices connect to a doorbell, telephone, or alarm that emits a loud sound or blinking light to let someone with hearing loss know that an event is occurring.

The most specific AAC device is a picture board or touch screen that uses pictures or symbols of typical items and activities that make up a person's daily life. For example, a person might touch the image of a glass to ask for a drink. Many picture boards can be customized and expanded based on a person's age, education, occupation, and interests. Keyboards, touch screens, and sometimes a person's limited speech may be used to communicate desired words. Some devices employ a text display. The display panel typically faces outward so that two people can exchange information while facing each other. Spelling and word prediction software can make it faster and easier to enter information. Speech-generating devices go one step further by translating words or pictures into speech. Some models allow users to choose from several different voices, such as male or female, child or adult, and even some regional accents. Some devices employ prerecorded words, while others have an unlimited vocabulary, synthesizing speech as words are typed in. Software programs that convert personal computers into speaking devices are also available.

Also, For many years, people with hearing loss have used text telephone or telecommunications devices, called TTY or TDD machines, to communicate by phone. This same technology also benefits people with speech difficulties. A TTY machine consists of a typewriter keyboard that displays typed conversations onto a readout panel or printed on paper. Callers will either type messages to each other over the system or, if a call recipient does not have a TTY machine, use the national toll-free telecommunications relay service at 711 to communicate. Through the relay service, a communications assistant serves as a bridge between two callers, reading typed messages aloud to the person with hearing while transcribing what is spoken into type for the person with hearing loss. However, with today's new electronic communication devices, TTY machines have almost become a thing of the past. People can place phone calls through the telecommunications relay service using almost any device with a keypad, including a laptop, personal digital assistant, and cell phone. Text messaging has also become a popular method of communication, skipping the relay service altogether. Another system uses voice recognition software and an extensive library of videos depicting American Sign Language to translate a signer's words into text or computer-generated speech in real-time. It can also translate spoken words back into sign language or text. Finally, for people with mild to moderate hearing loss, captioned telephones allow you to carry on a spoken conversation while providing a transcript of the other person's words on a readout panel or computer screen as a backup.

D. What types of alerting devices are available?

Alerting or alarm devices use sound, light, vibrations, or a combination of these techniques to let someone know when a particular event is occurring. Clocks and wake-up alarm systems allow a person to choose to wake up to flashing lights, horns, or a gentle shaking.

Visual alert signalers monitor various household devices and other sounds, such as doorbells and telephones. When the phone rings, the visual alert signaler will be activated and vibrate or flash a light to let people know. In addition, remote receivers placed around the house can alert a person from any room. Portable vibrating pagers can let parents and caretakers know when a baby is crying. Some baby monitoring devices analyze a baby's cry and light up a picture to indicate if the baby sounds hungry, bored, or sleepy.

E. Other activities:

- Sports:

  Assistive technology in sports is an area of technology design that is growing. Assistive technology is the array of new devices created to enable sports enthusiasts with disabilities to play. Assistive technology may be used in disabled sports, where an existing sport is modified to enable players with a disability to participate. Assistive technology may be used to invent entirely new sports with athletes with disabilities exclusively in mind. More people with disabilities are participating in sports and developing new assistive technology. Assistive technology devices can be simple, "low-tech", or they may use highly advanced technology, with some even using computers. Assistive technology for sports may also be simple or advanced. Accordingly, assistive technology can be found in sports ranging from local community recreation to elite Paralympic games. More complex assistive technology devices have been developed over time. As a result, sports for people with disabilities "have changed from a clinical therapeutic tool to an increasingly competition-oriented activity".

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Assistive devices can enable exercise and training, along with enabling participation in a sport. Below are some of the assistive devices currently available for different impairments:

- Mobility impairments:
  - Light-weight wheelchairs for basketball, tennis, and racing
  - All-terrain wheelchairs with rugged frames and wheels for rolling over unpaved surfaces, like hiking trails, snow, or beach sand
  - Handcycles, or recumbent bicycles, are like bicycles with pedals and steering using only the rider's arms.
  - Cross-country sit skis allow skiers to sit down and push along the trail with tips digging into the snow.
  - Weights that users strap onto their wrists rather than having to hold them with the hands
  - Gym equipment that lets users stay in a wheelchair while using arm exercise machines
  - Mitts with Velcro straps that help users to hold onto an exercise machine if their grip is not firm enough
  - Elastic bands or tubes that exercise muscles through resistance instead of weight
  - Paramobile devices such as specialized golf carts with support for standing assist players with mobility disabilities
  - Bowling balls with hand grips assist bowlers with limited use of their hands.
  - One-handed fishing rods assist fishers who have limited mobility.

Sports that use assistive technology may include the following:

- Accessible Fishing & Hunting
- Accessible Sailing / Boating / Kayaking
- Adaptive Archery
- Adaptive Bowling
- Adaptive Flying
- Adaptive Golf
- Adaptive Horseback Riding/Equestrian
- Adaptive Scuba Diving
- Adaptive Shooting
- Adaptive Skiing & Snowboarding
- Adaptive Table Tennis
- Adaptive Water Sports
- Extreme Wheelchair Sports
- Handcycling
- Power Soccer
- Quad Rugby
- Sled, Floor & Power Hockey
- Wheelchair Basketball
- Wheelchair Curling
- Wheelchair Fencing
- Wheelchair Lacrosse
- Wheelchair Pool and Billiards
- Wheelchair Racing and Field Sports
- Wheelchair Baseball
- Wheelchair Softball
- Wheelchair Table Tennis
- Wheelchair Tennis
- Wheelchair Volleyball
- Wheelchair Weightlifting

Many of the above sports have attained international elite sport status, being included in the Paralympic Games.

V. METHODOLOGY FOR MANUFACTURING OF ASSISTIVE TECHNOLOGY

This publication uses the term "indigenous production" in the broadest sense. It refers to the use of local, indigenous knowledge, skills, and production methods. The most crucial criterion for production to be considered indigenous is that the production process has been thoroughly assimilated into local conditions by the local people on a sustainable basis.

The choice of a strategy for producing assistive devices will vary considerably from country to country. Every country will need to consider:

- Economic, social and political priorities;
- Availability of personnel, infrastructure, raw materials, parts, and funds;
- Cost of locally produced devices, compared with the cost of importing devices;
- User demand.

In addition to factory-based and other conventional forms of production, the informal sector also produces assistive devices in a decentralized way, often in rural areas. Specific needs motivate families, helpers of people with disabilities, and other community members to produce devices with whatever materials and production techniques are available. User-specific devices are sometimes produced at workshops for vehicle maintenance and repair. In most cases, they are produced in rehabilitation centers run by Governments, NGOs, hospitals, and colleges.

A. User-Specifi Devices:

A central issue in production, so far generally neglected, is the extent to which devices are user-specific. An orthosis must be fitted to the size of a user's leg, not simply taken off a shelf. At a minimum, a workshop must take specific measurements of the shape of the affected leg and the location or height of various joints.

Although a wheelchair does not require the same degree of precise measurement, it must also be considered a highly user-specific device. Making wheelchairs in one "universal" extra-large size makes no more sense than making clothes in one extra-large size. People are of different sizes and will therefore require different-sized wheelchairs. This is a problem of particular concern in Asia, as wheelchairs imported from other regions (often through donations) and designed to fit people in those regions are often too large for local people.

Like clothes, wheelchairs can still be used if they are the wrong size, but they will be uncomfortable and awkward. For children, this could adversely affect their growth and development. Producing "one-size-fits-all" wheelchairs may be helpful when a wheelchair is to be used only under special conditions, as in a hospital, or on a very short-term basis, as for a wheelchair temporarily loaned to a user whose regular wheelchair is being repaired. However, it

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would be wrong to assume that such wheelchairs are suitable for long-term, daily use.

B. Appropriate technologies and production methods

International NGOs have contributed value to the initiation and upgrading of the production and distribution of assistive devices in developing countries of the ESCAP region. In some cases, however, the level of technology introduced may be too complex for the countries' current level of infrastructure and support services. In some places, local expertise could not entirely be developed on time to utilize such NGOs' presence. Devices appropriate for the environment of a developing country often use a simpler, less sophisticated technology than the devices adopted in developed countries. Unfortunately, this often leads them to be regarded as inferior, even if their usefulness, durability, and ease of repair could make them superior under local conditions.

However, poor production methods can sometimes result in bad experiences with appropriate technology, leading people to mistrust appropriately produced devices. The devices and methods of producing them must be at both an appropriate level of technology and a high level of technique: superficial but professional. Not every device produced within a country's boundaries is necessarily appropriate for use in that country. Some developing countries in the ESCAP region have imported techniques invented in developed countries for local use without significant effort to adapt that knowledge to local user needs. Long-term dependency on foreign expertise in the production of devices and the import of parts and materials, especially from developed countries, can make devices thus produced much less appropriate for local conditions. NGOs need to ensure that the beneficiaries of their programs will not be left stranded if the supply of foreign technicians' skills ends.

C. Mass production

Mass production of assistive devices and their parts may help reduce costs through economies of scale. It may also reduce the time required for production. There is, however, a corresponding increase in the cost and time for distribution, although mass production does allow a more comprehensive distribution network to be set up. In many cases, however, mass production of assistive devices is impossible or undesirable because it generally requires finished products to be almost identical. Although wheelchairs can be mass-produced, for example, they must still fit the requirements of each user. For further discussion, see section A on "User-Specific devices" in this Chapter.

Theoretically, devices may be produced using new flexible "just-in-time" methods that would allow them to achieve the economies of scale found in a factory while still being responsive to user requirements. In practice, however, the state of local infrastructure in developing countries makes this problematic. The difficulty is exaggerated by a view commonly held among producers that assistive devices are not profitable. Such a production system might be desirable as a future goal, but at present, it generally makes much more sense for developing countries to decentralize their production systems. Mass production is most useful for those devices (e.g., vibrating alarm clocks) which do not have to fit a particular set of body measurements. For devices that are user-specific to even a small degree, a decentralized production system makes it easier for people with disabilities to approach production sites to specify their requirements.

The advantages of mass production could also be realized for some user-specific devices if the mass-produced devices were adjustable. For example, some wheelchairs with adjustable height, footrest position, and width are now available.

Even when the finished devices must or should be custom-built, mass production of parts can still reduce costs through economies of scale. Where possible, mass production of parts makes finished devices cheaper, quicker to produce, more readily available, and easier to repair. Producing parts through a machine reduces their variability; thus, there is greater assurance of uniform quality. However, a system of mass production of parts combined with decentralized production of finished devices must be supported by solid distribution networks to transport the parts to the production centers. It also requires a considerable investment of capital.

D. Prescription

Every assistive device must be appropriate for the person who uses it. Even the most miniature user-specific devices, like braillers or vibrating alarm clocks, may not fit well with a user's lifestyle. People who prescribe assistive devices, whether doctors, technicians, or community-based rehabilitation (CBR) workers, should ask prospective users about their lives to optimize the chances that the potential users will receive the best devices for their situations. See Box 13 for a sample list of such questions. When rehabilitation personnel prescribes devices, it is helpful for them to specify what kind of device is needed. At present, many rehabilitation personnel tends to offer general prescriptions, such as "this person needs a prosthesis", rather than being able to give a specific description helpful for technicians, such as "this person needs an above-knee prosthesis for the lower limb, section socket, tubular system, knee XXXX with brake, and foot 1D10 (dynamic)". A general prescription may result in an unsuitable device for the user (e.g., it is too short or too heavy). This situation is common when rehabilitation personnel knows little about assistive devices. There is an unfortunate gap between doctors and other health workers, who know little about assistive devices, and technicians, who know little about the medical or anatomical aspects of disabilities. If the two groups could work more closely with one another and learn something about each other's work, they would be better able to meet user needs. A Prescription must consider the availability of support services for repair and maintenance in the long and short term. A device that cannot easily be repaired or maintained is not good or valuable. In conditions of poverty in the region's developing countries, it is unreasonable for prescribers to expect adherence to the strict standards for medical procedures common in developed countries. For example, prosthetists trained in developed countries sometimes have low regard for procedures of amputation surgery in developing countries. It is often said that such surgery is "improperly" performed, as it may lead to scarred stumps or stumps of a non-optimal size. However,

it is naive to expect that most rural areas will have access to the facilities or skills to perform "proper" amputation surgery and make the subsequent fitting of artificial limbs easier when many such areas do not even have primary health care services. It is indeed regrettable that amputation surgery cannot always be performed precisely to fit a new prosthetic limb. However, at least currently, it is not feasible to change this situation. In the meantime, it is more practical to adapt to the situation. Prosthetists need to accept that most emergency surgery will likely lead to stumps that are not the most optimal for fitting artificial limbs. Furthermore, they need to accept the reluctance of many amputees to undergo a second surgery to mend the stump to a more "acceptable" shape and size. Instead, Asian and Pacific developing countries must develop and use prostheses that can adapt to non-standard amputation procedures.

E. Quality control

In many developing countries of the ESCAP region, interest has recently increased in ensuring the quality of devices produced domestically. Some, including India and Viet Nam, have formulated quality-control standards for assistive devices, often similar to those of the International Standards Organization (ISO). Rushing to adopt such standards is rarely advisable, however. The primary need in developing countries of the region is to produce large enough assistive devices so everyone who needs a device can get one. High standards may raise production costs (costs that will be passed on to users, governments, and NGOs). They may also discourage the innovation of new products. People often choose between a device that does not meet ISO-type standards or no device at all. This caveat does not preclude the formation of some quality control system, provided that any such system carefully considers local needs and conditions and that users play a central role in its design. Simply copying a list of standards adopted by developed countries will likely have undesirable consequences. It is reasonable for a Government to expect a certain level of quality in the devices it provides free of charge to the poor. However, this level of quality should be ensured only through withholding funding, not through legal sanctions. For the government to impose fines (or more severe penalties) on those who produce devices that do not meet the standards adopted would be an undesirable restraint on innovation, which could hurt more than help people with disabilities. Standards and restrictions which make it illegal to produce adapted motorcycles significantly decrease the mobility of people with disabilities. The term "quality" should include technique as well as technology. Quality control should ensure that, for example, technicians make devices in precisely the right size for their users and align them properly, requiring durable materials and parts. High quality alone does not make a device right for its user. The ultimate measure of an assistive device is long-term user satisfaction. A wheelchair produced for a farmer may be of high quality in terms of good technique, the right technology, and external appearance. However, if the farmer can only do her job with crutches rather than a wheelchair, the "high-quality" device is not suitable for her. An appropriate system of quality control for assistive devices in a developing country of the ESCAP region will have the following features:

- Be technically feasible and practical in the environments of the majority of users;
- Not contribute to an increase in the cost of devices beyond acceptable limits, in either the short or the long term;
- Not restrict the further development of products;
- Not specify that all devices must have characteristics that most currently in use do not already have.

F. Non-Governmental Cooperatives:

There are many fine examples in the Asia-Pacific region of cooperation between Governments and NGOs in providing assistive devices. NGOs have played an active role, with government support, in developing local capacity for the production of assistive devices. Governments often provide the funding, equipment, or infrastructure needed for specific NGO-initiated projects. They also help select sites for NGO projects to ensure their sustainability. Governments can also support NGO efforts by coordinating diverse agencies to enhance production and distribution. Effective coordination can lead to better dialogue and exchange of information among people in different parts of a country who may be engaged in similar efforts in production or design, including community members and local workshop technicians.

In many cases, NGOs fund small pilot projects and provide technical assistance, often in the form of specialized expertise. In many Asian and Pacific developing countries, the trend has recently been for NGOs engaged in rehabilitation to operate only in major cities and their suburbs, without a presence in rural areas. This problem is increasingly being addressed, not least by changes in funding criteria to encourage NGO action in the rural areas and increase rehabilitation services in support of rural communities.

G. Raw materials

Raw materials commonly used in Asian and Pacific developing countries for various types of assistive devices include:

- Aluminium, in the form of tubes and strips (for wheelchairs, white canes, and orthoses);
- Steel, in the form of tubes and strips (e.g., for wheelchairs, knee joints, walkers, and orthoses);
- Titanium (for prostheses and wheelchairs);
- Wood (for wheelchairs, prostheses, and crutches);
- Thermoplastics of different types, such as polypropylene (for prosthetic sockets);
- Polyester resin (for sockets);
- Epoxy and polyurethane (for prosthetic feet);
- Polymethyl methacrylate (for lenses of devices for people with low vision);
- Polyvinyl chloride (PVC) (for orthoses);
- Nylon, polyethylene (for prostheses and orthoses);
- Natural rubber (for prosthetic feet);
- Glass fiber (for orthoses);
- Carbon fiber (for prostheses, wheelchairs);
- Leather (for shoes, prostheses, orthoses);
- Different solvents and catalysts, canvas, cloth, and plaster of Paris (POP).

Some countries have chosen to use only indigenously available raw materials. The advantages of this approach are that it is more likely to lead to the development of local capabilities, it is often lower in cost, and there is greater assurance of the supply of the materials. Imports of raw materials and parts, especially from developed countries, can create dependency on foreign expertise and technologies that may prove expensive and unsustainable in the long term. The disadvantage of this approach is that more effective or efficient materials cannot be used. This means that the devices may be lower in quality, higher in cost, or both. For example, aluminum and its alloys substantially reduce the weight of many devices, but these materials are not available in many developing countries of the ESCAP region.

For this reason, there is a general tendency to import at least some raw materials. Recycling available material is one way to obtain functional raw materials cheaply. Factories in Indonesia and Viet Nam recycle scrap metal from airplanes and helicopters into parts for orthoses. Parts of old prostheses are reused in the Philippines. The YAKKUM Rehabilitation Centre in Yogyakarta, Indonesia, uses worn tires to make rubber parts. However, the Centre found that its recycling program required improvement to enhance the durability of parts and devices made from recycled tire rubber.

Care should be taken when introducing a new chemical material. Some may require special safety measures in the process of making a device. PVC, for example, emits toxic fumes when burned. If workers are exposed to resin continuously for a full working day, it can cause headaches or loss of consciousness.

H. Imports:

Importing assistive devices can be a way for a developing country in the ESCAP region to provide otherwise unavailable devices. As far back as 1950, the international community recognized the need to facilitate the import of assistive devices to support the education of people with visual impairments. Government signatories to the Florence Agreement on the Importation of Educational, Scientific and Cultural Materials (opened for signature at Lake Success, New York, on 22 November 1950) agreed to allow easy import of braille documents and other articles for use by blind people.

Since then, countries have generally permitted easy import of assistive devices on conditions that people with disabilities use them. The ESCAP Secretariat recently surveyed to possibly include assistive devices in the Bangkok Agreement on Trade Negotiations among Developing Countries of the ESCAP Region, an agreement to reduce trade barriers and tariffs.

Imports from other developing countries are often more suitable than imports from developed countries, especially when the conditions for which the devices were designed to resemble those in the importing countries. Devices imported from developed countries in the absence of local needs assessment and capacity-building have usually had the following disadvantages:

- High cost;
- Unavailability of spare parts;
- Lack of local knowledge for repair and maintenance;
- Unsuitability to local physical or cultural conditions.

Prohibitive import restrictions, such as high tariffs or restrictive legislation, are unlikely to be the best way to deal with these problems. It is more important to ensure that agencies implementing disability policy know these problems and that expensive, imported high-technology devices are unlikely to be the best choice. Several countries, including Bangladesh, Bhutan, Cambodia, Pakistan, and the Republic of Korea, allow the import of most assistive devices duty-free. Others, including India, Sri Lanka, and Thailand, allow duty-free import of assistive devices when the devices are imported by people with disabilities or by organizations working on their behalf. It can be a long and complicated process to organize sufficient proof that the devices are imported for bonafide beneficiaries or their organizations. China produces most of its assistive devices using indigenous resources but imports some parts to produce high-technology devices. In India, the import of items produced within the country has generally been discouraged. The philosophy has been to encourage the domestic industry and enhance self-reliance. However, in the 1990s, India has begun to liberalize its trade policy and promote foreign investment. This has resulted in the encouragement of imported assistive devices.

In Fiji and Nepal, import duties are compulsory. Nepal charges a one percent duty on the import of devices by institutions and a 10 percent duty on imports by individuals. No duty, however, is levied if the devices are imported for business purposes.

The Philippine Tariff and Customs Code provides no specific exemption for assistive devices. It does, however, stipulate that imported articles of any kind donated to a non-profit organization for free distribution among the poor can be exempted from import duties if that organization is registered and obtains certification from the Department of Social Services and Development or the Department of Education, Culture, and Sports. The devices may not subsequently be sold, bartered, hired, or used for other purposes unless duties and taxes are paid. Assistive devices imported for other purposes are subject to tariffs of between 10 and 40 percent.

Many valuable or essential assistive devices are not yet locally produced in developing countries of the region. Since each incremental change brought about by an appropriate assistive device helps expand the capacity of people with disabilities to participate in the lives of their communities, reducing duties and simplifying customs clearance procedures will improve their lives. Officials in customs departments are often not well informed about people with disabilities and the devices they require for daily living. They are therefore inadequately equipped to make correct decisions. As a matter of policy, government focal points and NGOs working on disability issues should actively seek to inform customs officers through personal

contact, distributing explanatory information materials, and attending joint seminars.

VI. STATUS OF AT IN NEPAL

This paper aims to analyze and critically reflect on Access to Assistive Technology (AT) for persons with disabilities (PWD) in Nepal. This analysis aims to guide the development of a contextualized generic AT service delivery model suitable for these countries, based on the best practices identified.

A. Background:

The World Report on Disability states that about 15% of the world's population lives with some form of disability, whereas 2–4% of the world's population has severe difficulties in functioning without Assistive Technology. As discussed below (in section Context: PWD and AT policies), the prevalence of disability is often under-reported in Low- and Middle-Income Countries (LMICs). The WHO report predicts that the number of people living with disability will double by 2050. Assistive technology enables people to live healthy, productive, independent, and dignified lives and participate in education, the labor market, and civic life. Furthermore, AT reduces the need for formal health and support services, long-term care, and the work of caregivers. Without AT, people are often excluded, isolated, and locked into poverty, thereby increasing the impact of disease and disability on a person, their family, and society". The WHO estimates that 85 to 95% of those who could benefit from the use of AT do not have access to such services. Most people who do not have access to AT live in LMICs. For example, in many LMICs, only 5–15% of people who require assistive devices and technologies have access, and hearing aid production meets only 10% of global needs and 3% of the need in these countries. Seventy million people in LMICs need a wheelchair, but only 5–15% have access to one.

Globally, PWDs have less access to health and education opportunities and lower economic opportunities than their peers without disabilities. PWDs are often the most disadvantaged in society and are the victims of deprivation. Since the prevalence of disability is higher in LMICs, the disparities in Access to AT are also higher, given that access to health care, in general, is a well-known problem. Even though the current Sustainable Development Goals (SDGs) do not directly address AT for PWDs, as Tebbutt and others argue, AT services are essential to meet all 17 SDGs if they mean to "Leave No One Behind", as the SDGs claim. The lack of access to assistive devices in LMICs is due to various factors, including high costs, limited availability, lack of awareness, lack of suitably trained personnel, lack of governance, and inadequate financing.

B. Context: PWD and policies;

Disabilities are still treated with social stigma and as taboo in Nepal. They are often viewed as family curses imposed by the unseen force for some past sin performed by the person with a disability or the family. This encourages family members to hide the PWD in the family and not to report the disability, making them invisible to the outside world. Furthermore, disabilities are not captured on birth certificates. The resulting under-reporting can be seen in the prevalence rates of PWDs reported in the respective country's census data, which is far lower than the worldwide estimate of PWDs. The discrepancies in disability prevalence are both because of underreporting and inconsistency in the definitions of disabilities internationally. For example, the 2011 census in Nepal used seven categories of disabilities in Nepal, making the data incomparable internationally. Another fundamental flaw in the prevalence of disability reporting is that it is still impairment-focused rather than considering functionality.

Furthermore, disability and AT user statistics are not included in routine health data collection. This makes it hard to ensure AT, and other services are provided to PWDs in practice, even if they are guaranteed by the country's constitution, laws, and acts. Disability started to be included in legislation in Nepal in 1981, 1987, and 1995. However, no parts of the constitution of Nepal have AT service act yet. Further details on disabilities and AT provision in Nepal are presented in the subsequent paragraph.

C. Nepal

The prevalence of disability in Nepal, as reported by the 2011 census, is 1.94% (2.18% of males; 1.71% of females). The National Living Standards Survey (2011) reported the prevalence of disability as 3.6%. These figures are significantly lower than the WHO's estimate of the worldwide prevalence of disabilities, roughly 15% among the general population. It is widely suspected that prevalence in Nepal is under-reported. A survey carried out by specific impairment groups among school-age children in five districts of Nepal reported that 16.6% of children had some hearing impairment. Anecdotal evidence suggests that the Maoist insurgency from 1996 to 2006, the 2015 earthquake [17], high incidence of natural disasters every year, increased traffic accidents, fall injuries, and deafness have contributed to a higher prevalence of disabilities in Nepal compared to some other LMICs.

Even though the 2015 constitution guarantees the rights of PWDs to equal opportunities and federal law prohibits discrimination against any form of disability, there is still multifaceted and widespread discrimination against PWDs in Nepal, affecting their access to health, education, employment, and AT services. The Disabled Protection and Welfare Regulation (2051/1994), the ratification of the UNCRPD in 2010, the constitution of Nepal 2015, and the Disability Rights Act 2017 are some of the significant milestones policies the Government of Nepal has adopted for PWDs. All of these policies and commitments prohibit any form of discrimination.

Starting from the National Policy and Plan of Action (2007), Nepal introduced the provision of Access to AT services for PWDs. In addition, the Government of Nepal produced a comprehensive list of AT products based on the WHO Global Cooperation on Assistive Technology (GATE) initiative and the Nepal Disability Rights Act 2017. This list is currently being piloted with the newly formed local-level Government stakeholders who now hold the budget for PWDs and AT-related interventions. There is mandatory annual budget allocation to AT provision at the local level and a 5% reservation of all jobs within the government, private, and NGO sectors for PWDs. The Government of Nepal charges lower import duties on AT devices. Still, a study conducted in 2016 reported that only one in 8 PWDs had Access to AT. The implementation of the initiatives described is still weak. However, with increased access to the budget at the local level, the government's commitment to the rights of PWDs, and increased awareness among AT users, Access to AT services is improving. However, there is still a long way to go to ensure AT services are available to everyone who needs them in Nepal.

VII. IMPORTANCE OF ASSISTIVE TECHNOLOGY IN NEPAL

In Nepal, persons with disabilities often obtain assistive devices as donations from local and international non-government organizations. At the same time, this generosity does not go unappreciated. Innovation and technological advancement are strongly valued, leading to the organization's investment in study and research in assistive devices to discover new approaches to ensure the best possible support available for persons with disabilities. In Nepal, very few organizations provide wheelchairs and assistive devices with detailed assessment and measurement of the users as it requires importing the costly, tailored, measured devices from abroad.

Technology has become an indispensable part of the present global community. Be it to overcome the challenges of life or to compete in the speedy world; technology plays a crucial role. Access to appropriate technology increases one's efficiency and creates adequate opportunities for every individual in society. Moreover, it is even more required and relevant for persons with disabilities for their overall development and empowerment as it opens the door for their equality, non-discrimination, and social participation. Talking about the importance of technologies, a historical event for the people with disabilities is the adoption of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in December 2006. Article 21 of the Convention strongly focuses on properly using information and communication technologies for the right and welfare of people with disabilities.

The need for technologies and technological devices may vary from one person to another, depending upon the kind and nature of their disability. For example, a blind needs a talking technology, while a person having problems using fingers or without both hands may require a screen touch or voice operating technology. Today a visually-impaired person is not so disadvantaged when using a computer. Using the various screen reader software programs like Jaws, NVDA, Thunder, Super Nova, Speak Synthesizer, and Narrator, any blind or visually-impaired person can listen and work through all the icons appearing on the computer screen. Similarly, a low vision or partially sighted person with the capacity to read larger fonts can use magic software to increase the size of the object appearing on the computer screen. It may be recalled here that Nepali low vision engineer, late Him Prashad Gautam, had also developed a screen reading software called "Dristibachak" that gives the Nepali blind access to the Nepali font. Another technological device for the visually-impaired person is the refreshable Braille display, which may be used as an alternative to the screen reader. The electronic device called Braille memo has some facilities to record and display the recorded text in Braille printing.

Another computer software technology called the "Natural reader" can also read and record the scanned pages of a book in a natural human voice. It has brought significant advantages specifically for visually-impaired students. The use of mobile phone technology is also growing fast in the modern world. It has become an indispensable part of everyone's daily life. Different talking software programs like "Talk" or "Mobile Speak" can be installed to make all the commands of the mobile speak. Mobiles today have a voice operating system that can dial a phone with the help of a human, change display color, and change vibration helps the person with a hearing disability find calls and short messages in such mobile phone technology. However, many new and latest communication and information technologies are still beyond the reach of most of the world's disabled community, mainly in developing countries.

Moreover, in the absence of adaptive or assistive technological tools, they have been deprived of education, health, and employment opportunities that have rendered them unable to function on an equal footing with their regular counterparts. Technology always does not need to be heavy or complex. A simply designed device or mechanical instrument can act as a practical or supportive technology. For example, the white cane is a simple technological device that enables a person with a visual disability to move independently to his/ her destination. Technology plays a vital role in enhancing the morale and motivation of people with disabilities to lead life independently. Proper use of technology not only escalates one's efficiency in performing daily and professional assignments but also allows persons with disabilities to participate in the society and nation-building process actively. It is, therefore, equally important that the Government, civil society, donors, the NGOs-INGOs, media, and the general people also join hands to remove the barriers that the people with disabilities have been facing over the years. In this respect, the constructive and facilitating role of the Ministry of Education, Science and Technology, Nepal Academy of Science and Technology, and social entrepreneurs will be vital in coordinating the efforts between the different stakeholders to develop various appropriate and improvised technologies to ensure full and active participation of people with disabilities in the society.

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VIII. MATERIALS AND METHODS

This paper is based on a comprehensive study conducted in Nepal, observing mobility and hearing-related AT service delivery centers run by the government, as well as private and non-governmental organizations, and interviews with key informants: policymakers, AT service providers(10), and service users (20) between February 2022 to June 2022. A descriptive, qualitative exploratory study design was followed. A quality assessment framework was used to structure the analysis and interpret the findings.

A. Method of inquiry:

A descriptive exploratory qualitative study design was used. This research aimed to critically review the available AT provisions in Nepal and to develop further and recommend a generic service delivery model suitable to Nepal, if not a universal service delivery model. A qualitative research method was chosen because this research needed an in-depth understanding of AT services and users' experiences. To gather data on existing models of service provision and use of AT, Key Informant Interviews(KII) in Nepal (NP) with Government officials (5), service providers (10), and service users (20) between March 2022 to May 2022. Observational notes were made during visits to service delivery centers. These visits were intended to observe the process of Access to AT services, the manufacturing process, and the AT users' involvement in the manufacturing process. Research assistants working with in-country partners in Nepal helped find participants to interview and organize visits to service delivery centers.

Since this research focussed on the status of Assistive Technologies in Nepal, the KII participants were randomly selected to enable the researcher to gather rich information about status-related AT and existing models of AT service delivery. Three groups of participants were interviewed:

- AT service policy makers/implementers (mostly current or retired Government employees)
- AT service providers (mostly Government/NGO AT service providers)
- AT service users (mainly mobility and hearing aid related AT service users)

The in-country partners contacted possible participants from these three categories, the research was explained to them, and they were asked whether they were interested and prepared to be interviewed by the researcher.

B. Ethical consideration

Participants were informed about the research, their voluntary participation, and their right to withdraw at any time from the interview. The interviews were conducted at places convenient for the participants, either their workplace or home. Written consent was always obtained before each interview, and verbal consent was also obtained to record the interview.

C. Data collection

The data collection tools were piloted before the complete study, and necessary changes were made. The interviews were transcribed verbatim and translated from the local language to English. Some transcripts were back-translated to ensure no meanings were lost during the translation process.

D. Data analysis

The framework assesses AT service delivery by critically looking at the system's accessibility, competence, coordination, efficiency, flexibility, user-centeredness, and infrastructure - each further divided into four subcategories. This paper focuses only on accessibility and status as this is the essential criterion. The intention of the framework is not to provide a judgment of the system in place but to analyze and discuss the system's quality. This study, this analysis is based on observation of AT service centers, the interviews conducted, and observational notes.

IX. RESULTS

We have summarised our findings on how Access to AT service delivery is understood by policymakers, service providers, and service users. These are presented as the quality of the AT services as judged by respondents against the accessibility component of the quality assessment framework we used. In this section, we present respondents' perspectives on whether the AT services are known and understood by the prospective users or not (awareness), who is eligible to access these services when they need them (eligibility), and where they are available (reachability), and whether they are affordable to those who need such services (affordability).

A. Theme: awareness

Our interviews and observations suggest that in Nepal, the awareness level for AT service delivery among policymakers and service providers is higher compared to AT service users. Access to information operates on a top-down, supply-driven model: policies are formulated at the Government ministry level and passed to the service providers, and it is often presumed that the information will trickle down to (potential) AT users. However, that is rarely the case, mainly because of the lack of awareness among AT service users. An AT service provider in Nepal shares his experience as:

"The number one problem is that people still have very little understanding of AT, even about their needs and requirement. Their very need, that people need this kind of technological support to live an independent and productive life, is absent from people's minds. So, I think right now, we probably, according to government data, maybe 5-6 percent of the population are facing this problem."

Even the limited understanding people have about AT is minimal, and they often understand it only as mobility-related aids such as wheelchairs. However, still, people misunderstand physical rehabilitation services as wheelchairs and crutch only. People are unknown of the accessibility of this service.

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Because of the delay in PWDs and their families becoming aware of AT services, many people who would benefit from them do not access such services for many years. As well as a lack of knowledge of available services, prospective AT users often have a minimal understanding of their problems, developments in AT, and their rights to such services. Sometimes, PWD does not even know that their condition could be improved with AT. This leads to complications, ill health, and reduced life expectancy. There is a lack of mechanisms to inform people about the availability of AT services. Only after 2-4 years of cutting legs did they know about AT and get the service. The system which is developed here is not known to most of the PWDs. The first reason is no identification of disability itself. Also, no one understands the value of such services. Firstly, information is not reached to differently able people. There is a lack of information. Without such information, people are unaware that their day-to-day life would be easier if they got orthosis and prostheses.

Often the level of awareness that exists is gained through peer groups, family members, and neighbors. For example, a hard-of-hearing person in Nepal who currently works as a service provider in an NGO shared his experience as:

"I have a problem with hearing, I have had this since my childhood. When I was in primary school, I felt I have a problem with hearing. I used to feel everything around me is so silent, I was very young to understand the problem actually after my Secondary School Certificate I went to my maternal uncle's place during the holiday, he took me to the market and there he bought me a hearing aid machine without testing or anything."

Lack of awareness among the service providers and service users limits access to AT services for people with disability. Often the implementation of a policy is a further hurdle in this process. There is a problem with the policy itself. On the one hand, the problem with the policy is that every differently able person should get service, have the facility of insurance, and have free access to services that should be mentioned in the policy. On the other hand, people still lack awareness. However, in recent years, there is some evidence that awareness is gradually increasing since the Government of Nepal has provided a physiotherapist post in district hospitals, which will increase awareness among the health workers and patients, leading to increased awareness and Communication about AT services too.

In general, visible disability can be identified easily. However, it is tough to identify if the disability is not visible. For example, children with developmental issues are a challenge to identify. Usually, the identification of disability in the early stage is difficult. When a child is grown and starts schooling, only many things like low vision and hearing problems can be identified by the teacher. These findings suggest that despite the government's continued effort to address the rights of PWD and provide health and AT services, there is still a huge gap between policy and practice. There are gaps in awareness among the policymakers, general public, AT service providers, people with disability, their families, and AT service users. However, policymakers and service providers have better knowledge of issues than PWDs and their families. Access to AT services depends to a great extent on awareness of them. PWDs already disadvantaged due to their disability are less likely to be aware of their rights or the availability of AT services without a very concentrated effort from all levels. An integrated multisector approach to addressing disability and AT service needs to increase the knowledge amongst communities.

B. Theme: eligibility

One of the common phenomena of AT services in Nepal is that, until very recently, NGOs were the leading players in providing AT services for PWDs. In Nepal, these are provided directly by the government or through CSOs' (Civil Society Organisation) own initiatives. Access to the services provided by NGOs and CSOs is not uniform in the types of AT services and geography where they are provided. The Governments in Nepal have policies to provide these services uniformly, but the implementation of these policies is fragile. These issues have affected Access to AT services.

The availability of AT services is different in different states of Nepal. AT service provision in Bagmati is better than in some other states.

Most of them [PWD in Bagmati?], 50-60% of disabled people are getting the assistive technology device. They are trying to provide either wheelchairs or 4-wheelers scooters to the disabled ones for their mobility. Some organizations provide complete AT services in Nepal. An AT user in Nepal who also works with a charity in Nepal that provide AT services shares their process of providing AT services as:

"Manufacturing is the different process here in AT, we first listen to them like what they needed and then we analyzed that what is things they needed and only then the needed AT services in provided to them. We provide them those devices from the outside resources."

Even though the demand for AT services is very high, the use of AT services is still shallow among PWDs. An AT user in Nepal who also works with a charity that provides AT services shares her experience that not many people use AT services because these are not available to them:

"Last month I was in a meeting in BRAC Center (name of a place), there I saw 25 people with disability but none of them use any assistive technology. They had problems with legs or hands but none of them were using any assistive technology."

These findings suggest that there are still challenges to accessing the system, scheme, or process for anyone who needs AT in Nepal, but the situation is improving slowly.

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C. Theme: reachability

AT facilities are centered around urban areas in Nepal, which limits access to these services for people living in the rural parts of Nepal. Especially in rural areas, most of the assessment, screening services, and IT service delivery follow a temporary camp-based model. Where local government authoritieocal groups get in touch with service providers to assess and distribute AT, the providers visit the area with required logistics and human resources. Often these camps assess people with disabilities for appropriate AT, take measurements, and provide AT if available – otherwise, they fabricate or purchase those and send them to the required places. We organize mobile camps in different districts(Kathmandu, Pokhara, Bajura, Achham, Doti, Dhangadhi, etc.). We primarily focus on one area of municipalities to get the whole scenario of that municipality; we focus on people using those AT services and exceptionally able people, and we also consider the point of view of people living there.

However, compared to a few years ago, Nepal has improved access to AT services for those who need them. The Federal Government is introducing various Acts and rules to address the rights of the people who need AT. Both local and federal Governments are allocating resources and prioritizing AT services, more people are becoming aware of the needs, and the people who need AT services are organizing themselves and claiming their rights. Since local governments are allocating regular funding for PWDs, some of the services related to them are being provided at the local level through camps. As a result, it is getting easier for PWDs, even in rural areas, to access AT services. The Act has explained assistive devices as their right. The assistive device should be made readily available at the required time. Policy and legal arrangements are made for this. So now, federal states, provincial states, and local states are motivated by such guidelines.

AT services are not accessible at a place where the PWD or their family could easily visit. Often these people are sent from one place to another, which costs money. This discourages PWDs and their families from accessing AT and other related services. Mainly in the hilly region of Nepal, the geographical structure of those hilly places does not allow disabled people to get easy access to these services. Even if they get those services, they do not get the proper environment and infrastructure to use them. Lack of information is one of the barriers to accessing AT services in Nepal. For example, many PWDs are not aware of the existence of a disabled person's Identity card. One participant shares his experience:

"I went to the District Social Welfare Officer, I told them I need an ID card, they gave me a form I filled it up accordingly, and submitted some papers and you know government office is very painful to deal with whatever that's a different story, after waiting a while I got my ID card, though they told me I was the first one to ask for the ID card nobody took it before me there. (Bajura)"

Even though the situation is improving, there are still various challenges for PWDs to reach services. Physical distance, lack of mobility due to their disability, lack of support from family members and the cost of travel, geographical challenges, and lack of proper transportation in many Nepal places hinders their access to AT services.

D. Theme: affordability

The common understanding among policymakers, AT service providers, and service users in all three countries is that it is the government's responsibility to provide AT services to those who need such services. It is also common in all three countries that prospective AT users might receive their AT devices in three ways: purchase them themselves from a private provider; get them from the government, or get them through a charity. The resources provided by the government are insufficient to meet even a fraction of the demand for AT services. That is where the charity sector steps in, but those services are also minimal. This ultimately forces most AT users to purchase services out of their pockets or not to use AT services at all. An AT service provider in Kathmandu, Nepal shares:

"The next thing is we have limited resources. We talk about those services as well as providing such services, we even know about their necessity, but we don't have resources. Resources should be either provided by the provider or the services purchased by the users themselves."

AT services are expensive, often not available, and even if they are available, they are not accessible to people living in the rural part of Nepal. Often repair and maintenance are not locally available. The Government of Nepal has mandated the local government to allocate some funding annually for people with disabilities. Nepal also provides monthly allowances to people with disabilities, which they can use to purchase AT services. In some cases, they can also get free AT devices from the government and charitable organizations. However, despite these efforts from the Government and non-Government sectors in Nepal, AT services are not still financially affordable to the people who need these services in Nepal.

E. Possibility of AT in Nepal:

Our findings suggest significant similarities in the accessibility (and lack of accessibility) of AT services in Nepal and other developing countries like Bangladesh and India. We found a reasonable awareness among policymakers and service providers about relevant policies, practices, and availability of AT services in all three countries. However, awareness levels are relatively low among potential AT users and hugely varied depending on their access to information, mobility, and place of living. People living in remote areas with lower mobility and limited access to information such as mobile phones, radio, and television know less about AT services. In contrast, those living in cities with better access to such information have a higher degree of awareness. Such lack of awareness results in non-use of AT services even if they are available and disparities in Access to AT services limiting their life opportunities.

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Since the severity of the disabilities is categorized in Nepal, not all PWDs who could benefit from using AT are eligible for the AT services and allowances provided by the government and charitable organizations. This leaves the majority of PWDs without AT. They have to buy those services out of their own pockets. It is common in Nepal that, until recently, AT services were provided chiefly by charitable organizations. However, this is changing, and governments are gradually taking responsibility for AT services. With increased government funding, access has improved. Still, the accessibility of the AT services is very patchy in Nepal. Urban-centric AT policies and practices have left most people living in the rural parts of the country without Access to AT services. A temporary Outreach camp model of AT service is standard in Nepal and other developing countries, meaning often there are very few regular AT service provisions. Because of the social, economic, and cultural practices, it is still common among AT users to rely on the government or charity sector to get financial support to purchase AT. This phenomenon is changing with the allocation of funding at the local level in Nepal. Therefore, accessibility to AT services for PWDs is still challenging in Nepal.

The study was conducted in Kathmandu, Dhangadi, Bajura, Doti, Achham, etc. (Nepal), the place which has relatively better AT(Kathmandu), and the palace, which has a worse condition in AT(Bajura, Achham). Therefore, the results can be generalizable throughout all hilly and valley regions of Nepal but still can be generalized to all districts in Nepal. Similarly, interview participants were purposively selected to obtain broad and in-depth information on AT service in Nepal, which resulted in selecting participants who were readily accessible for interviews. Therefore, the views expressed in this research will not represent the voices of all PWDs and AT users in Nepal. As a result, the findings and recommendations do not automatically imply that these are valid for the whole country but need to be contextualized. Since the interview participants were selected only after their interest, the sentences they talk to are free from any pressure. Most AT users who participated in this research are from the forefront, receiving AT services. Therefore, the views of the PWDs living in Nepal's rural and urban regions are included in this research, although other district AT service users may differ.

This study also shows that it is only very recently that the understanding of Access to AT services for PWDs in Nepal has shifted from a welfare mindset to a right-based approach. Since the ratification of the UNCRPD by Nepal and other countries, policymakers and AT service providers have become more aware of the PWDs' rights, and the respective governments have included provisions on rights to equal Access for PWDs in legislation. For example, Rights of Persons with Disabilities 2017 in Nepal includes some provisions to ensure the rights of PWDs to access quality services. However, this does not always translate into those rights being realized on the ground. Consequently, very few users who participated in the study were aware of their rights, and the welfare model still prevailed at the user level.

We would like to make the following recommendations on each thematic area presented in this research:

- Awareness: There should be more awareness programs at the community level on PWDs' rights to AT services.
- Eligibility: The criteria for accessing Government funding to purchase required AT services by PWDs needs to be more flexible to increase the % of PWDs accessing such services.
- Reachability: Government should facilitate the establishment of AT centers locally in rural communities and encourage those centers to provide personalized AT services rather than always providing such services through temporary camps.
- Affordability: The Government funding allocated each year for AT services for PWDs needs to reach the rural community where PWDs are still not aware of the availability of such funding.

X. CONCLUSIONS

AT service provisions are poorly developed in Nepal. On all quality indicators assessed, the systems show significant weaknesses. AT users have minimal awareness about their rights to these services and the availability of AT services. The range of services available is minimal, and eligibility is dependent on medical criteria related to visible and severe disabilities.

Lack of accessibility, eligibility, reachability, and affordability are the main barriers to accessing AT services for PWD in Nepal. Increased community-level awareness, increased government funding, and a community-based, medically informed, flexible social model of AT services are ways to ensure Access to AT services for PWD in Nepal.

- Increased community awareness is necessary to increase access to Assistive Technology Services for Persons with Disabilities.
- Increased and flexible funding from the government and philanthropists will improve rehabilitation.
- Establishing community-based Assistive Technology Services centers will increase access and improve rehabilitation.

The Government of Nepal should ensure that the policies regarding PWDs and AT services are translated into practices to address the unmet needs for AT services. Our findings are significant discrepancies in available AT service provisions for people liviNepal'sin urban and rural Nepal. This can be improved by establishing more AT centers, posting more AT professionals, and integrating AT services with government health centers, even within the available resources. It is essential to involve AT users, their representative organizations, and advocacy groups in formulating AT policies, designing the interventions, and implementing the AT services. There has been some increase in financial resources through the local Government in Nepal, but this is still insufficient. Therefore, the Governments should significantly increase their budgets for PWDs-related activities and AT services. AT services are still treated as charities in all three countries rather than as a fulfillment of PWDs' rights. This needs to change at the system level as well as in practice.

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