

## Review Article

# Need & strategies for prioritisation of rehabilitation research in India

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**Background & objectives:** India faces the highest rehabilitation need in South East Asia. Rehabilitation research is essential to define the gap between the need and available rehabilitation services at all levels of healthcare in both urban and rural settings for individuals across life span.

**Methods:** A comprehensive rapid literature search was conducted in two scientific databases namely - PubMed and Cumulative Index to Nursing and Allied Health Literature (CINAHL); and two scientific registries, namely - Clinical Trials Registry India and *Shodhganga*, to report the current status of rehabilitation research in India. Articles published in English (1801 till 2024), reporting studies pertinent to rehabilitation services such as physiotherapy, occupational therapy, speech rehabilitation, audiology rehabilitation, prosthetics and orthotics and clinical trials and doctoral theses pertinent to rehabilitation were included.

**Results:** A total of 10,692 and 546 research articles were identified in PubMed and CINAHL, respectively. Findings of rapid literature search suggested that the volume and level of research evidence pertinent to rehabilitation are considerably low *vis-a-vis* the huge and diverse need for rehabilitation services in rural-tribal and urban settings in India. Secondly, the spectrum of rehabilitation research is largely clinical research.

**Interpretation & conclusions:** Present findings underscore an urgent need to prioritize context-specific rehabilitation research in India. The results highlight the need for encompassing a wider focus of rehabilitation research including health system and health policy research, extending beyond clinical research. A strategic research framework is proposed which presents a multi-level approach to prioritize, execute and accelerate rehabilitation research for accessible and effective rehabilitation services for all individuals in need, across life-span, at all healthcare levels.

**Key words** Health system research - India - policy research - prioritisation - rehabilitation need - rehabilitation research - strategies

India, home to one-sixth of the world's population, faces a growing demand for rehabilitation. This surge is driven by the country's epidemiological and

demographic shifts, including an aging population, the rise of non-communicable diseases (NCDs), lingering effects of communicable diseases including

COVID-19 and substantial burden of injuries and natural disasters<sup>1,2</sup>. Rehabilitation is an essential health service which should be accessible to all people with rehabilitation needs, at all levels of healthcare including primary healthcare which is the goal of Universal Health Coverage in order to achieve SDG-3 goal<sup>3</sup>.

Rehabilitation need is highest in South-East-Asia region, where 630 million people<sup>4</sup> need rehabilitation, which represents almost one-quarter of the global rehabilitation need. Within South-East-Asia, India faces the highest need with more than half the people with rehabilitation needs across the region (440 million)<sup>4</sup>.

In the last three decades (1990-2021) India has witnessed a massive surge of 105 per cent rise in years lived with disability. The most recently reported need (2021) is 32.5 thousand prevalent cases per 100 thousand including all conditions, which are age and gender adjusted<sup>4</sup>. The prevalence/incidence of a few common health conditions in India, which require rehabilitation is as follows, elderly people (10% of total population)<sup>5</sup>, spine pain (12 month period prevalence of 66% in rural adult men and 88% in rural adult women)<sup>6,7</sup>, knee osteoarthritis (prevalence of 300-600 per 10,000 persons)<sup>7</sup>, fractures/trauma (incidence of 65% for bony injuries and 35% for soft tissue injuries in adults in 12 months)<sup>8</sup>, stroke (cumulative incidence between 105 to 152/100,000 persons per year and crude prevalence of 44 to 559 per 100,000 middle aged adults *i.e.* above 40 yr of age in the past decade)<sup>9</sup>, chronic obstructive pulmonary disorders (prevalence of 7% among population aged 30 years and above)<sup>10</sup> and coronary artery disease (prevalence of 21% per 1000 adults of Indian population)<sup>11</sup>. The huge burden of health conditions requiring rehabilitation point to an urgent need of mainstreaming rehabilitation into the health system in South-East-Asia region including India.

It is likely that rehabilitation was not prioritised, because the nation was repeatedly challenged by the outbreaks and epidemics of major diseases and nutritional disorders in the past decades and hence all the health research efforts were focussed intensely on reducing morbidity and mortality<sup>12</sup>. Although these conditions resulted in limitations in daily functioning, it is only later that the focus shifted to the impact of health conditions beyond survival on daily functioning<sup>13</sup>.

Yet, rehabilitation awaits prioritisation and integration into the mainstream healthcare in India, similar to most LMICs<sup>14</sup>. Mainstreaming rehabilitation

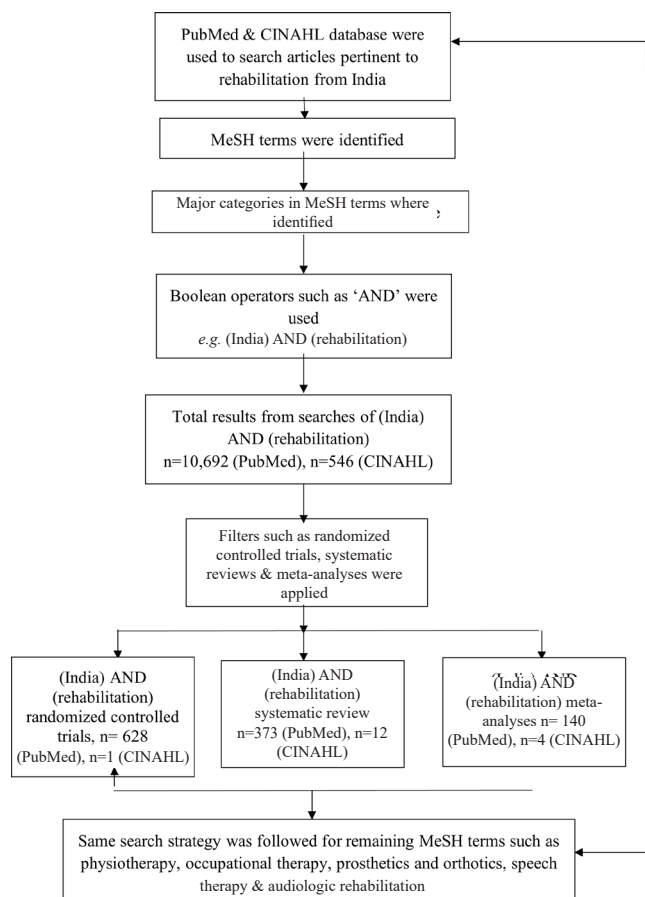
into the healthcare system in India including 28 States and nine Union Territories, across all government and non-government sectors in urban and rural-tribal sectors is a colossal task. Therefore, health policy and systems research aimed to understand and improve policies, planning and implementation is necessary. Health policy and systems research (HPSR) is a 'field that seeks to understand and improve how societies organise themselves in achieving collective health goals, and how different actors interact in the policy and implementation processes to contribute to policy outcomes'<sup>15</sup>. A deeper and wider understanding of the existing rehabilitation needs and services at primary, secondary and tertiary levels of healthcare system across the nation, informed by evidence, based on precise quality data is crucial for strategic and context-specific planning of rehabilitation services. Systems-level rehabilitation research will help to inform pertinent policy-making and re-allocation of budget for resources<sup>16</sup>.

Typically, the research studies span across three broad categories, namely- health systems research; implementation research (with a focus on implementing approaches to strengthen rehabilitation in the health system), and clinical research (effectiveness of interventions for rehabilitation, including assistive technology). It is observed that conventionally healthcare research has leaned towards clinical research in India. However, in order to achieve the goal of rehabilitation for all, it is equally important to research the health system and focus on implementation research to develop sustainable models of rehabilitation care which are accessible to all.

The objective of the present review was to report the current status of rehabilitation research including the volume and type of research; challenges encountered and strategies necessary for prioritization of rehabilitation research in India.

## Materials & Methods

A comprehensive rapid literature search was conducted in scientific databases such as PubMed and Cumulative Index to Nursing and Allied Health Literature (CINAHL) to report the current status of rehabilitation research in India (Fig. 1). The Medical Subject Headings (MeSH) categories and subcategories including India OR\* Indian AND (rehabilitation research AND policy) (rehabilitation research AND system) (rehabilitation OR\* therapeutic intervention OR\* intervention) AND (physiotherapy OR\* physical



**Fig. 1.** Search strategy adopted in PubMed and CINAHL to search articles pertinent to rehabilitation from India.

therapy OR\* physiotherapist/s OR\* physical therapist/s OR\* physical therapy modalities OR\* exercise therapy OR\* group physiotherapy) AND (occupational therapy OR\* occupational therapist/s OR\* ergotherapy) AND (orthosis OR\* orthotic devices OR\* parapodium orthosis OR\* braces OR\* splints) AND (prosthesis OR\* implants OR\* artificial limb OR\* replacement) AND (speech therapy OR\* voice training) AND (audiologic rehabilitation OR\* audiologic habilitation OR\* aural rehabilitation) were used. Clinical trials registered in Clinical Trials Registry India (CTRI) and doctoral theses registered in *Shodhganga* were searched to identify rehabilitation research studies in India in addition to the articles published in scientific databases.

Papers describing research on rehabilitation, available in English since 1801 till 2024 were included. Articles reporting studies pertinent to rehabilitation services such as physiotherapy, occupational therapy, speech rehabilitation, audiology rehabilitation, prosthetics and orthotics and clinical trials and doctoral

theses pertinent to rehabilitation were included in the study. Filters such as systematic review, randomised controlled trials and meta-analyses were applied to ensure the inclusion of high-quality and evidence-based articles.

Two reviewers (RM and SK) screened the titles for inclusion. Queries were resolved with the third reviewer (QM). Studies belonging to other fields such as engineering, agriculture, economic, medical, ayurvedic or surgical were excluded. Findings of comprehensive rapid literature search were used to report the volume, spectrum of research and the level of research evidence in rehabilitation.

## Results

A total of 10,692 and 546 research articles were identified in PubMed and CINAHL, respectively. Number of research papers, RCTs, or cohort studies conducted in India were substantially lower compared to the studies conducted in certain high-income countries (Table). An approach of bibliometric analysis is likely to change the precise number of published research articles.

Number of research projects registered with the Clinical Trials Registry India (CTRI) in the field of rehabilitation is also limited. Out of a total of 68,227 clinical studies registered in the past 17 yr (2007 to 2024), 1396 trials were identified after using a keyword 'rehabilitation'; whereas the remaining studies were related to medical, surgical, ayurvedic, dental, unani and nursing interventions. All 1396 titles were reviewed and 365 studies were excluded, which involved medical, surgical or other complementary medicine interventions for rehabilitation. Among the 1031 rehabilitation clinical trials, 540 were randomised clinical trials; 133 were observational studies, 93 were cross-sectional studies and 265 experimental studies.

Another source of information on rehabilitation research in India was *Shodhganga*. It is a national reservoir of theses stored in a repository hosted and maintained by the INFLIBNET Centre. A search on *Shodhganga* with a keyword 'rehabilitation' revealed 164 theses between 1959-2024. On screening the titles, 55 theses were identified as relevant to rehabilitation whereas 109 studies were excluded, which involved engineering, agriculture, economic, medical, ayurvedic or surgical. Among the 55 theses, eight were observational, 12 were cross-sectional, seven were RCT, 16 were experimental and 12 others included case control, descriptive and mixed studies. Although it is possible that a few older

**Table.** PubMed and CINAHL search results of articles related to rehabilitation in India

| MeSH terms  | PubMed          |                 |                    |               |             | CINAHL          |                 |                    |               |             |
|---|-----------------|-----------------|--------------------|---------------|-------------|-----------------|-----------------|--------------------|---------------|-------------|
|   | No. of articles | Type of studies |                    |               | Time period | No. of articles | Type of studies |                    |               | Time period |
|   |                 | RCT s           | Systematic reviews | Meta-analyses |             |                 | RCT s           | Systematic reviews | Meta-analyses |             |
| (India) AND (rehabilitation research) AND (policy)  | 0               | 0               | 0                  | 0             | 1979-2024   | 0               | 0               | 0                  | 0             | 1950-2024   |
| (India) AND (rehabilitation research) AND (systems) | 0               | 0               | 0                  | 0             | 1979-2024   | 0               | 0               | 0                  | 0             | 1950-2024   |
| Rehabilitation                                      | 819,006         | 59,874          | 26,319             | 12,463        | 1909-2024   | 1,154           | 7               | 23                 | 3             | 1909-2024   |
| (India) AND (rehabilitation)                        | 10,692          | 628             | 373                | 140           | 1944-2024   | 546             | 1               | 12                 | 4             | 1944-2024   |
| Physiotherapy                                       | 240,782         | 32,805          | 12,935             | 6,880         | 1913-2024   | 48,056          | 1,019           | 4,697              | 1,881         | 1913-2024   |
| (India) AND (physiotherapy)                         | 4,340           | 575             | 264                | 85            | 1952-2024   | 228             | 2               | 6                  | 2             | 1952-2024   |
| occupational therapy                                | 75,829          | 4,496           | 2,765              | 1,085         | 1917-2024   | 43,032          | 249             | 1,424              | 253           | 1917-2024   |
| (India) AND (occupational therapy)                  | 901             | 39              | 46                 | 25            | 1972-2024   | 305             | 0               | 15                 | 1             | 1972-2024   |
| Orthosis  | 19,560          | 1,829           | 629                | 276           | 1945-2024   | 11,808          | 107             | 526                | 200           | 1945-2024   |
| (India) AND (orthosis)                              | 232             | 19              | 12                 | 4             | 1967-2024   | 32              | 0               | 0                  | 0             | 1967-2024   |
| speech therapy                                      | 32,376          | 1,709           | 882                | 296           | 1937-2024   | 4,423           | 37              | 128                | 50            | 1937-2024   |
| (India) AND (speech therapy)                        | 594             | 25              | 19                 | 5             | 1968-2024   | 22              | 1               | 0                  | 0             | 1968-2024   |
| audiologic rehabilitation                           | 6,437           | 131             | 48                 | 15            | 1946-2024   | 2,403           | 6               | 59                 | 9             | 1946-2024   |
| (India) AND (audiologic rehabilitation)             | 50              | 1               | 2                  | 1             | 1968-2024   | 16              | 0               | 0                  | 0             | 1968-2024   |

CINAHL- Cumulative Index to Nursing & Allied Health Literature

theses may not have been uploaded on *Shodhganga*, the total number of doctoral studies in the field of rehabilitation remain low across India. Rehabilitation science does not feature in the top 20 areas of research on the current PhD research profile in India<sup>17</sup>.

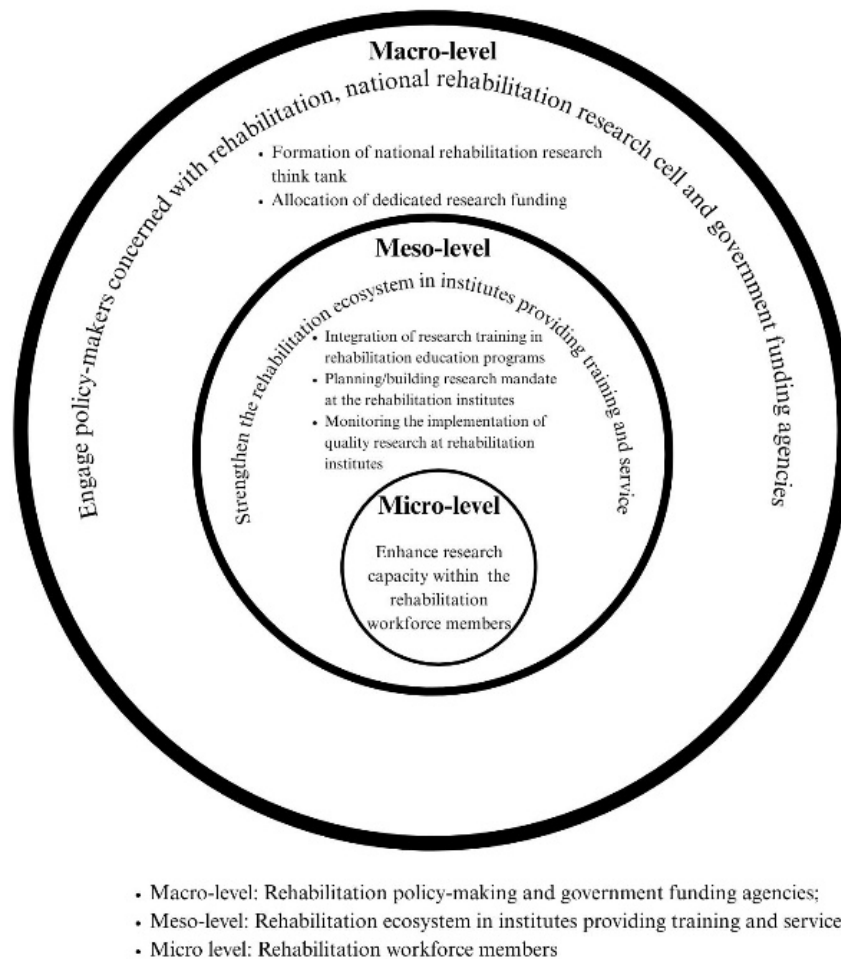
### Discussion

Our findings suggested that the volume and the level of research evidence pertinent to rehabilitation is considerably low *vis-a-vis* the huge and diverse need for rehabilitation services in rural-tribal and urban settings in India.

The strategies to prioritize context-specific rehabilitation research can be developed through either a top-down or bottom-up approach. It is possible to construct the steps at multiple levels ensuring

harmonious action: (i) Macro-level: rehabilitation policy-makers, national rehabilitation research cell and government funding agencies; (ii) Meso-level: rehabilitation centres/institutes; (iii) Micro-level: rehabilitation workforce members. (Fig. 2).

(i) *Macro-level i.e. rehabilitation policy-makers, national research cell and government funding agencies:* The two major challenges at the macro level are lack of national rehabilitation research framework and inadequate funding for rehabilitation research. India has demonstrated strategic planning, meticulous implementation and success in the immunization program and control of several communicable diseases such as HIV, tuberculosis, etc. in the past decades, resulting in a remarkable rise in survival<sup>18</sup>. However, rehabilitation research lacks a strategic framework. Design and implementation of an inter-disciplinary



**Fig. 2.** Strategic framework for rehabilitation research in India.

strategic research framework engaging various stakeholders of rehabilitation at multiple levels, is warranted to plan an effective rehabilitation research strategy for India with a defined agenda and time-bound output to address the unmet need of rehabilitation.

Recently, the World Health Organization (WHO) emphasised on promotion of high quality research in rehabilitation including health policy and systems research and proposed a research framework, through a multi-stakeholder participatory global consultative process in order to stimulate HPSR to generate the evidence required by key stakeholders<sup>19</sup>. In India, the existing rehabilitation research framework needs revived concerted attention of all concerned ministries, policy-makers, government funding agencies and national rehabilitation research cell with specific measures including (a) formation of a dedicated national rehabilitation research think tank for strategic advancement of rehabilitation research in India; and (b) allocation of dedicated research funding.

The think tank can be embedded into the existing national healthcare research framework, engaging the key stakeholders, namely - policy-makers and experts (engaged in planning, implementing, and budgeting rehabilitation services); rehabilitation educators (academic experts in designing and delivering rehabilitation education and cultivating inter-professional awareness about rehabilitation) and patients and caregivers (to share lived experiences and needs). Caregivers play a vital role in rehabilitation and hence they can have a meaningful voice in informing the research agenda including the socio-economic context in India. A participatory research approach with community-engagement and diverse stakeholders will result in an appropriate rehabilitation research agenda aligned with the national health research priorities and synched with the apex research body's strategies for a *Viksit Bharat 2047*, alongside achieving the goal of rehabilitation for all<sup>20</sup>. The think-tank would additionally monitor the execution of strategic rehabilitation research

framework and timed tangible output, necessary for iterative recalibration of research agenda.

Currently, at the national level, research in various disciplines of medical science, biotechnology and science and technology is planned, supported and promoted by respective funding departments or councils such as Indian Council of Medical Research<sup>21</sup>, Department of Science and Technology<sup>22</sup>, Department of Biotechnology<sup>23</sup>, *etc.* Research in complementary health sciences is promoted by the Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy Ministry<sup>24</sup>. Each funding organization defines the research mandate of the respective organisation, which collectively informs the health research agenda for India. Currently, all the above mentioned research funding organisations which are funded by different ministries, such as Ministry of Health and Family Welfare<sup>25</sup>, Ministry of Science and Technology<sup>22</sup> and Ministry of Ayush<sup>24</sup>, fund rehabilitation research projects in a fragmented manner. In the absence of a national strategic research framework, the rehabilitation research agenda is not in tandem. Hence, although rehabilitation research has been funded sparingly by all the above mentioned government funding agencies in India; proportionate funding with respect to the magnitude and complexity of rehabilitation need continues to be a challenge. For example, albeit the high incidence of trauma and fractures in India<sup>2</sup> or the common incidence of low back pain, the proportionate research focus is negligible<sup>26</sup>.

Prioritised investment of government funding agencies in rehabilitation research in proportion to the need, can alleviate the socio-economic burden caused by limitations in functioning. It is expected that the efforts of National Commission for Allied and Healthcare Profession established in 2024<sup>27</sup> (including rehabilitation professions) would add impetus to rehabilitation research, in addition to the ongoing efforts of the Ministry of Social Justice and Welfare<sup>28</sup>. Proportionate allocation of funding is essential for rehabilitation system research, policy research and implementation research to ameliorate the broad functions of rehabilitation such as awareness, early detection of impairment, intervention, improved functioning and monitoring<sup>29</sup>.

*(ii) Meso-level i.e. rehabilitation institutes providing training and service:* The three major challenges at meso-level are inadequate robust research training in education, deficient research mandate with narrow focus of research limited to clinical research, and lack of monitoring of quality rehabilitation research.

At present, 822 institutes offer rehabilitation training and services in India, including 700 physiotherapy institutes, 27 occupational therapy institutes, 77 institutes offering training in audio speech therapy, and 18 institutes offering training in prosthetics and orthotics<sup>30</sup>. The growing volume of rehabilitation institutes and service centres are addressing the need for training and service requirement in India<sup>31</sup>; but the gap in rehabilitation research remains unaddressed. The current the curriculum of most rehabilitation training programs includes research training in some form; but the implementation of research training is limited in scientific rigour. A large majority of rehabilitation institutes are yet to cultivate a culture of quality research and build a robust research ecosystem designed for context specific research.

Hence, it is essential to strengthen the research ecosystem at the institutes providing training and services including specific strategic measures as follows: (a) integration of appropriate basic research training into the curricula of all the rehabilitation education programmes and advancing the level of research training at higher academic levels, to achieve the competencies required to conduct quality research; (b) Planning a wide and diverse research mandate to cover the complete spectrum of research beyond clinical research; and (c) monitoring the implementation of quality research at rehabilitation institutes to achieve the expected output.

Emphasis on quality research training in all curricula of rehabilitation, at all levels (Bachelors-Masters-Doctoral) will help to build a critical mass of competent rehabilitation research taskforce in India. Currently, a total of 822 rehabilitation institutes, offer training across India, in a total of 783 districts (2024). It is possible for each rehabilitation institute to assess the rehabilitation needs of one or more neighbouring districts and build a context-specific research agenda. The collective agenda can provide insights into the health system research priorities and national rehabilitation research agenda in order to design need-based effective intervention strategies and address unmet rehabilitation needs of that particular district.

Secondly, a review of rehabilitation system including rehabilitation service provision, policies, cost of care, insurance coverage, and other components is important to understand the complete fabric of rehabilitation services in India and transform the rehabilitation landscape of India. It is also important that rehabilitation research needs to extend beyond tertiary care to primary healthcare to design effective strategies for achieving the goal of rehabilitation for

all. The relevance and need for primary care research has been reiterated worldwide and few strategies to strengthen primary care research are available for reference<sup>32</sup>. Health policy and systems research will add value to the initiative of rehabilitation for all, by focusing on evidence for effectively organizing and integrating health services. It will also help to promote systems-thinking approach to meet rehabilitation need of all individuals for better health-outcomes<sup>18</sup>.

(iii) *Micro-level i.e. rehabilitation workforce members*: Only a small proportion of rehabilitation care professionals are engaged into research, resulting in limited research capacity within the rehabilitation workforce nationally. Based on the records available at the *Shodhganga* and the projects registered at the CTRI, it appears that out of a total of approximately more than 100 thousand qualified rehabilitation professionals engaged in either rehabilitation training or service<sup>33,34,35</sup>, a small portion is trained in research (doctoral level). The gap between rehabilitation research need and proportion of workforce engaged in research is wide.

Therefore, at the micro-level, there is an urgent need to strengthen the research capacity within the rehabilitation workforce members of all disciplines throughout India. Rehabilitation professionals engaged in training can be encouraged and motivated to conduct research on meaningful contextual research problems. The keen rehabilitation workforce members engaged in the service provision can be trained to review the services delivered for ongoing improvement<sup>36</sup>. Measures to develop research competencies can include: (i) sensitisation and motivation of rehabilitation professionals with incentive and due remuneration for research efforts, and (ii) training professionals to acquire competencies essential to conduct context specific robust research.

The present review underscores the urgent need to prioritize context-specific rehabilitation research. India needs a strategic research framework for rehabilitation, which is built on permeable interaction between various divisions of research planning, funding and implementation namely health systems, health policies, health delivery, rehabilitation experts, and persons with rehabilitation needs and caregivers. Synchronised and iterative action at multiple levels responding to unmet rehabilitation need through a comprehensive strategy will produce the necessary momentum in rehabilitation research. The proposed strategies can inform appropriate action in countries with similar socio-economic challenges.

By examining the current research landscape and acknowledging the challenges, the analysis provides a roadmap for progress. The proposed strategic framework presents a comprehensive approach to prioritize, execute, and accelerate meaningful rehabilitation research across the complete spectrum of research including health policy and systems research. This will pave the way for accessible and effective rehabilitation services for all individuals in need across India, spanning urban, rural, and tribal communities at all healthcare levels. This framework holds the promise of using evidence to transform the lives of countless individuals with rehabilitation needs, empowering them to achieve their full potential and participate fully in society. By investing in rehabilitation research today, India can build a healthier and more inclusive tomorrow.

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