

IASP 2025

in Low- and Middle-Income Settings

GLOBAL YEAR FACT SHEET Pain Management, Research and Education

Challenges and Opportunities for High-Quality Fundamental Pain Research in Low-Income Countries and Settings

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Fundamental pain research is essential for advancing the field of pain management and, by extension, improving global well-being and health. However, it faces distinct challenges in low-income countries and settings (LICS). This fact sheet highlights key considerations, challenges, and opportunities for pain research in these settings.

Prevalence and Impact of Pain in LICS

Chronic pain affects over 20% of the adult population globally, with a significant burden in LICS where access to pain management and healthcare services is limited.¹² Pain conditions in low-income settings are often influenced by challenging working or living conditions, poverty, trauma, and lack of social support.^{1,3} In particular, painful conditions such as low back pain, osteoarthritis, post-traumatic pain, and cancer pain are highly prevalent, and they are often worsened by limited access to trained pain specialists, diagnostic tools, and therapeutic options.¹² Stigma and cultural barriers related to pain expression or seeking medical care can further affect healthcare access.³ Furthermore, the epidemiology of pain remains poorly characterized in many LICS, and therefore, the true global impact of chronic pain is still incompletely understood.

Challenges for Fundamental Pain Research in LICS

Fundamental research faces particular barriers in LICS where finite resources significantly constrain basic research and thus impede progress.^{4,5} Financial and infrastructural resources are often scarce, as exemplified by high-quality laboratory equipment being accessible only at a few restricted sites within a large country or region. The already-limited funding is often further stretched in the absence of tax exemptions on research equipment, which are available in some high-income countries, and the imposition of high import taxes in many low-income countries. Bureaucratic customs procedures further slow down the progress of research. While open-access publishing aims to improve access to scientific publications, it paradoxically hinders the dissemination of research from low-income countries by requiring researchers to pay exorbitant publishing fees in foreign currencies, with no dedicated funding to cover these costs.

Poor (or scarce) epidemiological data are a typical constraint on engagements with potential funders of pain research in LICS. In the context of national funders, the lack of pain data influences research funding priorities, making other, bettercharacterized health issues appear more appealing to fund than pain research.³ Consequently, knowledge transfer remains minimal, evidenced by a small number of patents filed annually, a limited number of biotech companies established, and almost no influence of pain research advancements on healthcare policy.

Retaining researchers is arguably the most significant barrier to advancing fundamental pain research in LICS. In Latin America and Sub-Saharan Africa, many scientists lack a salary that reflects their education, knowledge, and contribution to society. Young graduates often perceive the scientific environment as restrictive, highly competitive, inadequately funded, and offering little certainty for a stable future in research institutions.⁴ Likewise, the continuous "brain drain" of capable scientists and healthcare professionals with specialized training in neuroscience and fundamental pain research is a significant burden.⁴ A study published in 2011 estimated that, although 1 in 8 prominent scientists active between the late 20th and early 21st centuries had been born in a developing country, about 80% of those had relocated to a developed country.⁶ LICS need to retain such scientists, especially given the remarkably low ratio of people who are active in research in Latin America or Sub-Saharan Africa relative to developed continents such as North America (613 vs. 97.5 vs. 4788 per million inhabitants, respectively).⁷ Improving these conditions is essential to curbing the migration of scientists from LICS.

Opportunities and Potential Impact

The challenges outlined above highlight the need for strategic approaches to enhance the capabilities of scientists in LICS who choose to strengthen research in their home countries rather than emigrating. One strategy is to promote regional and international collaborations. Establishing inter-university agreements to support joint PhD and/or research programs could provide access to training, mentorship, and resources, thereby strengthening local research capabilities.8 One advantage of the current era is the accessibility of virtual meetings and discussions, allowing peers from around the world to connect. These interactions not only shape ideas and facilitate the exchange of knowledge and skills, but also provide more subtle yet powerful benefits, such as fostering interpersonal connections that researchers in geographically isolated LICS often lack.

A second strategy that has a relatively low cost but high potential impact is epidemiological studies that include under-represented (or omitted) countries in Sub-Saharan Africa, Latin America, and Asia.¹ A third, complementary strategy is to incorporate culturally tailored approaches and conduct research on pain within the specific cultural and socioeconomic contexts of local communities. This approach has the potential to uncover unique insights into pain mechanisms common across humans, as well as effective management strategies that may be relevant to specific contexts. For example, rich traditions of herbal and alternative therapies, or culturally embedded social practices, could offer novel pain management solutions with broader applicability.

A fourth strategy is to focus on developing affordable technologies, such as mobile phone-based solutions or low-cost equipment, to help bridge existing infrastructure gaps. Emerging technologies such as telemedicine, artificial intelligence-based therapies, and other technological innovations are rapidly becoming mainstream and could prove to be particularly useful in disadvantaged settings.

Fifth, capacity-building initiatives and training programs in fundamental and translational pain science for scientists and healthcare providers, including close interactions between these groups, stand to establish a strong foundation for sustainable, relevant, and impactful research.

Funding and Support Mechanisms

Securing funding for high-quality pain research is another significant challenge faced by researchers in LICS. Certain international organizations, such as IASP, the European Union, the World Health Organization, and the International Brain Research Organization, offer grants for research in LICS. The US National Institutes of Health (NIH) also funds selected research topics relevant to LICS. However, the funding available is not commensurate with the knowledge gaps or the size of the population represented by LICS research. Public-private partnerships with industries specializing in analgesic drug development or medical devices may offer additional opportunities for funding and technology transfer if vigorously pursued. The lower costs of clinical trials executed in LICS, albeit under strict institutional review board and local regulatory agency surveillance, could make these regions appealing to investors, fuelling the development of new knowledge and generating resources that could be re-invested in further fundamental research. Finally, encouraging governments and local organizations within LICS to implement long-term science policies that prioritize better funding, salaries, and opportunities for younger generations of scientists could promote sustainable development and lead to long-term improvements in scientific progress and pain management for patients.² Affluent

indigenous individuals and entrepreneurs could also establish foundations dedicated to promoting fundamental research in neuroscience and pain.

Case Studies and Success Stories

The IASP Developing Countries Project: Initiative for Improving. Pain Education has been helpful over the years. It has consistently provided grants that support improving pain education and practice in developing countries, especially LICS. Specifically, it has helped to create innovative solutions to pain education, research, dissemination, and practice in developing countries. Most importantly, the grant also encourages the development or implementation of policy changes in hospitals, universities, governments, and other institutions.⁹¹⁰

The concerted efforts of regional and national pain associations have helped to significantly improve pain education, practice, and, to some extent, research. Some associations mount educational programs including training in research methodology. They also serve as advocacy groups working with the ministries/departments of health to improve pain education and practice. In some instances, they serve as links to multinational industries and facilitate responsible opioid distribution and research. Webinars organized by national societies, as well as annual conferences, create opportunities for networking, knowledge acquisition, and collaboration for multidisciplinary pain clinics and research.¹⁰

Conclusion

Advancing fundamental pain research in LICS is a challenge that demands continued commitment and dedication, a strong sense of purpose, and the capacity to make impactful decisions that would elevate the quality of fundamental science in LICS. Furthermore, it demands innovative approaches, sustainable funding, and the establishment and maintenance of strong regional and international collaborations. By addressing the unique challenges and leveraging opportunities in LICS, the global research community can help reduce the burden of pain, improve quality of life, and build a foundation for equitable health outcomes worldwide.

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