

reduce medical errors and improve patient safety⁸.

Healthcare expenditure: Cost of healthcare has become a major concern for patients world over. These studies highlight optimal health expenditure, pharmaceutical expenditure and various drug alternatives.

Prescribing behaviour: These studies focus on the prescribing behaviour of physicians and its impact on patients.

Let us consider research on methods. In these studies statistical inference and hypothesis testing is done. Different research methodologies are adopted like quasi-experimental, survey, quantitative and qualitative models, principles of literature searching and critical appraisal.

The patient-reported outcome (PRO) and patient preference studies are related to health outcomes reports of patients undergoing overall treatment. Efficacy of treatment can be identified based on patient-reported outcomes. Aspects of well-being, health status, health-related quality of life, etc. can be assessed from these studies. The use of digitized PROs, or electronic patient-reported outcomes (ePROs), is on the rise in today's health research industry⁹.

In the case of conceptual papers, some are published based on latest pharmacoeconomics concepts. Conceptual research focuses on the concept or theory that explains or describes the phenomenon being studied. These papers are based on secondary data sources, such as facts and figures.

Research in the area of pharmacoeconomics and health outcomes studies has increased in India over the last five years. Compared to the Western countries, research is still at a nascent stage in India. Collaborative research with foreign authors is also increasing, which is an encouraging trend in this area. However, there some challenges like shortage of skilled technical workforce, establishing standard guidelines, insufficient funding for the said research, lack of authenticated and organized database of healthcare system, and awareness about relevant features of pharmacoeconomics and health outcomes research for healthcare professionals, government officials and all healthcare members associated with it¹⁰.

Due to increased cost of overall healthcare, pharmacoeconomic and outcomes research evaluation plays an important role in cost-effective health services. The rapid development of such studies in India may be more beneficial to society in the coming years.

1. Muragundi, P. M., *Curr. Sci.*, 2014, **106**, 1051.
2. Ahmad, A., Patel, I., Parimilakrishnan, S., Mohanta, G. P., Chung, H. C. and Chang, J., *J. Res. Pharm. Pract.*, 2013, **2**, 3–9.
3. <https://www.ispor.org/about-ispor.asp> (accessed on 12 November 2016).
4. Koçkaya, G., Yenilmez, F. B. and Tuna, E., In Proceedings of ISPOR 19th Annual

European Congress, Vienna, Austria, Abstr, no. PHP 243, October 2016.

5. <http://accesspharmacy.mhmedical.com/content.aspx?bookid=462§ionid=4110076> (accessed on 16 November 2016).
6. <http://effectivehealthcare.ahrq.gov/index.cfm/what-is-comparative-effectiveness-research1/> (accessed on 5 December 2016).
7. <http://www.hopkinsmedicine.org/gim/research/content/pharmacoepi.html> (accessed on 8 December 2016).
8. <http://depts.washington.edu/hserv/hs-research-definitions> (accessed on 12 December 2016).
9. https://en.wikipedia.org/wiki/Patient-reported_outcome (accessed on 25 December 2016).
10. Lyles, A., *Eur. J. Pharm. Sci.*, 2008, **34**, 7–24.

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NEWS

Representation of physical processes in weather and climate models*

The improvement of numerical models for predicting weather and climate at different spatial and temporal scales is being carried out globally. While much progress has been achieved, there are still significant challenges, particularly in the backdrop of enhanced extreme weather events, which need to be addressed with better understanding of physical processes, based on observations and subsequent representation of these processes through improved parameterization. To discuss these issues with emphasis on tropical weather and climate, and also to motivate a good number of students/postdocs/early career scientists, a four-day international work-

shop on 'Representation of Physical Processes in Weather and Climate Models' was held at Indian Institute of Tropical Meteorology, Pune during 13–16 February 2017. Experts and eminent scientists in model development from across the world and from all the leading centres attended and delivered lectures during the workshop. In the panel discussion, it was unanimously recommended that such workshops on parameterization should take place at various places in the country so that they can provide a platform for dialogue between scientists and students involved in research in the field. All the presentations, scripts related to hands-on exercises and video recordings

of the talks are available on-line (https://www.youtube.com/playlist?list=PLgQC-KqNw6z_AndRt11yu5Fr0ZXrV1C6KK) and presentations are available at the following website: <http://www.tropmet.res.in/introspect/>. This note is intended to draw the attention and motivate younger researchers to use the techniques discussed in the workshop for future applications in climate modelling.

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