Original Articles

Analysis of evaluations of health system/policy interventions in India

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ABSTRACT

Background. Analysis of the scope and quality of evaluations of health system/policy interventions done in India is not available. Such analysis can help in conducting more useful evaluations.

Methods. We accessed evaluation reports of health system/policy interventions aimed at improving population health in India, reported during 2001–08, which were available in the public domain through extensive internet searches. We developed and used a classification system for the type of evaluation, commissioning agency, health system/policy area covered and methodology used, and a method for assessing the quality of evaluation reports.

Results. Of the 219 total evaluation reports in the public domain, 6% assessed needs, 22% process, 42% outcome and 30% impact. Seventy-six per cent evaluations were commissioned by international agencies. Among health system components, services were the focus of evaluation in 74.9% of reports, with human resources, financing, drugs/products, information system and governance having little representation. Only 21% of evaluation reports were rated as good quality. Among evaluations based mainly on health system data, 42% were poor quality compared with 20% that were based on population data. Seventy-two per cent of the outcome/impact evaluations presented only basic tabulations and just 12% attempted multivariate analysis. Eighty-two per cent of the outcome/impact evaluations had no controls, among which 42% were poor quality versus 17% poor quality among outcome/impact evaluations with controls. Among the 54% evaluations in which the intervention implementer was involved, only 1% reported negative conclusion about the intervention compared with 37% among evaluations in which the implementer was not involved.

Conclusion. This analysis of health system/policy intervention evaluation reports from India identifies specific areas that need improvement. We recommend that Indian agencies should commission more evaluations as international agencies currently dominate, involvement of intervention implementer in the evaluation needs scrutiny as potential bias is suggested by our analysis, and health system components other than services need more attention. Outcome/impact evaluations need to incorporate controls in design and multivariate techniques more often in their analysis to achieve higher quality robust evaluations in India.

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INTRODUCTION

Evaluation is a systematic assessment of the worth or merit of some object or activity.[1] Evaluations of health system and policy interventions are necessary to understand whether or not such interventions are working and what could be done to enhance them to improve population health. Properly done evaluations can contribute to improving the efficiency and effectiveness of the use of societal resources. The need for such evaluations has been recently emphasized in the literature.[2–5] Strengthening evaluation research has been suggested to be one of the highest priorities for India to facilitate improvements in health outcomes in the population and to reduce health inequities.[6]

To plan for systematic development of evaluations for population health interventions and programmes in a country, it would be useful to have an understanding of the type of evaluations being done, the commissioning agencies, the organizations conducting evaluations, the topics covered and the aspects of quality. Such analysis is not available for India or for most low- and middle-income countries. We conducted such an analysis for evaluations of health system and policy interventions to improve population health in India that were reported from 2001 to 2008 and were available in the public domain through the internet.

METHODS

No specific health system research database was available for identifying evaluations of health system/policy interventions in India reported during 2001–08. We therefore searched the websites of Indian and international organizations to identify reports on evaluations of health system/policy interventions in India published

between 2001 and 2008. The Indian organizations searched included government and non-government organizations. The national health ministry, as well as other relevant national ministries and government agencies were identified using an online directory of government organizations.[7] Non-government, health research and academic organizations were identified using an online database of non-government organizations in India and a directory of health research institutions in India.[8,9] The international organization websites searched included bilateral, multilateral, global health initiatives,[10] other non-government organizations and schools of public health. Websites and identified reports also provided leads to further organizations to search. Google was used to locate websites when a website address was not available. Each organization website was searched and all links followed to identify evaluation reports. Any listing of publications available for download or website database of publications was thoroughly reviewed. A total of 578 websites were searched (Appendix 1. Websites searched for reports on evaluations of health system/policy interventions in India; available at *www.nmji.in*). We aimed to assess evaluation reports other than articles in journals, as such reports often come to the attention of health planners in India whereas journal articles often do not.

A report was considered an evaluation of health system/policy interventions if it dealt with the assessment of needs, process, outcome or impact of an intervention, programme or policy to improve population health.[11] After a literature review of the types of evaluations in public health and social research, and a preliminary scan of the evaluation reports, the following classification was used: *needs assessments* which were conducted to assist planning of specific programmes, *process evaluations* which investigated the process of delivering a programme, *outcome evaluations* which assessed effects of a programme in relation to output objectives, and *impact evaluations* which assessed the overall impact of the outputs.[1,12] If more than one of these aspects were part of the evaluation, it was classified in the higher category, e.g. if an evaluation assessed both process and impact, it was classified as an impact evaluation.

The organizations that commissioned the evaluation and those that conducted it were recorded. The organizations implementing the programme/policy evaluated, and whether they were involved with producing the evaluation report, were also recorded. The organizations were classified under Indian government or non-government organizations, international organizations, or collaborations between Indian and international organizations.

The main health system component evaluated was recorded according to the WHO building blocks of health system as: governance/leadership, health services, health economics/financing, human resources/training, medical products/technologies, or health information system.[13] If the evaluation included several components with no one component as the main focus, it was classified as cross-cutting. Some evaluations of programmes/policies to improve population health did not cover the health system, but instead covered environmental or social determinants of health, and these were classified accordingly. The disease/health condition covered by the programme/policy evaluated by the report was recorded based on the national health programmes and other major health themes.[11,14] In case the evaluation report addressed predominantly a health system component with no one specific disease focus, it was considered to be cross-cutting across all health conditions. The overall conclusion of the process, outcome and impact evaluations regarding the programme/policy evaluated was recorded as positive, neutral or negative, if this was stated or implied in the results and/or interpretation.

The representativeness and geographical spread of the sample used in the evaluation was recorded. We examined the sampling procedure or description of data used by the evaluation to determine whether the sampling was representative of the target population. For example, if random sampling was used this was considered as representative of the population, but if purposive or convenience sampling was used, this was considered as not representative of the population. The geographical spread of the sampling was documented as national, state, district or sub-district. The final categories used for the geographical representation were: nationally representative, representative of multiple states, covering multiple states but not representative of them, representative of one state, representative of multiple districts, covering multiple districts but not representative of them, representative of one district, or covering a sub-district area.

Each evaluation was assessed for study design, type of data used, methods of data collection and analysis. The overall study design was classified based on the major types suggested by the Cochrane Collaboration, which included descriptive case study, cross-sectional study without a control, cross-sectional study with control, before and after study, controlled before and after, and randomized/quasi-random cluster controlled trial.[15] In examining the type of data used, we recorded whether the main data used were from the population or the health system, whether they were primary or secondary, and if secondary whether they were from the routine health information system.[16] Whether the analysis was quantitative only, qualitative only, or both was noted. For the reports with any quantitative analysis, whether univariate, bivariate or multivariate statistics were used was recorded.

Whether the evaluation used triangulation, defined as the use of data from different sources with either similar or differing methodologies to answer the same question was also assessed. The type of triangulation was sub-classified into the type of methods employed: *different data sources* when the type of method used to collect was the same (e.g. two population surveys), *multiple methods* when the methods of data collection were different but both were quantitative or qualitative (e.g. quantitative population survey and quantitative service statistics), and *mixed methods* when different methods were used where one method was quantitative and the other qualitative.[17]

A quality score was assigned for each report based on 7 components: definition of objectives of the evaluation; description of methods; appropriateness of methods; clarity of results; level of analysis; appropriateness of interpretation of the findings; and relevance to informing further improvements in public health programmes and policies. A score of 0 to 3 was assigned for each component based on generally accepted quality norms for research outputs, where 0 was completely inadequate, 1 was somewhat inadequate/not meeting reasonable standard, 2 was adequate/meeting reasonable standard, and 3 was excellent implying close to ideal. The aggregated quality score out of 21 for each evaluation was converted into a per cent score. Evaluations that scored 33% or less were considered *poor*, those with a score of 34%–66% were considered *fair*, and those with a score of 67% or more were considered of *good* quality. This quality scoring system is similar to the one that we used previously in an assessment of public health research output from India.[11] Trial runs of this scoring system were performed on a sample of reports by all authors and insights from these were discussed to arrive at a consistent approach. One author assessed all reports. In case of any doubt

while scoring, input was obtained from the other two authors for a decision. In addition, the scoring of a sample of the reports was reviewed by the other two authors; no major differences were found from the original assessment.

Data were entered into a database in MS Access 2007 and analysed using SPSS 17 software (SPSS Inc, Chicago, USA). Chi-square test was used for statistical comparison between the groups.

RESULTS

We identified 219 reports on evaluation of health system/policy interventions in India from 2001 to 2008 (Appendix 2; Identified reports on evaluation of health system/policy interventions in India, available at *www.nmji.in*). Of these, 13 (5.9%) were needs assessment, 48 (21.9%) process evaluations, 92 (42%) outcome evaluations and 66 (30.1%) impact evaluations. The number of reported evaluations almost doubled from 77 during 2001–04 to 142 during 2005–08.

Of the 191 evaluation reports for which the commissioning agency could be identified, 75.9% were international organizations, 21.5% were Indian organizations and 2.6% were collaborations between Indian and international organizations (Table I). The proportion of evaluations commissioned by Indian organizations increased slightly from 14.1% during 2001–04 to 25.2% during 2005–08 (χ^2=3.13, p=0.08). Of the 215 evaluation reports for which the organization conducting the evaluation could be identified, 43.3% were by international organizations, 41.4% by Indian organizations and 15.3% were by collaborations between Indian and international organizations (Table I). The proportion of evaluations conducted by collaborations between Indian and international organizations changed from 11.7% during 2001–04 to 17.4% during 2005–08 (χ^2=1.24, p=0.27).

Among health system components, health services were the focus of evaluation in 74.9% reports, with human resources, financing, drugs/products, information system and governance having sparse representation (Table II). Environmental or social system/policy interventions related to health were the topic of evaluation in 7.8% of the reports. The most common disease/health condition addressed by the health system/policy evaluations was reproductive and child health (42%) followed by HIV/AIDS (13.7%) and tuberculosis (5%; Table III). Evaluations of health system/policy interventions for chronic non-communicable diseases and injuries changed from 2.6% of the total during 2001–04 to 9.9% during 2005–08 (χ^2=3.88, p=0.05); this was quite low as compared with their contribution to the disease burden in India.

TABLE I. Organizations that commissioned and conducted the evaluations during 2001–08

Organizations	Commissioned *n* (%)	Conducted *n* (%)
Indian organizations	*41 (21.5)*	*89 (41.4)*
Government organizations	34 (17.8)	20 (9.3)
Central Ministry of Health and its agencies	23 (12.0)	15 (7.0)*
Other central ministries and government agencies	7 (3.7)	5 (2.3)†
State or local government agencies	4 (2.1)	0
Not-for-profit health research institutions	4 (2.1)	22 (10.2)
Not-for-profit research institutions	2 (1.0)	25 (11.6)
For-profit private organizations	0	10 (4.7)
Medical and paramedical academic institutions	0	7 (3.3)
Collaborations between Indian organizations	1 (0.5)	5 (2.3)
International organizations	*145 (75.9)*	*93 (43.3)*
Multilateral organizations	46 (24.1)	29 (13.5)
Bilateral organizations	76 (39.8)	12 (5.6)
Others‡	10 (5.2)	42 (19.5)
Collaborations between international organizations	13 (6.8)	10 (4.7)
Collaborations between Indian and international organizations	*5 (2.6)*	*33 (15.3)*
Indian government organizations and international organizations	4 (2.1)	10 (4.7)
Other Indian organizations and international organizations	1 (0.5)	23 (10.7)
Total	191§ (100)	215§ (100)

* This includes 1 evaluation (0.5% of total) conducted by the Indian Council of Medical Research institutes

† This includes 3 evaluations (1.4% of total) conducted by the Indian Council of Social Science Research institutes

‡ These include foundations, not-for-profit health research and not-for-profit research organizations for commissioning; and include foundations, university departments, not-for-profit health research, not-for-profit research and for-profit research organizations for conducting evaluations

§ Of the total 219 evaluation reports, 28 did not have a commissioning organization and 4 did not mention the conducting organization

TABLE II. Health systems and environmental/social components evaluated in the reports

Component	Evaluated during 2001–08, *n* (%)
Health system component	*202 (92.2)*
Health services	164 (74.9)
Health economics/financing	9 (4.1)
Human resources/training	7 (3.2)
Governance/leadership	7 (3.2)
Medical products/technologies	6 (2.7)
Health information system	5 (2.3)
Cross-cutting*	4 (1.8)
Environmental/social component	*17 (7.8)*
Water and sanitation	5 (2.3)
Indoor air pollution	3 (1.4)
Outdoor air pollution	1 (0.5)
Gender issues	7 (3.2)
Human and civil rights	1 (0.5)
Total	219 (100)

* Evaluations including more than one health system component with no one component as the main focus were classified as cross-cutting

TABLE III. Disease/health condition addressed by evaluations

Disease/condition	Evaluations done during, *n* (%)		
	2001–04	2005–08	2001–08
Reproductive and child health	34 (44.2)	58 (40.8)	92 (42.0)
HIV/AIDS	9 (11.7)	21 (14.8)	30 (13.7)
Tuberculosis	4 (5.2)	7 (4.9)	11 (5.0)
Nutrition	1 (1.3)	8 (5.6)	9 (4.1)
Injury	1 (1.3)	6 (4.2)	7 (3.2)
Diabetes and cardiovascular disease	0 (0.0)	5 (3.5)	5 (2.3)
Oral health	0 (0.0)	4 (2.8)	4 (1.8)
Vector-borne diseases	2 (2.6)	1 (0.7)	3 (1.4)
Blindness	1 (1.3)	1 (0.7)	2 (0.9)
Mental health	0 (0.0)	2 (1.4)	2 (0.9)
Leprosy	0 (0.0)	2 (1.4)	2 (0.9)
Iodine deficiency	0 (0.0)	1 (0.7)	1 (0.5)
Others*	6 (7.8)	3 (2.1)	9 (4.1)
Cross-cutting†	19 (24.7)	23 (16.2)	42 (19.2)
Total	77 (100)	142 (100)	219 (100)

* Includes 4 evaluations of system/policy interventions related to water and sanitation, 3 related to indoor air pollution, 1 related to outdoor air pollution and 1 related to Avian influenza

† Evaluations addressing predominantly a health system component with no one specific disease focus were classified as cross-cutting

Of the 219 evaluation reports, 74 (33.8%) were rated as poor quality with a score of 33% or less, 99 (45.2%) were rated as fair quality and only 46 (21%) as good quality. The proportion of poor quality reports was much lower for evaluations conducted by collaborations between Indian and international organizations as compared with those conducted by either Indian or international organizations (χ^2=12.5, p=0.0004; Table IV). Of the 158 outcome or impact evaluations, 129 (81.6%) had no controls (Table V). Of these 129 evaluations without controls, 54 (41.9%) were poor quality whereas among the 29 outcome/impact evaluations with controls 5 (17.2%) were poor quality (χ^2=6.13, p=0.01). Eighty-eight (55.7%) of the outcome/impact evaluations had both quantitative and qualitative analysis, 59 (37.3%) had only quantitative analysis and 11 (1.5%) had only qualitative analysis. Of the 147 outcome/impact evaluations that included quantitative analysis, 72.1% presented only basic tabulations, 16.3% presented bivariate analysis and only 11.6% presented multivariate analysis. About half of those with basic tabulations alone were scored as poor quality. Advanced analysis was more frequent in the evaluations with controlled study designs (χ^2=14.49, p=0.0001; Fig. 1). Of the 158 outcome or impact evaluations, only 9 (5.7%) had triangulation of some kind, which included 3 (1.9%) that used different data sources, 1 (0.6%) that used multiple method and 5 (3.2%) that used mixed methods.

The main data on which the evaluation was based were from the health system in 138 (63%) reports and from the population/patients in 81 (37%). Among evaluations based mainly on health system data, 42% were poor quality whereas 19.8% were poor quality among those based on population data (χ^2=11.32, p=0.0008). Of the 219 reports, 30 (13.7%) used data from the routine health information system in some form.

Of the 158 outcome/impact evaluations, 77 (47.8%) had sampling that was representative of the areas covered in the evaluation whereas the remaining had non-representative samples (Table VI). Interestingly, the proportion of evaluations with a representative sample dropped from 57.6% during 2001–04 to 43.4% during 2005–08 (χ^2=2.98, p=0.08).

TABLE IV. Organizations conducting evaluation and report quality

Organization conducting evaluation	Quality of evaluation report			Total
	Poor	Fair	Good	
Indian organizations	28 (31.5)	42 (47.2)	19 (21.3)	89 (100)
International organizations	40 (43.0)	40 (43.0)	13 (14.0)	93 (100)
Collaborations between Indian and international organizations	2 (6.1)	17 (51.5)	14 (42.4)	33 (100)
Total	70 (32.6)	99 (46.0)	46 (21.4)	215* (100)

* Of the total 219 evaluation reports, 4 did not mention the conducting organization

TABLE V. Study design of outcome and impact evaluations

Study design	*n* (%) of outcome and impact evaluations
Without controls	*129 (81.6)*
Descriptive case study	30 (19.0)
Cross-sectional without control	29 (18.4)
Before and after without control	70 (44.3)
With controls	*29 (18.4)*
Cross-sectional with control	7 (4.4)
Before and after with control	19 (12.0)
Quasi-experimental design or randomized controlled trial	3 (1.9)
Total	158 (100)

In 200 reports on process, outcome or impact evaluation, it was possible to assess whether the agency implementing the intervention being evaluated was involved with the evaluation or not. Among these, the implementing agency was involved with 108 (54%) evaluations. This seems to have biased the overall conclusion of the evaluation, with only a minute fraction of such evaluations reporting a negative conclusion as compared with a much higher proportion among evaluations in which the implementing agency was not involved (χ^2=44.67, p<0.0001; Fig. 2).

DISCUSSION

Evaluation research has been identified as a major priority in India to bring about more effective improvements in population health.[6] The analysis reported in this paper on evaluation of health system and policy interventions available in the public domain in India provides a composite picture of the organizations involved with the evaluations, topics covered, methods and analysis used, and quality of evaluations.

That only 1 of every 4 evaluations of health system/policy intervention in India are commissioned by Indian governmental organizations, with the vast majority by international agencies, is of concern as it implies that evaluations are not high enough on the health planning agenda in India. This anomaly must be corrected urgently.

Health services were the focus of 3 of every 4 evaluations. The poor attention given to input components of the health system, such as human resources, financing, drugs and health products,

TABLE VI. Geographical representativeness of sampling for outcome/impact evaluations

Sample	Evaluations done during, *n* (%)		
	2001–04	2005–08	2001–08
Representative	*34 (57.6)*	*43 (43.4)*	*77 (48.7)*
Nationally	8 (13.6)	18 (18.2)	26 (16.5)
Multiple states	11 (18.6)	6 (6.1)	17 (10.8)
One state	6 (10.2)	10 (10.1)	16 (10.1)
Multiple districts	4 (6.8)	4 (4.0)	8 (5.1)
One district	5 (8.5)	5 (5.1)	10 (6.3)
Non-representative	*25 (42.4)*	*56 (56.6)*	*81 (51.3)*
Multiple states	10 (16.9)	25 (25.3)	35 (22.2)
Multiple districts	3 (5.1)	10 (10.1)	13 (8.2)
Sub-district	12 (20.3)	21 (21.2)	33 (20.9)
Total	59 (100)	99 (100)	158 (100)

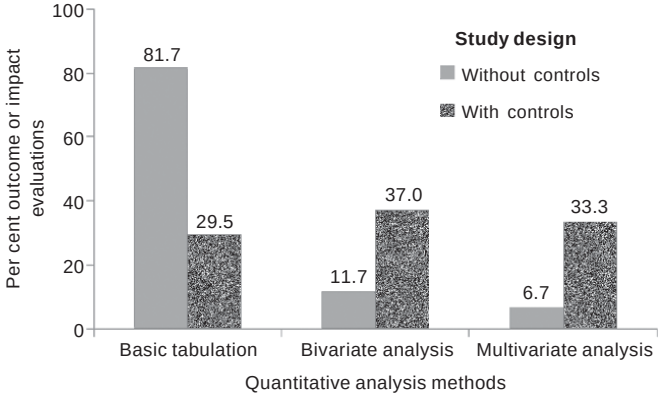

FIG 1. Analysis methods used in outcome and impact evaluations

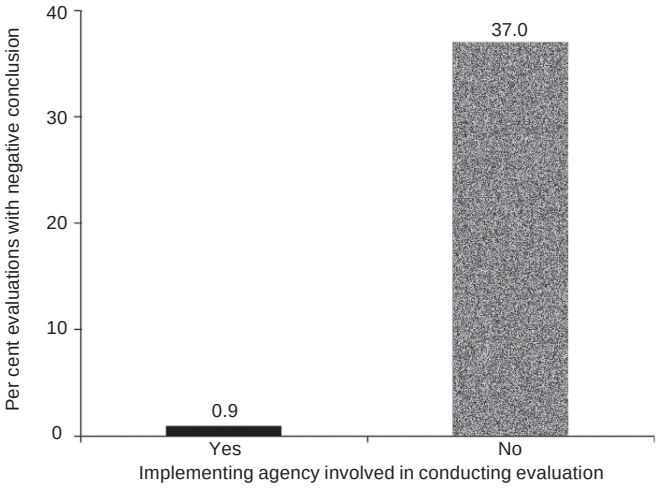

FIG 2. Relation between intervention implementing agency involvement in conducting evaluation and conclusion of evaluation about intervention

information system, and governance, is an ominous indicator because without proper attention to components of the health system that enable health services the likelihood of improving population health in a sustainable manner is reduced.[13,18] The relatively scanty focus on evaluations of environmental and social interventions related to population health is also an important aspect that needs to be addressed as health of societies is influenced substantially by these distal determinants.[19]

With a major portion of disease burden in India now attributed to chronic non-communicable diseases and injuries,[20] the low proportion of evaluations of system/policy interventions related to these are in part because the focus on these conditions has come about only over the past few years in India.[21,22] As population-level interventions for chronic non-communicable diseases and injuries are in a relatively early stage of development, this provides an opportunity to integrate systems/policy evaluations with the interventions. This opportunity must not be lost.

Only one-fifth of the evaluation reports were scored as having good quality and one-third as poor. Evaluations conducted by collaborations between Indian and international organizations produced substantially better quality reports than those conducted by either alone. This phenomenon was also observed in all public health research reports previously,[11] and reaffirms the value of bringing together complementary skills and perspective for good quality evaluations. Four out of every 5 outcome/impact evaluations had no controls in the study, which is a big problem as inferences without controls would generally not be robust. Of the outcome/impact evaluations with quantitative analysis, 72% had only basic tabulations and <12% included multivariate analysis. Less than 6% included triangulation of any sort. Another finding of concern in our analysis is that the proportion of outcome/impact evaluations with a representative sample was less than half and dropped from 58% during 2001–04 to 43% during 2005–08. These findings point to serious deficiencies in the design and analytical approach, which if not addressed would result in continuing poor or mediocre quality evaluations in India.

The finding that evaluations based on health system data had a substantially higher proportion of poor quality than those based on population data confirms the notion that skills to analyse health system data in India are even more deficient than those needed for population data analysis. Special attention is needed to develop these analytical skills in India as these are necessary to develop a health system that can hope to be equitable and to achieve universal healthcare in India.[6,23] The use of routine health information system data was infrequent in the evaluations. If such data were available and used, the evaluations of large scale health system/policy interventions would be more efficient and widely applicable.[5] Systems to improve the availability of relevant health information data collected on an ongoing basis and its real-time utilization must therefore be developed further in India on a high priority.[24]

In our analysis, in just over half the evaluations the agency implementing the intervention that was evaluated was involved with the evaluation. Among these evaluations <1% reported a negative conclusion about the intervention that was evaluated, whereas the proportion with negative conclusions was 37% among the other evaluations. While it is possible that involvement of the implementing agency could better inform the evaluation, the difference in the proportion of negative conclusion is so striking that this involvement must be scrutinized if the conclusions of the evaluations in India have to be robust and useful for improving population health.

Our analysis has several limitations. First, this analysis is based on evaluation reports of health system/policy interventions available through internet searches. Accessing evaluation reports not available in the public domain is challenging as many evaluation reports are guarded by the commissioning agencies and often not shared. This highlights the need for making all evaluations readily available in the public domain as a public good. It is possible that evaluations reported in the second half of 2000–08 may have had a higher likelihood of being placed on the internet, so our findings should be interpreted keeping this possibility in mind. Second, we did not include in our assessment the few articles on evaluations published in journals. Our reasoning for this was that reports rather than journal articles more often come to the notice of health planners. However, in the past couple of years several evaluations of major health system/policy interventions have been published in journals. Future studies would therefore benefit from including these in the assessment as well. Third, our quality scoring system could have been biased by the authors' perceptions of what constitutes good quality in research reports. We believe however that even with these limitations our analysis of the readily available evaluations provides an initial overview of the state of evaluations of health system/policy interventions in India over most of the past decade.

The findings in this paper can be used to correct the current deficiencies in the approach, design and analysis of evaluations of health system/policy interventions in India. These corrections are necessary for developing evaluation research in India, which in turn is necessary for more effective and efficient improvement of population health. Policy-makers, academics and other stakeholders need to pay a lot more attention to emphasizing, commissioning, conducting and disseminating relevant and robust evaluations than has happened so far in India. This effort would benefit from taking into account the methodological issues related to evaluations that are being discussed globally.[3,5] Investment in developing strong methodological skills in evaluation research in India would serve population health well.[6]

In summary, this composite analysis of health system/policy intervention evaluation reports from India identifies specific areas that need improvement. Indian agencies should commission more evaluations of health system/policy interventions as international agencies currently dominate. The poor representation

of components of the health system other than health services, as well as chronic diseases and injuries, should be addressed systematically. The outcome and impact evaluations should incorporate controls and representative samples in the design and multivariate techniques in the analysis more often to achieve higher quality evaluations in India. Involvement of intervention implementer in conducting the evaluation should be under strict conditions as our analysis suggests a potential bias due to this towards favourable conclusions from the evaluation. As collaborations between Indian and international organizations in conducting evaluations result in better quality reports, such collaborations should be encouraged when feasible.

Competing interests. None

Authors' contributions. LD conceived this research and led the design, analysis and interpretation. MZR made major contributions to the design, conducted the data analysis and participated in the interpretation. RD contributed to the design, analysis and interpretation. All authors approved the final version of the manuscript.

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