Which Interventions should be Included in National Health System Assessment Framework? Selecting Essential Interventions Based on Effective Coverage Approach

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Abstract

Background: Coverage of population with essential health services should be regulated into any local framework for monitoring progress towards UHC. **Aim:** The present study was conducted to find out the essential health care interventions in Iran UHC monitoring system. **Methods:** 23 experts participated in this study. Semi structured questionnaires were completed and data were analyzed using quantitative content analysis. **Findings:** Interventions in each following level were extracted reflecting Iranian health system priorities; Promotion services: modifying non-communicable diseases risk factors, training and counseling regarding sexual and mental health, prevention of smoking and substance abuse and promotion of safety and traffic culture. Preventive care: diabetes and hypertension screening, prenatal and antenatal care, HIV/Aids and hepatitis screening, breast, cervical and lung cancer screening, prevention of osteoporosis and DPT and Tetanus immunization. Treatment: treatment of diabetes and hypertension, mental disorders, HIV/Aids, cardiovascular disease, upper respiratory infections; surgical treatments for trauma and accidents, arthritis and disc, hospital care for prematurity and smoking cessation. Rehabilitation services: rehabilitation of cardiovascular diseases, cancer, trauma and accidents, musculoskeletal disorders and mental illnesses. Prevalence rate, mortality, disease related complications, and burden of disease were among the most frequent criteria for selecting essential interventions. **Conclusion:** Selecting the optimal set of interventions is generally the starting point of the designing an assessment framework. Every country based on their health needs as well as epidemiology and demographic situations needs to create measures to assess coverage of essential interventions selected based on logical criteria.

Keywords: Health system assessment framework; Effective coverage; Essential interventions; Intervention selection criteria; UHC monitoring

Introduction

Delivering health care interventions is the central task of health systems. Tracking performance and identifying whether the tasks are implemented well or not can help guide decision-making processes and lead to good policy formulation in way of make improvements in health systems. [1] Assessment of health system interventions and programs in low and middle-income countries provides data on the individuals who should be targeted for the detection, care and treatment of health problems and where additional resources and efforts are to be targeted. [2]

Currently, what is emphasized in Universal Health Coverage (UHC) as a broader international effort in the health sector as well as a part of the post-2015 health systems development agenda, is the importance of population coverage with high quality interventions. [3] The World Health Organization (WHO) defines UHC as a situation where all people who need health services (prevention, promotion, treatment, rehabilitation and palliative care) receive them, without incurring financial hardship. [4] As UHC was perceived as a crucial component of sustainable development, its promoting has been the paramount part of most of low and middle income countries' health system development strategy. [5] However, discussions on the suitability of UHC often focus on its capability to monitor and its function in improvement of health systems. [6,7]

In 2003, the concept of effective coverage was introduced and its measurement was suggested by WHO to be incorporated into health system performance assessment based on preliminary efforts of Shengelia and colleagues in early of 2000. [8] In their introduced concept, effective coverage that combines three widely used components of need, utilization, and quality of healthcare interventions, were defined formally as "the fraction of potential health gain that can be delivered through an intervention by the health system that is actually delivered. [1,8]

As it was mentioned above, UHC is defined as the proportion of population in need of an intervention who are using an effective intervention without falling into financial hardship. [9] Effective coverage unites intervention need, use, and quality into a simple but data-rich metric, reflecting the core components of UHC (19). The measurement of effective coverage for a range of diseases and conditions along with financial protection represents a critical component to move and track progress towards UHC. [3] In other words, measuring coverage of the population with essential and effective health services (effective coverage), is exactly what comprises the UHC monitoring framework. [10] These are why the effective coverage has been suggested as a metric for monitoring UHC. [11]

The first step in designing a health system assessment framework with effective coverage or any other measurement strategy is selecting the optimal set of interventions that will be assessed or monitored. But based on what criteria this set of interventions should be included in the assessment framework of the UHC or health system of a particular country? Presenting a health system assessment framework completely depends on the kind and level of interventions selected for monitoring. If this task is not performed well, the assessment results may lead to misunderstanding and misguided decision making in the process of development of health system delivery.

To date, several global frameworks have been developed in order to track progress to UHC and health system performance assessment. Preparing a local and country level framework, however, according to health profile and characteristics of each country is inevitable.

As it is mentioned, coverage of population with needed quality interventions is one of the main components of UHC. In order to set goals to move to UHC and track any efforts in this area, therefore, two main questions should be answered to first:

- What are the essential and needed interventions in monitoring context and

- What are the main criteria for selecting these interventions?

The aim of this study as a part of broader project is to answer these main questions in Iran health system.

Methods

This study was performed as part of a broader project aimed to provide a framework for assessing effective coverage of health services in Iran in 2017. In this paper, we present a start point of this project which includes selecting essential and high priority interventions for assessment as the first and main step of assessing effective coverage of health systems.

Data collection

We designed a semi-structured data collection tool including two parts: the first was to gather demographic characteristics of the participants such as gender, age, educational background and field of study, work experience, and current position. The second and main body of the questionnaire included two main questions concerning the essential interventions of health system in full spectrum of promotion, prevention, treatment and rehabilitation as well as the criteria for suggesting or selecting each intervention. The participants were purposively selected based on their academic and research background or job experiences making them have insights to the subject. The questionnaires were completed through individual interview sessions, holding expert panels, and electronically via e-mail. Aim of the work was presented at the beginning of the interview meetings and panels and then the participants were asked to complete the questionnaires. For the participants to whom the questionnaire was sent electronically, we sent a fifteen-minute video-including the aim of the project along with the questionnaire and requested them to complete the questionnaire after watching that.

Data analysis

We applied a deductive quantitative analysis approach and used descriptive quantitative content analysis method to analyze the collected data. Words and phrases were selected as coding unit based on the research questions and the concepts to be identified. A coding scheme was designed for developing coding classification rules including assigning 0 and 1 to two main categories namely interventions and criteria and 1 to 4 to four subcategories namely four ranges of services (promotion, prevention, treatment, and rehabilitation) respectively in each main category. During the coding process, each numerical code was assigned to the proper category. The numeric codes were assigned to the data manually by the first author (VS). For the coding process, we prepared a coding form in Access 2010 database which then was transferred into STATA 14 for descriptive analysis.

Results

Twenty three experts participated in the study and 16 completed questionnaires were collected. Some of the panel participants jointly completed the questionnaire because they were from the same expert groups such as health or treatment. The majority of participants were faculty members and about 80% with work experiences up to 10 years. Table 1 summarizes the other demographic characteristics of the participants in the study.

Based on descriptive analysis of collected data, the observed records in each of the four levels of intervention delivery are shown in Table 2. As this table shows, the records are almost appropriately distributed among the main (interventions and criteria) and the secondary categorizes (promotion to rehabilitation). However, the highest and lowest frequencies of records were related to prevention and rehabilitation levels, respectively.

We present the main findings of this study in two parts: First, essential interventions proposed by the participants in order to be included in effective coverage assessment framework in four levels, and then in the next step, the main criteria for selecting these interventions. Findings in each two parts are presented based on the most frequently stated cases. Table 3 summarizes priority interventions in four domains of care according to the participants' points of view.

Interventions

Promotion: As to promotion services, the words such as training and consultation were used by the participants to specify interventions. The most frequent codes were related to non-communicable and chronic diseases risk factors such as physical activity and nutrition. The other essential interventions according to experts' viewpoints included training and
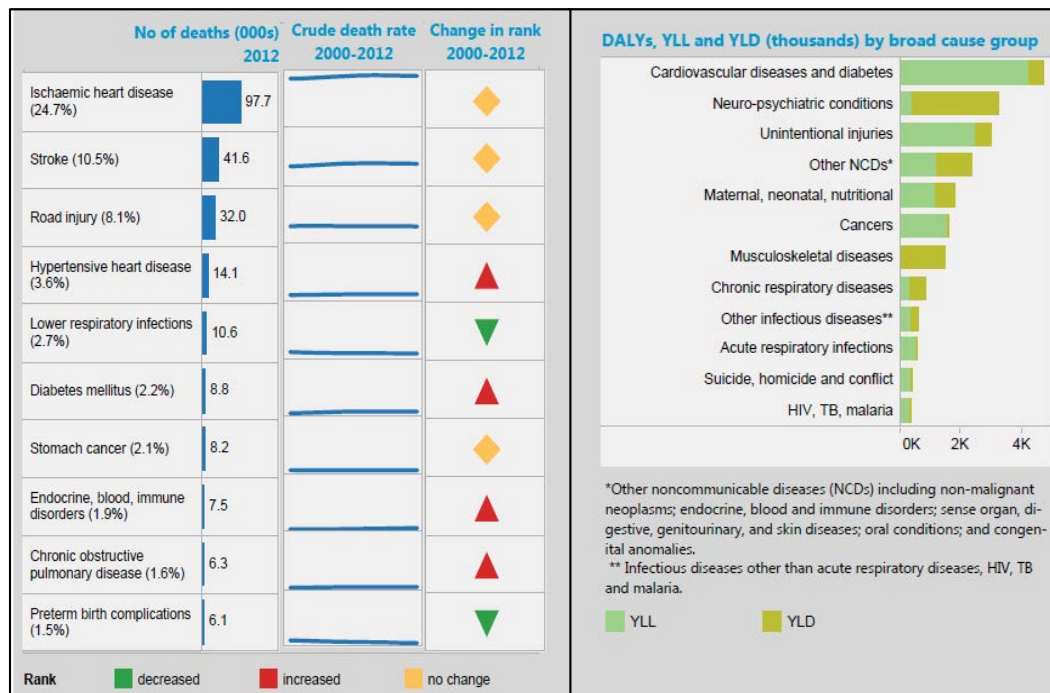

Figure 1: Top causes of death and burden of disease in Islamic Republic of Iran in 2012.

Table 1: Demographic characteristics of the participants in the study.			
	Sub-group	Frequency (n)	Percent (%)
Gender	Male	17	73.91
	Female	6	26.09
Age	30-40	6	26.09
	41-50	11	47.83
	51-60	6	26.09
Work experience	0-10	5	21.74
	11-20	11	47.83
	21-30	7	30.43
Specialty	Health Services Management	4	17.39
	Clinical Specialist	4	17.39
	General Medicine	3	13.04
	Epidemiology	3	13.04
	Community Medicine	2	8.7
	Health Policy	2	8.7
	Epidemiology/Health Management	1	4.35
	Health	1	4.35
	Health Management	1	4.35
	Physiotherapy	1	4.35
	Nursing	1	4.35
Current position	Faculty member	9	39.13
	Health manager	4	17.39
	Health expert	3	13.04
	PhD student/Health expert	3	13.04
	Head of university/Faculty member	1	4.35
	Head of hospital/Faculty member	1	4.35
	Head of Educational Deputy/Faculty member	1	4.35
	Head of Education Development Center	1	4.35

Table 2: Descriptive analysis of the observed records.

Records	Intervention		Criteria	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
	534	57.61	393	42.39
Intervention delivery level				
Promotion	150	28.09	106	26.97
Prevention	165	30.90	132	33.59
Treatment	121	22.66	87	22.14
Rehabilitation	98	18.35	68	17.30

Table 3: High priority interventions mentioned by the experts.

	Intervention scope	Condition/Disease	Target Group	Target
Promotion				
	Training	Risk factors (nutrition, physical activity)	Middle aged and adults	Modifying non-communicable and chronic disease risk factors, Improving lifestyle
	Training, Consultation	Sexual health	Students and teenagers	Prevention of sexual problems
	Training, Consultation	Mental health	Students and teenagers	Prevention of mental illnesses
	Training	Traffic culture	the public	Promotion of community safety
	Prevention	Smoking, substance abuse		Prevention of smoking and substance abuse
Prevention				
	Screening	Non-communicable and chronic diseases (Diabetes, hypertension)	Adults	Prevention of cardiovascular diseases
	Care	Prenatal, antenatal and childbirth	Pregnant women	Prevention of pregnancy Complications on mother and child
	Identifying Positive Cases	Infectious diseases(HIV/Aids and hepatitis)	High risk groups	Early diagnosis and treatment
	Screening	Breast cancer	Women	Early diagnosis and treatment
	Screening	Cervical cancer	Women	Early diagnosis and treatment
	Screening	Lung cancer	Adults	Early diagnosis and treatment
	Prevention	Osteoporosis	old people	
	Immunization	DPT vaccination	adults	Prevention of vaccine-Preventable diseases
	Immunization	Tetanus vaccination	Pregnant women	Prevention of vaccine-Preventable diseases
Treatment				
	Control	Non-communicable and chronic disease (Diabetes, hypertension)	Patients	Prevention of complications and cardiovascular disease
	Treatment	mental disorders (depression)	Patients	Prevention of illness progression or acute condition
	Treatment	infectious Diseases(HIV/Aids)	Patients	increase longevity
	Surgery	Trauma and accidents	Injured people with trauma and disabled people	Improving quality of life
	Treatment	Cardiovascular disease	patients	Increase longevity
	Surgery	orthopedic (arthritis, disc)	people with hard Musculoskeletal disorders	Improving quality of life
	Treatment	Respiratory infections (upper)		
	Treatment	Neonatal diseases (prematurity)	Neonates	Reducing infant mortality
	Cessation	Smoking and addiction	Smokers and addicts	Prevention of related Complications
Rehabilitation				
	Rehabilitation	Cardiovascular diseases (Myocardial infarction, stroke)	Stroke patients and patients with heart surgery history	Prevention of attack recurrence or its complications
	Rehabilitation	cancer	patients	Improving quality of life in patient and patient family
	Rehabilitation	Trauma and accidents	Injured people with trauma and disabled people	Improving quality of life
	Rehabilitation	Musculoskeletal disorders (lumbar disc)	Patients with surgery history or disabled people	Improving quality of life, returning to job
	Rehabilitation	mental illnesses	patients	

Table 4: High priority selection criteria mentioned by the experts.

Criteria	Promotion	Prevention	Treatment	Rehabilitation	Total frequency
Prevalence rate	9	10	8	7	34
Mortality	6	6	4		16
Prevention of complications		9	7		16
Quality of life			1	15	16
Severity of following complications	3	6	4		13
Burden of disease	1	5	5	1	12
Impact on health promotion	5	3			8
Prevention of death	4	5	4		8
Service universality	4	2	1	1	8
The main cause of hospitalization			7		7
Cost effectiveness	1	2	2	1	6

counseling on sexual health and mental health, especially at school age. Also, prevention of smoking and substance abuse and promotion of safety and traffic culture were among the mentioned essential interventions. The main target groups in this area were adults and school students [Table 3].

Prevention: As it was mentioned, the most observed codes (31%) were related to preventive services. The most frequent word suggested by the experts in this area was screening and identifying new cases with 21 records. Among chronic conditions, diabetes and hypertension obtained high rank of records. The other high priority interventions in this group were cancers. Moreover, the experts focused on pregnancy care and immunization. As Table 3 shows, the main target groups in preventive services were women and adults.

Treatment: The participants tried to specify interventions of this category through words of control, treatment, and surgery. Among chronic conditions like the ones mentioned in prevention services, diabetes and hypertension obtained high frequency of records. The other priorities in this area were related to surgical treatments including trauma and accidents and orthopedic conditions. The target group of this domain was obviously patients. The other selected treatment interventions have been shown in Table 3.

Rehabilitation: According to the participants' opinions, rehabilitation of cardiovascular diseases obtained the highest records. At this level, the majority of observed codes were related to the mentioned interventions and the number of unique codes and codes with low frequency were lower than the other levels indicating the high agreement among experts opinions at this level compared to the others. Rehabilitation of cardiovascular diseases, especially stroke and myocardial infarction, cancers, trauma and accidents, musculoskeletal disorders and mental illnesses were among high priority suggested interventions.

Intervention selection criteria

In this section, we present the most important criteria for choosing essential services based on the participants' opinions. Prevalence rate of diseases or conditions was the main selection criterion in all of four intervention levels with the highest record. The other priority criteria were mortality, prevention of complications, severity of following complications, and burden of disease. Some high priority criteria were choosing the cause in special areas such as quality of life and being among main

causes of hospitalization, which were the selection criteria in rehabilitation and treatment respectively. Other criteria have been shown in Table 4.

Discussion

First step in designing and implementing effective coverage as a performance assessment tool is selection of essential interventions. [11] It is obvious that given the broad range of health services delivered by health systems, it is impossible to include all health services in the national health system assessment framework. [11,12] Achieving the optimal set of interventions, therefore, is inevitable. It is clear that this optimal set of interventions vary across countries as a function of national epidemiology and other characteristics. [1] In health system assessment efforts, priority interventions which could both address the most important health needs of population and be a good set of proxies at all levels of the health system and at full spectrum of services from promotion and prevention to treatment and rehabilitation should be considered. [10]

As the first attempt in developing practical concept of effective coverage in Mexico, effective coverage was measured for some proxy public health interventions. [13] However; there have been some criticisms on this effort due to lack of obvious selection process of interventions. [14]

In addition to covering all range of services, a proper effective coverage assessment framework should create a good balance between services, various sex and age groups and communicable and Non-Communicable Disease (NCDs) within each area (promotion to rehabilitation). [6] As the findings of the study show, a good distribution of interventions has been made among all range of the services based on the participants' points of view. This distribution is also evident among services in different age and sex groups as well as communicable and non-communicable diseases [Table 3].

It is more important to pay attention to these issues in designing performance assessment frameworks in low and middle income countries experiencing epidemiological transition. Monitoring effective coverage of health system in these countries should include both sets of interventions focusing on communicable diseases, maternal and child health, and interventions with a focus on addressing NCDs, mental health, and injuries for adolescents, adults, and the elderly. [15,16] Iran is such a country that experiences a rapid epidemiological transition with an

increase in the burden of NCDs. [17] Therefore, considering these chronic conditions such as hypertension and diabetes with high prevalence rate is necessary, as the estimated effective coverage for them in practical efforts is very low in similar contexts. [2,13,16,18,19]

After promotion of risk factors in adults, sexual and mental health education and consultation at school ages have been one of the priority areas in promotion services based on the participants' opinions. Based on WHO statistics, neuro-psychiatric conditions has the greatest burden of disease after cardiovascular diseases and diabetes with the highest amount in years of healthy life loss due to disability (YLD) among other diseases [Figure 1].

The suggested interventions in prevention care included screening NCDs, especially diabetes and hypertension and common cancers, maternal and child interventions, immunization, and identifying positive cases of infectious diseases. Measuring effective coverage of maternal and child health interventions was one of the selection priorities in the majority of practical efforts having been ever done on measuring effective coverage. [2,13,16,20] It also was a high priority area proposed by the 2001 technical consultation for selecting interventions for effective coverage assessment because of their ability to produce a significant health gain in a relatively short time, their correspondence to the priorities and objective needs of the countries, existence of ample evidence for their effectiveness and being a response to a significant health problem at national and regional levels. [21] Furthermore, there is relatively little additional cost to obtaining the data for calculating effective coverage for these interventions. [15]

Other preventive services, such as vaccination, have also been the subject of assessment in practical experiences of effective coverage. [22-24] Effective coverage of these obligatory public health functions, are important in contributing to the achievement of health system goals. [25]

As Figure 1 shows, ischemic heart disease, stroke, road injury, hypertensive heart disease, diabetes mellitus and preterm birth complication were among the top 10 causes of death in Iran in 2012. Moreover, cardiovascular diseases and diabetes, cancers, musculoskeletal diseases, maternal and neonatal problems and injuries were among the top ranks of the burden of disease. All of these are along with the participants' viewpoints, especially in treatment services, representing Iran's health system priorities.

While, a comprehensive assessment framework should capture all levels of services, [10,15,26] based on our review, however, there has not been any practical effort on measuring effective coverage of rehabilitation services until now. Rehabilitation reduces hospital stays and thereby costs, it also reduces disability, and improves quality of life. [27] Due to high rates of myocardial infarction, stroke and trauma in Iran, therefore, the assessment of rehabilitation services related to them is essential for achieving the mentioned goals.

In order to develop a global framework and guide countries to design a local framework to assess UHC, the Bellagio meeting has proposed a set of criteria for selection of intervention coverage indicators for the countries that have limited capacity to monitor progress. Some of these main criteria include public health priority, proven interventions with large health impact, measurability (numerator & need), quality component, universality, equity, data availability, and potential financial risks to users. [6] Also, it has been recommended that some considerations should be considered regarding the selection of interventions in assessing effective coverage including burden of disease, affordable interventions, and special considerations of social priority. [1]

According to the participants' point of views, prevalence rate was the most frequent criterion for selecting essential interventions [Table 4] one of which represents public health priority. Mortality, disease related complications, and burden of disease were among other important criteria recommended by the experts. Table 4 shows the other main criteria.

So far, a number of key criteria have been suggested in theoretical discussions and then have been applied in practical experiences. Criteria for selection of interventions in Mexico were based on the projected impact of interventions on the burden of disease, affordability, potential impact on health disparities, and the ability to extrapolate from those interventions to others. [12] To measure the effective coverage of health interventions in China, Liu and his colleagues selected those interventions that represent China's major health problems that target the most common diseases and their risk factors. However, on the basis of data availability, they could measure effective coverage only for a few numbers of interventions. [19] Although Martinez and his colleagues have not explicitly pointed to intervention selection criteria in their work, an appropriate combination of interventions in various fields' condition on the comparability of data between the countries under study was a concern. [2] Leading causes of mortality, [28,29] high maternal mortality ratio, [20] high occurrence and prevalence rate [18,30] and conflict in coverage rate of different sources [22] were among the important selection criteria which have been ever used for assessing effective coverage of health interventions in other efforts around the World.

It should be noted that choice of a priority set of interventions is not strictly a technocratic undertaking and it needs to reflect local values, priorities and perceptions. No single indicator is likely to meet all criteria equally well and countries should choose options in a way to meet their own needs. [6]

Conclusion

Choosing appropriate tracer indicators for assessing health system and monitoring the achievement of goals such as the Millennium Development Goals and Universal Health coverage is very important. High priority interventions vary across countries reflecting their special situations. Therefore, designing local assessment framework based on the global ones can help achieve national health system goals.

For health system assessment or UHC monitoring, we need a focus on the level and distribution of coverage of essential health interventions aimed at the key causes of disease and injury

burdens. Selecting the optimal set of interventions is generally the starting point of designing an assessment framework. Every country based on their epidemiology situations, demographic profiles, their health needs as well as levels of socioeconomic development needs to create simple and sound measures to assess coverage of essential interventions selected based on logical criteria then try to design health information systems to collect relevant and related data. What we presented in this paper was a preliminary attempt to identify interventions addressing the main causes of ill health, ranging from promotion to rehabilitation in Iran.

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Competing Interests

The authors declare that they have no competing interests.

Availability of Data and Materials

We agree to share our data and materials.

Ethics Approval and Consent to Participate

Ethical permission to conduct this study was obtained from Tabriz University of Medical Science (IR.TBZMED.REC.1395.769). The participants had the right to freely participate in the study and fill out the questionnaire.

References

1. Health Information Systems Knowledge. Assessing health system performance using effective coverage. Pac Health Dialog. 2012;18:234-235.

2. Martínez S, Carrasquilla G, Guerrero R, Gómez-Dantes H, Castro V, Arreola-Ornelas H, et al. Effective coverage of health interventions in Latin America and the Caribbean: Metrics for the assessment of health systems performance. Salud Publica Mex. 2011;53:S78-S84.

3. Jordans MJ, Chisholm D, Semrau M, Upadhaya N, Abdulmalik J, Ahuja S, et al. Indicators for routine monitoring of effective mental healthcare coverage in low- and middle-income settings: A Delphi study. Health Policy Plan. 2016.

4. World Health Organization. 2010. World Health Report, 2010: health systems financing the path to universal coverage. World Health Report, 2010: health systems financing the path to universal coverage.

5. Tan KB, Tan WS, Bilger M, Ho CW. Monitoring and evaluating progress towards universal health coverage in Singapore. PLoS Medicine. 2014;11:e1001695.

6. Evans DB, Saksena P, Elovainio R, Boerma T. Measuring progress towards universal coverage. Geneva: World Health Organization. 2012.

7. World Health Organization. Monitoring progress towards universal health coverage at country and global levels: framework, measures and targets. 2014.

8. Shengelia B, Tandon A, Adams OB, Murray CJ. Access, utilization, quality, and effective coverage: an integrated conceptual framework and measurement strategy. Soc Sci Med. 2005;61:97-109.

9. Beer N, Ali AS, Shakely D, Elfving K, Al-Mafazy AH, Msellem M, et al. High effective coverage of vector control interventions in children after achieving low malaria transmission in Zanzibar, Tanzania. Malaria Journal, 2013;38.

10. Boerma T, Eozenou P, Evans D, Evans T, Kieny MP, Wagstaff A. Monitoring Progress towards Universal Health Coverage at Country and Global Levels. PLoS Medicine, 2014b;11.

11. Ng M, Fullman N, Dieleman JL, Flaxman AD, Murray CJ, Lim SS. Effective coverage: a metric for monitoring Universal Health Coverage. PLoS Med. 2014;11; e1001730.

12. Ozgediz D, Hsia R, Weiser T, Gosselin R, Spiegel D, Bickler S, et al. Population health metrics for surgery: Effective coverage of surgical services in low-income and middle-income countries. World Journal of Surgery. 2009;33:1-5.

13. Lozano R, Soliz P, Gakidou E, Abbott-Klafter J. Feehan DM, Vidal C, et al. Health System Reform in Mexico 3: Benchmarking of performance of Mexican states with effective coverage. The Lancet. 2006;368:1729-1741.

14. Laurell AC. Health system reform in Mexico: a critical review. Int J Health Serv. 2007;37;515-535.

15. Colston J. The use of effective coverage in the evaluation of maternal and child health programs. 2011.

16. Gakidou E, Lozano R, González-Pier E, Abbott-Klafter J, Barofsky JT, Bryson-Cahn C, et al. Health System Reform in Mexico 5: Assessing the effect of the 2001-06 Mexican health reform: An interim report card. The Lancet. 2006;368:1920-1935.

17. Moghadam MN, Sadeghi V, Parva S. Weaknesses and challenges of primary healthcare system in Iran: a review. The International Journal of Health Planning and Management, 2012;27.

18. López-López E, Gutierrez-Soria D, Idrovo AJ. Evaluation of a diabetes care program using the effective coverage framework. International Journal for Quality in Health Care. 2012;24:619-625.

19. Liu Y, Rao K, Wu J, Gakidou E. Health System Reform in China 7: China's health system performance. The Lancet. 2008;372:1914-1923.

20. Randive BB, Chaturvedi SD, Diwan V, Costa AD. Effective coverage of institutional deliveries under the Janani Suraksha Yojana programme in high maternal mortality provinces of India: Analysis of data from an annual health survey. The Lancet. 2013;381.

21. World Health Organization. Background paper for the technical consultation on effective coverage of health systems. Geneva: World Health Organization. 2001.

22. Travassos MA, Beyene B, Adam Z, Campbell JD, Mulholland N, Diarra SS, et al. Immunization coverage surveys and linked biomarker serosurveys in three regions in Ethiopia. PLoS One. 2016;11.

23. Colson KE, Zúñiga-Brenes P, Ríos-Zertuche D, Conde-Glez CJ, Gagnier MC, Palmisano E, et al.. Comparative estimates of crude and effective coverage of measles immunization in low-resource settings: Findings from Salud Mesoamérica 2015. PLoS One. 2015;10.

24. Colson KE, Gagnier MC, Palmisano E, Ranganathan D, Zúñiga-Brenes P, Ríos-Zertuche D, et al. Comparative estimates of immunisation coverage from three different sources: results from the SM2015 evaluation. The Lancet. 2013;381.

25. Kosen S. Measuring the effective coverage of the immunisation programme in Indonesia: using community-based surveys. The Lancet. 2013;381.

26. Boerma T, Abouzahr C, Evans D, Evans T. Monitoring intervention coverage in the context of universal health coverage. PLoS Medicine. 2014a;11.

27. Fuhs AK, Lagrone LN, Porras MGM, Castro MJR, Quispe RLE, Mock CN. An Assessment of Rehabilitation Infrastructure in Peru. Archives of physical medicine and rehabilitation. 2017.

28. Gakidou E, Nordhagen S, Obermeyer Z. Coverage of cervical cancer screening in 57 countries: Low average levels and large inequalities. PLoS Medicine. 2008;5:e132.

29. Idzerda L, Adams O, Patrick J, Schrecker T, Tugwell P. Access to primary healthcare services for the Roma population in Serbia: a secondary data analysis. BMC International Health and Human Rights. 2011.

30. Viviescas-Vargas DP, Idrovo AJ, López-López E, Uicab-Pool G, Herrera-Trujillo M, Balam-Gómez M, et al. Effective coverage to manage domestic violence against women in mexican municipalities: Limits of metrics. Revista da Escola de Enfermagem, 2013;47:781-787.