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REVIEW

Decentralization of health systems in low and middle income countries: a systematic review

Daniel Cobos Muñoz · Paloma Merino Amador · Laura Monzon Llamas · David Martinez Hernandez · Juana Maria Santos Sancho

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Abstract
Objectives A substantial number of low and middle income countries (LMICs) have implemented health sector reforms in the last 40 years, and the majority of them have included some degree of decentralization of the health system as part of the wider reform. This review will provide an updated and comprehensive assessment of the effects of decentralization in LMICs.
Methods We conducted a systematic review of published and grey literature till May 2015, following standard methods.
Results 54 qualitative, quantitative and mixed methods studies conducted in 26 countries were included in the review. We found positive and negative effects of decentralization of health systems in LMICs. Whereas decentralization of governance, financing and service delivery, have been shown to have positive effects on the system; decentralization of resource management has been challenging in several settings.
Conclusions Overall, lessons learned from LMICs suggest that factors such as adequate mix of technical skills at the local level to perform decentralized tasks, effective decentralization of decision-making to the periphery, and political leadership are key factors for a successful decentralization.

Keywords Systematic review · Decentralization · District health system · Universal health coverage · Health sector reform · UHC · Governance · LMIC

Introduction

A substantial number of low and middle income countries (LMICs) have implemented health sector reforms in the last 40 years, and the majority of them have included some

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D. Cobos Muñoz (✉) · L. Monzon Llamas
Swiss Tropical and Public Health Institute, Socinstrasse 57, PO Box 4002, Basel, Switzerland
e-mail: daniel.cobos@unibas.ch; ongcaps@yahoo.es
URL: http://www.swisstph.ch/

L. Monzon Llamas
e-mail: aural1000@yahoo.es

D. Cobos Muñoz · L. Monzon Llamas
University of Basel, Basel, Switzerland

P. Merino Amador
Department of Microbiology, Hospital Clínico San Carlos, Madrid, Spain
e-mail: merinopaloma@yahoo.com

D. Martinez Hernandez · J. M. Santos Sancho
Department of Public Health and Preventive Medicine, Complutense University, Madrid, Spain
e-mail: dmartine@ucm.es

J. M. Santos Sancho
e-mail: juanamsa@ucm.es

degree of decentralization of the health system as part of the wider reform (Senkubuge et al. 2014).

There is no consensus on the definition of decentralization among authors, but most of them agree that decentralization entails the transfer of some managerial, technical or fiscal responsibilities from the central level to the periphery (usually districts) (Mills et al. 1990). Advocates for decentralization argue that "smaller organizations, properly structured and steered, are inherently more agile and accountable than are larger organizations" (European Observatory on Health Systems and Policies 2007). Decentralized health systems are expected to empower communities in health decision-making and thus to be more responsive to local needs; to be more efficient in the management of resources; and more accountable to users (Mills et al. 1990; Bossert 2000). On the other hand, some authors have raised concerns about the risk of enhancing inequities as the central level lose capacity to act as an equalizer among the different decentralized areas; or potential issues related to coordination among different levels (Litvack et al. 1998).

Although decentralization has a long history in LMIC, it is until the 1970s that interest on this type of reforms emerged in global health. The Harare Declaration in 1987 recommended decentralized health systems based on primary health care (PHC) as the backbone for achieving the goal of "Health for All" in 2000 (WHO 1987). The Millennium Development Goals brought a focus on vertical programmes where the logic of PHC and district health systems did not fit easily. Lately, the return to Alma Ata principles in 2008 also brought a renewed interest on local health systems as essential elements to achieve universal health coverage (UHC) (WHO 2009).

Whereas strategies to strengthen health systems have been shown to improve health outcomes and people's well-being in different settings (Hatt et al. 2015), the effects of (complex) health system reforms have been more difficult to assess (Adam and de Savigny 2012; Atun 2012; Gilson 2012). Research into decentralization of health systems has a long history and there is a large volume of published studies attempting to explain the effects of health sector reforms in low resource settings. A number of reviews of the literature compiled some of this evidence but did focus on the effects of wider health sector reforms (that might or might not have included some degree of decentralization) (Brinkerhoff and Leighton 2002; Segall 2003; Senkubuge et al. 2014; Willis and Khan 2009); they were limited to specific geographic areas (e.g. Latin America) (European Observatory on Health Systems and Policies 2007; Homedes and Ugalde 2005); or they were published more than 10 years ago (Berman and Bossert 2000; Cassels 1995; Gilson and Mills 1995; Levaggi and Smith 2003; Litvack et al. 1998).

This review will provide an updated and comprehensive assessment of the effects of decentralization in LMICs. We expect to strengthen the evidence base in this area and to identify lessons learned from countries experiences that would inform the implementation of the 2030 Agenda for Sustainable Development towards achieving the sustainable development goals (United nations 2015).

Methods

We conducted a systematic literature review based on Cochrane methods (Higgins and Green 2011) and following the PRISMA criteria for reporting of systematic reviews (Moher et al. 2009).

Search strategy

We undertook a search in MEDLINE, EMBASE, Global Health, Scielo and PsycInfo to identify all articles published before May 2015. We also performed a manual search within web pages of relevant institutions. We searched for peer-reviewed articles, as well as grey literature such as project reports or evaluations. Search terms used, databases searched and webpages accessed can be seen in Online Resource.

Selection of studies

All types of study design describing the effect of decentralization of health systems in LMICs were included in the review. For the purpose of this review, we considered decentralization as a process in which some technical, managerial or fiscal functions of the health system were transferred from central structures to local structures.

Duplicate references were removed and studies were assessed for relevance. Relevant papers were identified and full texts were assessed for inclusion using a pre-specified set of criteria. Articles were included if: (1) the study context was an LMIC as defined by the World Bank in 2016 (World Bank 2016); (2) the main purpose of the study was to analyse decentralization of the health sector; (3) the results were based on primary data; (4) the study had a control or comparator (excluded descriptive studies); and (5) written in English, Spanish, Portuguese or French.

Articles that met all inclusion criteria were included for quality assessment and data extraction.

Quality assessment

Quality of studies was assessed using criteria adapted from several quality assessment tools for qualitative [Critical Appraisal Skills Programme (CASP) 2014] and quantitative studies (Thomas et al. 2004). Quantitative studies were assessed for the risk of selection bias, risk of bias related with the study design, identification and treatment of confounders, data collection methods, follow-up of participants and blinding. Quantitative studies were given an overall rating of 'strong', 'moderate' or 'weak' quality following the methodology described elsewhere (Thomas et al. 2004).

Qualitative studies were not given an overall rating or score as there is no consensus in this area. We rather presented the results for each criterion in the quality assessment.

Methodological quality was not used to exclude studies or for sub-group analyses.

Data extraction and analysis

Qualitative and quantitative data were extracted using predefined data extraction templates. We extracted measures of frequency or effect from quantitative studies. Both point estimates and confidence intervals were extracted if available.

Quotes referring to the effect of decentralization of the health system were extracted from qualitative studies. We extracted three main types of quotes: quotes from respondents' comments in interviews; participant remarks in focus group discussions (FGD); and authors' statements in "Results" and "Discussion" sections of the articles.

Both indicators from quantitative studies and quotes from qualitative studies were classified using two categories. First, data were classified as suggesting a positive, neutral or negative effect of decentralization. For instance, a quote from a participant in a focus group discussion suggesting increased access to health services, or an indicator showing 5 % increase in vaccination coverage, were considered as "positive" effects.

Second, each quote or indicator was classified as suggesting an effect on one of the six "building blocks" of the health system as described by WHO (governance; financing; medicines, vaccines and medical equipment; health information; health workforce; and service delivery) (WHO 2008, 2010). For example, an indicator showing an increase in the total health expenditure in a district was categorized as an effect (positive) on the financing building block. We also added a "general" category to account for those effects that could not be associated with one specific building block (i.e. health outcome indicators such as mortality).

Results

Description of the studies

The screening and selection process is represented in Fig. 1. The implemented search strategy yielded 4081 published articles. After removing 435 duplicates and 3650 non-relevant studies, 240 references were considered relevant. 54 studies were finally included in the review (11 qualitative studies, 28 quantitative studies and 15 mixed methods studies). 144 quantitative indicators and 293 quotes were extracted from included studies, respectively. Table ESM 1, Table ESM 2 and Table ESM 3 in the Online Resource show the main characteristics of included studies.

Included studies took place in 26 countries: 11 countries in Africa, 10 countries in Asia, 4 countries in South America and 1 country in North America. Three studies included several countries in the analysis.

Quantitative data were extracted from 38 studies (23 interrupted time series, 10 surveys, 2 cross sectionals with control, 2 before and after design and 1 cohort study). Qualitative information was extracted from 26 studies.

Quality assessment

The overall rating for methodological quality in quantitative studies was moderate for 16 studies and weak for the rest. None of the studies scored as 'strong' in the overall rating. Approximately half of the studies used valid and reliable data collection methods or controlled for confounders in the analysis, if necessary. Only eight studies had a low risk of selection bias.

Only one qualitative study complied with the ten CASP quality criteria. 11 studies complied with more than 75 % of the criteria, seven complied 50–75 % of the criteria and eight did not comply with at least 50 %. Most studies had a clear study question, their qualitative methodology was appropriate and they presented the results with clarity.

Table ESM 4 and Table ESM 5 in the Online Resource show the detail of the quality assessment of qualitative and quantitative studies, respectively.

Typologies of decentralization processes

We found a wide variety of decentralization processes among the countries included in this review. In most settings, decentralization was applied to only one "building block" of the health system, service delivery being the most frequently decentralized. Only five countries (Brazil, Colombia, Laos, Mozambique and Turkey) decentralized functions from all six "building blocks" to the periphery.

Considering the number of building blocks decentralized, our findings indicated that the perception of

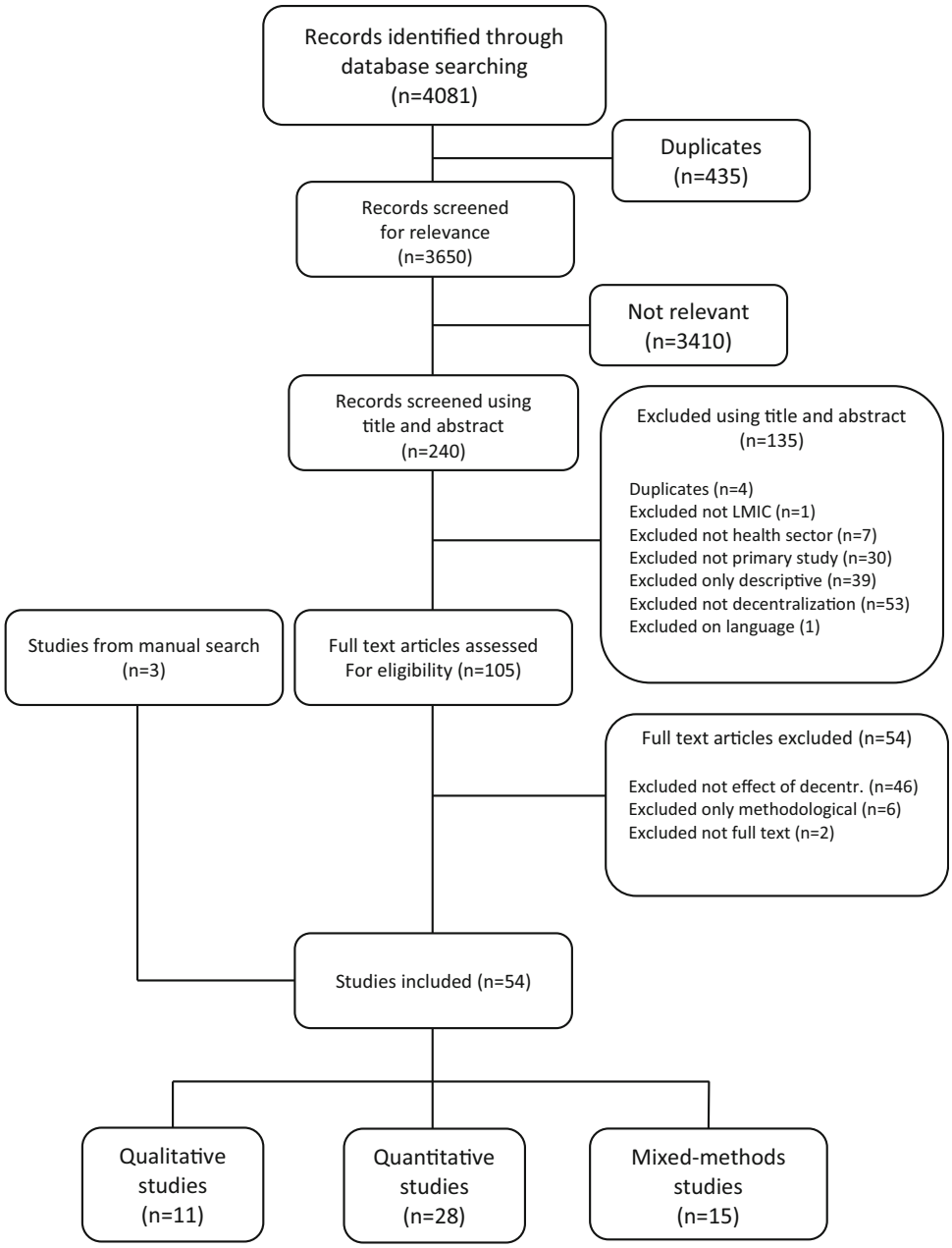

Fig. 1 Search and screening results diagram

stakeholders involved in wider reforms (four or more building blocks decentralized) was less positive (Fig. 2b). Quantitative indicators consistently showed positive effects irrespective of the number of building blocks decentralized (Fig. 2a).

A detailed description of the decentralization process in each country can be seen in Online Resource Table ESM 6.

Effects of the decentralization of the health system

Whereas the analysis of quantitative data showed a predominantly positive effect of decentralization, qualitative information showed a more heterogeneous picture. Figure 3 shows the number of quantitative indicators and quotes that suggested a positive or negative effect of decentralization on each "building block".

General effects of the decentralization

Table ESM 7 in the Online Resource shows all quantitative indicators extracted from the studies.

All studies estimating mortality outcomes consistently reported positive effects of decentralization on adult (Fayorsey et al. 2013), child (Bixby 2004; Guanais and Macinko 2009; Perks et al. 2006) and maternal mortality (Perks et al. 2006). A study conducted in Costa Rica found a decreased

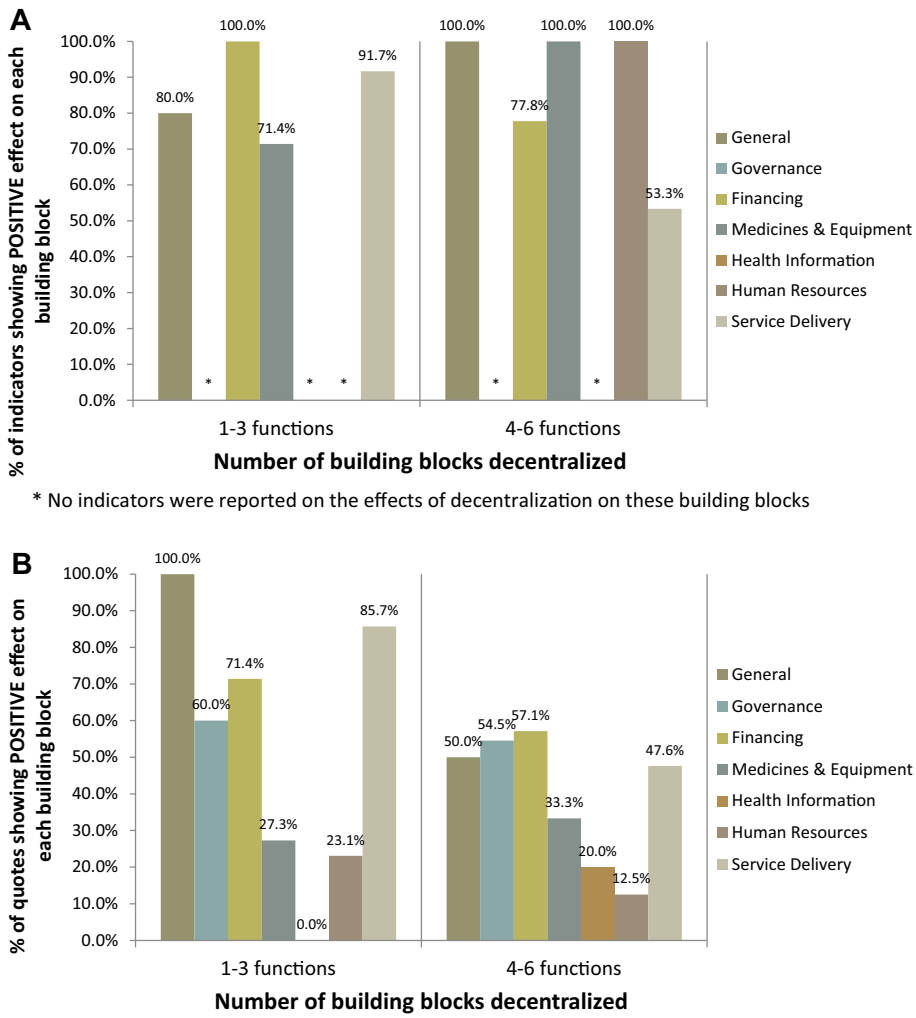

Fig. 2 Proportion of indicators (**a**) or quotes (**b**) extracted from studies that showed a positive effect of decentralization in low and middle income countries on each building block according to the functions decentralized in the health reform process

relative risk of dying in decentralized areas compared to centralized ones. The risk of dying was lower in decentralized areas with a RR of 0.98 (95 % CI 0.96–0.99), 0.98 (95 % CI 0.96–0.99), and 0.89 (95 % CI 0.84–0.95) for adults, children under 5 years and due to communicable diseases, respectively (Bixby 2004). Similar results were found in Brazil where post-neonatal mortality decreased by 0.8 % (95 % CI −1.28 to −0.32, $p \leq 0.05$) after decentralization of the health system (Guanais and Macinko 2009).

Qualitative studies showed positive and negative outcomes of decentralization. Positive effects were reported in Nepal (Regmi et al. 2010), Pakistan (Ansari et al. 2011), South Africa (Bedelu et al. 2007), Mexico (Arredondo and Orozco 2006) and Uganda (Anokbonggo et al. 2004b). In contrast, a participant in an FGD in Pakistan suggested that after the decentralization of management of the health system to the periphery: "(…) government medicines are diverted and sold in the market, and doctors and other health workers expect unofficial payments in exchange for providing care" (Ansari et al. 2011).

Effects on governance

No quantitative indicator on the effect of decentralization on the governance of the system was reported.

Qualitative studies described both positive and negative effects of decentralization. One of the most reported positive effects of decentralization on governance of the system was an increase of community participation in health issues (Arredondo and Orozco 2008; McPake et al. 2003; Regmi et al. 2010; Seshadri et al. 2012; Shaikh et al. 2012). It was also concluded that planning processes were more adapted to the local setting, with higher involvement from different stakeholders (Arredondo and Orozco 2006, 2008; Kroeger et al. 2002; La Vincente et al. 2013; Munga et al. 2009; Regmi et al. 2010).

Several studies reported that local authorities interfered in the decision-making process to obtain spurious benefits after decentralization (Kroeger et al. 2002; Liu et al. 2006; Munga et al. 2009). Coordination problems between the central level and local authorities were also reported: "In

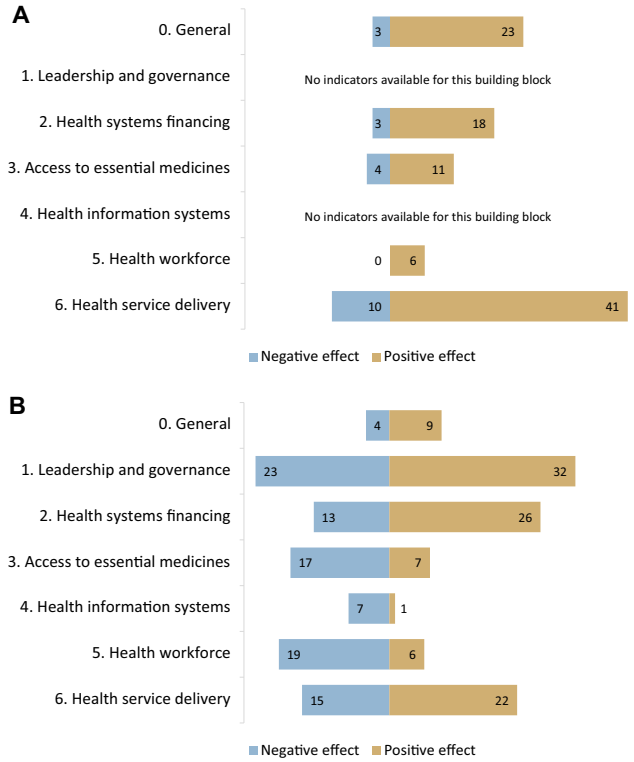

Fig. 3 Number of indicators (**a**) and quotes (**b**) extracted from studies that showed a positive or negative effect of decentralization in low and middle income countries

situations where there is a conflict between political parties at the federal and state level, coordination is weak and conflicts have resulted in priority programs being blocked" (Arredondo-Lopez and Orozco-Nunez 2014).

Effects on financing

Most quantitative indicators showed positive effects of decentralization. Adbullah et al. found in their analysis of the decentralization process in Indonesia that total health expenditures (THE) in districts increased after decentralization both for rich and poor districts (Abdullah and Stoelwinder 2008). This was mainly due to the mobilization of local resources. Similar results were found in Colombia and Chile, where the ratio of total health expenditure per capita between the richest decile and the poorest decile went from 6.1 in 1994 (before decentralization) to 1.18 in 1997 (after decentralization) (Bossert et al. 2003a, b).

Out of pocket payments decreased after decentralization in most of the investigated countries. Examples of this trend were shown in Cameroon where the cost of antiretroviral treatment went from 7500 CFA to 5400 CFA per person per year of HIV treatment ($p < 0.01$) (Loubiere et al. 2009), or in China where treatment for tuberculosis dropped from \$25.2 to \$5.4 ($p < 0.0001$) after decentralization (Wei et al. 2008).

Several informants and participants in FGDs believed that resources for health were higher after decentralization (Arredondo-Lopez and Orozco-Nunez 2014; Jaramillo 2002; Kroeger et al. 2002; Munga et al. 2009). However, three qualitative studies conducted in Mexico and Colombia showed that out of pocket payments increased in some districts when financing functions were devolved to the periphery (Arredondo and Orozco 2006, 2008; Jimenez et al. 2007). This was not the only negative impact on equity reported in qualitative studies. Some authors acknowledged the fact that decentralization restricted cross-subsidization among different regions in the country (Campos-Outcalt et al. 1995; Phommasack et al. 2005).

Effects on access to medicines and equipment

Only three studies reported quantitative indicators related to this "building block" and all of them ranked as low quality in our analysis (Ali Jadoo et al. 2014; Anokbonggo et al. 2004a; Boyer et al. 2012).

Data from qualitative studies consistently showed negative effects of decentralization on the availability of medicines, vaccines and/or medical equipment (Anokbonggo et al. 2004b; Ansari et al. 2011; Arredondo and Orozco 2006, 2008; Campos-Outcalt et al. 1995; Carvajal et al. 2004; Kroeger et al. 2002; Munga et al. 2009; Saide and Stewart 2001; Wei et al. 2011). Increase in bureaucracy after decentralization (Arredondo and Orozco 2008; Kroeger et al. 2002; Saide and Stewart 2001; Shaikh et al. 2012) and lack of management skills in the periphery (Arredondo and Orozco 2006; Carvajal et al. 2004; Jimenez et al. 2007; Munga et al. 2009) were the two most frequently reported explanations of this result. Munga et al. in their study in Tanzania concluded: "(…) districts are being assigned too many responsibilities that do not match with the resources at their disposal, a phenomenon described as 'responsibilities without resources and authority'" (Munga et al. 2009).

Effects on health information systems

No quantitative indicator was reported in relation to the effect of decentralization on health information systems. Information from qualitative studies was scarce and mainly related to the decentralization of vertical programs (Campos-Outcalt et al. 1995; Carvajal et al. 2004; Kroeger et al. 2002; Shaikh et al. 2012). Most of the studies found that the quality of the health information declined after decentralization (Carvajal et al. 2004). Lack of technical capacity was the main reason for this in Papua New Guinea and Pakistan (Campos-Outcalt et al. 1995; Shaikh et al. 2012).

Effects on human resources

Data from quantitative studies showed a positive effect of decentralization on human resources. An increase in the number of health professionals per capita (in China and Colombia (Jaramillo 2002; Liu et al. 2006)) and an increase in the average salary for health staff after decentralization (in Colombia) were reported (Jaramillo 2002).

In contrast, information extracted from qualitative studies showed a number of negative effects of decentralization on the management and retention of human resources. Munga et al. analysed the interesting process of decentralization and recentralization of the management of human resources in Tanzania (Munga et al. 2009). One reason outlined in this study, as well as in others, for this negative effect of decentralization was the interference of local authorities in recruitment processes (Campos-Outcalt et al. 1995; Munga et al. 2009; Shaikh et al. 2012). As pointed out by one high level official in Tanzania: "some 3–4 years ago, I remember we requested nurses and clinical officers to fill the gaps existing in our health facilities, but the council had changed the budget to look as if we needed more agricultural extension officers while we actually demanded for health workers… and it has later on been learnt that some councillors had their relatives who qualified as Agricultural Extension Officers whom they wanted to be assured of employment" (Munga et al. 2009). Other factors reported were the increase in bureaucracy to recruit personnel (Munga et al. 2009), delays in setting up contracts (Saide and Stewart 2001), delays in the payments of salaries (Phommasack et al. 2005), increase in the cost per health professional (Ayala Cerna and Kroeger 2002) and inequities of the distribution of health professionals after decentralization (Liu et al. 2006; Munga et al. 2009).

Effects on service delivery

Service delivery was the most frequently analysed area of the impact of decentralization. In theory, one of the most significant advantages of decentralizing service delivery is that services will be closer to users. This statement is supported by the findings in China and Cambodia where distance to health facilities decreased (Wei et al. 2011) and the proportion of people with a health facility less than 3 km from their home increased, respectively (Saly et al. 2006).

The effects of the decentralization on the utilization of health services were mixed. Rashidian et al. estimated that the probability of having access to a hospital bed was 4.6 times higher in decentralized districts ($p < 0.001$) (Rashidian et al. 2013). Similar results were found in Laos (Perks et al. 2006), Colombia (Jaramillo 2002) and Zambia (Blas and Limbambala 2001). An analysis of vaccination coverage in 144 countries showed that DTP3 and measles coverage was 8.8 % (95 % CI 3.9–13.7) and 8.8 % (95 % CI 3.9–13.7) higher in countries with a higher degree of decentralization, respectively (Khaleghian 2004). In contrast, Phommasack et al. found that utilization of health services dropped from 11 to 35 per 10,000 inhabitants, to 0.4–1.5 per 10,000 inhabitants after decentralization (Phommasack et al. 2005). Studies conducted in Pakistan and Mexico obtained similar results (Ansari et al. 2011; Vargas Bustamante 2010).

The performance of health programs has also been positively affected by decentralization in most of the settings. For instance, performance indicators for tuberculosis and HIV programs improved in Djibuti (Bernatas et al. 2003), Sudan (El-Sony et al. 2003), Kenia (Kangangi et al. 2003; Reidy et al. 2014), China (Wei et al. 2008), Cambodia (Saly et al. 2006) and Cameroon (Boyer et al. 2010; Loubiere et al. 2009), Malawi (Chan et al. 2010) and South Africa (Bedelu et al. 2007) after decentralization. There is only one example where average viral load after 12 months of treatment was worse in decentralized health facilities than at central hospitals (Bedelu et al. 2007).

Data extracted from qualitative studies showed both positive and negative effects of decentralization on the delivery of health interventions. Several studies reported an increase in coverage of health services after decentralization (Ansari et al. 2011; Arredondo and Orozco 2008; Bedelu et al. 2007; McPake et al. 2003; Regmi et al. 2010; Wei et al. 2011). Also quality of care improved after decentralization in a number of settings (Arredondo and Orozco 2008; McPake et al. 2003; Munga et al. 2009; Regmi et al. 2010).

Negative effects of decentralization reported in other settings were related to low performance of health professionals (Jimenez et al. 2007) or unpleasant behaviour of staff with patients (Ansari et al. 2011). Some authors identified worse program performance after decentralization (Ayala Cerna and Kroeger 2002; Carvajal et al. 2004; Jimenez et al. 2007).

Discussion

In the era of the Sustainable Development Goals, health systems will require major shifts in design to achieve UHC (WHO 2015). Decentralized systems are advocated as an essential element in the path towards achieving UHC (O'Connell and Sharkey 2013), and some authors advocate for a revision of the district health strategy in the light of this new goal (Meessen et al. 2014). This systematic review of published and grey literature provides a comprehensive analysis of the effects of decentralization in LMICs. We gathered evidence from 26 LMIC located in 4 continents.

We found positive and negative effects of decentralization of health systems in LMIC. Whereas quantitative data consistently showed positive effects, qualitative studies painted a more heterogeneous picture of the impact of decentralization. This wide variety of effects of decentralization was also reported in previous reviews for high income countries (European Observatory on Health Systems and Policies 2007; Levaggi and Smith 2003) and LMICs (Han 2012).

Partly explained by their different political and historical contexts (Berman and Bossert 2000), health sector reforms implemented in countries varied widely. The results of this study did not show any clear association between standard decentralization typologies [i.e. deconcentration–devolution–delegation–privatisation (Mills 1990)] and specific effects. However, when we considered the number of "building blocks" decentralized in one reform, we found that the perception of actors involved in wider decentralization processes (four or more building blocks decentralized) was less positive than of those reforms with three or less functions decentralized. This was particularly relevant for effects on financing, service delivery and general effects (Fig. 2a, b). Although, we cannot infer from these results that wider decentralization processes are less like to be perceived as effective, there are some lessons that could be extracted from the evidence.

First, the perception of negative effects of wider decentralization processes was primarily related to the implementation of the reform and not to the reform itself. Inadequate mix of technical skills at the local level to perform devolved tasks, decentralization of decision-making without providing authority to materialize decisions, or insufficient resources to implement essential activities were some of the weaknesses reported across countries.

Second, the decentralization of services to primary health care (e.g. HIV care) has been perceived as having better results than wider processes in which several building blocks were decentralized. Some of the distinctive elements of the design and implementation that contributed to their positive effects were: intensive training of the staff that will assume the decentralized functions; sequential role out using pilots to understand the implications of the reform; or effective supervision of decentralized units.

Finally, irrespective of the number of functions decentralized to the periphery, our findings indicate that management of human resources, medicines and medical equipment deteriorated after decentralization. Increased bureaucracy and lack of managerial skills at the local level were some of the most frequently reported reasons. Countries moving towards decentralization should consider interventions to mitigate these negative effects (Atun et al. 2010; Mshelia et al. 2013; Egger et al. 2007). Our results further support the idea that it is not advisable to promote a "one size fits all" approach in decentralization (Homedes and Ugalde 2005).

Considering the effects of decentralization on specific building blocks, our findings suggest that decentralization increased community participation and improved engagement in health planning processes. It seems possible that these results are due to the progressive empowerment of communities and the inclusion of local agents in decision-making processes. Decentralization also improved communication and mutual accountability between communities and the health sector (i.e. participation of local agents in the assessment of the performance of their local health system created new communication channels). Although these results are consistent with previously published studies (Ciccone et al. 2014), some authors have identified limiting factors such as lack of financial support for community representatives (Kamuzora et al. 2013), or asymmetry in technical knowledge between community members and health professionals (Fleury et al. 2010).

Our findings indicated that decentralized systems were able to generate more resources for health. Local government that assumed financing responsibilities of the health system, identified unused local resources, created local institutions to pool funds from different sources, or created new taxes earmarked to health. They not only increased the resources for health, but also improved equity. These results match those observed in earlier studies (Frumence et al. 2014; Gilson and Mills 1995; Mills et al. 2002).

This review included qualitative studies and quantitative studies ranked as having moderate or low quality. Although we recommend that new evidence be generated using more robust study designs, we argue that the standard approach for medical research would be inappropriate for assessing the impact of health system decentralization for various reasons. The complex nature of decentralization as an intervention and the range of outcomes that interest policy makers would be difficult to capture in quantitative study designs (English et al. 2008; Mills et al. 2008). Health systems interventions are affected by numerous contextual factors and their effects are the result of the dynamic interaction of multiple subsystems (Atun 2012). Policy and decision makers would be interested not only in the effects of decentralization, but also in how and why such interventions had this impact (Adam and de Savigny 2012; Adam et al. 2012).

The findings in this review are subject to a number of limitations. Only studies reported in English, French, Spanish or Portuguese were searched. The single-reviewer study inclusion decision-making process could have reduced the study's sensitivity to capturing all relevant evidence. However, we believe that double, independent decision-making on inclusion would not have substantially changed the conclusions of this review.

Conclusions

Effects of health system decentralization in LMIC were both positive and negative. Whereas quantitative data consistently showed positive effects, qualitative studies reported a more heterogeneous picture of the effects of decentralization. Experiences from countries suggested that the decentralization of governance, financing and service delivery, could have positive effects on the system. The evidence also suggests that decentralization of resource management could be challenging if sufficient capacity at the local level does not exist and transparent accountability mechanisms are not in place.

Overall, lessons learned from the decentralization processes in LMICs suggest that factors such as adequate mix of technical skills at the local level to perform decentralized tasks, effective decentralization of decision-making to the periphery, and political leadership are key factors for a successful decentralization process.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

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