

Identify and Prioritize Criteria for Efficient Allocation of Donation Resources

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Abstract

Introduction: Using civil society's and donors' resources can be helpful options to strengthen financing of the Iranian Health System to reduce the Out-of-Pocket Expenditures. Although local and public funds can address many problems of health systems, but the main concern is allocation of resources mobilized by donors.

Objective: the current study aims to identify and prioritize effective factors on allocation of resources mobilized by donors in the Iranian Health System context.

Methods: The current study comprises of three parts. The first part was a qualitative study to identify factors that influence allocation of resources mobilized by donors. At the second part, Delphi method was used to evaluate experts' consensus on allocation criteria. In the second part, identified criteria were prioritized. Hierarchical analysis was used to prioritize criteria.

Results: The results of the analysis of interviews were divided into 3 groups: Financial Sustainability Framework, Corporate Funding Organization, Optimum Funding Allocation and 6 main categories including (Recruitment, Maintenance and Active Participation, Organizing and Planning, Executive factors, method of investment, identification of real need, need-based decision criteria) and 36 sub-categories were extracted.

Conclusion: Policy-makers and managers of the health system must channel the mobilized resources through appropriate planning, organizing, and monitoring. Furthermore, parallel activities must be avoided. Lack of appropriate management and good organization of donations result in waste of resources, which distract donors' attention from the health system

Keywords: resources allocation, financing, health donors

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Introduction

Health systems mobilize resources from different sources such as taxes, social health insurance contributions, private insurance, direct payments, and donors(1). Health financing is defined as management and allocation of incomes to purchase health services(2). Due to factors such as scarcity of resources, rising health

expenditures, and inefficiency of health insurances, Out-of-Pocket Expenditures (OoPE) have increased in the Iranian Health System (IHS). Therefore, families are faced with catastrophic health expenditure. Hence, using civil society's and donors' resources can be helpful options to strengthen financing of the IHS to reduce the OOP (3). Donation can either be local or international, and is an important source of financing in health systems of low income countries (4). Although local and public funds can address many problems of health systems, but the main concern is allocation of resources mobilized by donors(5). Studies on financing health systems by donors have revealed that in Iran most of resources mobilized by donors are allocated to build and expand physical infrastructures of, charity-based healthcare facilities as well as covering health expenditures of poor patients(3, 4, 6). Given that one of the most important tasks of managers is optimal allocation of financial resources and maximizing efficiency in using available resources(7), it seems that lack of clear criteria on allocation of such resources has led into challenges for health policy-makers. Therefore, the current study aims to identify and prioritize effective factors on allocation of resources mobilized by donors in the IHS context. It worth noting that according to the best knowledge of the authors no study has been conducted on allocation of donations in the IHS.

Methodology

The current study comprises of three parts. The first part was a qualitative study to identify factors that influence allocation of resources mobilized by donors. Study context was the MoH, MU, donor institutions, and Non-Governmental Organizations (NGOs). Research community also comprised of MoH's and MU's experts, faculty members of universities, social health professional, public health professional, and health donors. Semi-structured interviews were used to collect data. Interviewees were informed about data collection methods, recording, confidentiality, and study's objectives. Purposive and snowball sampling methods were used. Interviews continued to the saturation point. In total 41 interviews were conducted. Interviews took 30 to 40 minutes.

At the second part, Delphi method was used to evaluate experts' consensus on allocation criteria.

Research community was experts, university professors, health system researchers, and sociologists with sufficient knowledge and experience (those whom were willing to participate and had enough time). Experts of this step were health policy-makers and health system's experts. The Delphi technique was applied for two rounds. To collect data a questionnaire comprised of two parts (demographic and allocation criteria) was used. To answer the questions, a Likert Scale ranging from 1 to 9 was used (i.e. 1 was equal to lowest level of consensus and 9 the highest). To sample the participants, purposive and snowball sampling methods were employed. The sample size was 23, and the questionnaire was electronically sent to all participants. Descriptive statistics was used to analyse the data. Answers were categorized into three categories: weak consensus (1-3); moderate consensus (4-6); and high consensus (7-9). Consensus was defined as at least 70% of agreement. Such criteria were selected as final criteria, others were removed.

In the second part, identified criteria were prioritized. Hierarchical analysis was used to prioritize criteria. Research community of this part comprised of experts and policy-makers. After identifying allocation criteria, in order to prioritize criteria, a questionnaire on comparing pairs was sent to the research community. The study validity was evaluated by experts and pundits. Reliability of the questionnaire was evaluated by using consistency rate. To prioritize the criteria, data were entered into the Expert Choice software, and criteria were mutually evaluated. After data entry, weight of each factor of the questionnaire was determined for data analysis (i.e. based on the results of the comparisons (which could be very important, important or equally important) a weight equal to 9, 7, 5, 3 and 1 was given to each factor). Finally, based on the scores and geometric mean, the criteria were prioritized according to the obtained weights.

Findings

In the current study, to conduct interviews, interviewees were categorized into three categories: faculty members of Departments of Health Economics, donors, and managers (policy-makers) of the IHS. 71 and 19% of interviewees were males and females, respectively. Interviews took between 30 to 45 minutes. 36 criteria on allocation of resources mobilized by

donors were extracted (table 1).

Table 1 Effective factor (criteria) for allocation of resources mobilized by donors

Category	Sub-themes	Main themes
Creating infrastructures of sustainable financing	Attraction, maintenance, and active participation of donors	<ol style="list-style-type: none"> 1. Attraction, maintenance, and active participation of donors; 2. Providing feedbacks to donors; 3. Increasing public trust in governmental organizations; 4. Culture building among donors; 5. Increasing trust among donors; 6. Facilitation and encouragement of investment; 7. Direct monitoring of projects by donors;
Lay the ground for organizing participations and financial resources	Organization and planning	<ol style="list-style-type: none"> 8. Coordination of governmental organizations; 9. Establishing committees and instructions; 10. Organizing collection of donations; 11. Establishing a financial fund; 12. Establishing targeted centres; 13. Establishing hospital donors' assembly.
	Operational issues	<ol style="list-style-type: none"> 14. Investor-management split; 15. Emphasizing on social responsibility of organizations, by donors, and reducing negative consequences of Social Determinants of Health (SDH); 16. Using operational structures of leading countries; 17. Providing technical and scientific consultations to donors.

Cont... Table 1 Effective factor (criteria) for allocation of resources mobilized by donors

Optimal allocation of financial resources	Investment method	18. Donation to training and research areas; 19. Donation to knowledge based organizations; 20. Investing in infrastructure, based on levelling rules; 21. Investing in hospital and clinical equipment, based on levelling rules; 22. Helping to the poor; 23. Providing c of hard to cure diseases;
	Identifying real needs	24. Identifying local needs by investigating incidence and prevalence of different diseases; 25. Investigating macro and micro indicators of health system as well as allocation of resources by the MoH and other organizations; 26. Conducting research to identify real needs and to perform need assessment; 27. Managing tendencies of donors toward short-term projects; 28. Identifying socio-economic status and demographic characteristics of the area.
	Need-based criteria to make decisions	29. Prioritizing preventive services, instead of treatment and universal health coverage; 30. Aligning donors' desire with identified needs; 31. Anticipating regional needs; 32. Prioritizing long-term projects over short-term ones; 33. Prioritizing deprived areas; 34. Investigating cost-effectiveness; 35. Access to health services and health equity; 36. Tendency toward services/areas which private sector is not willing to participate.

Level of consensus among experts (over identified criteria) was investigated by employing the Delphi technique. 23 policy-maker, manager, and health expert participated at the first round. Response rate was 100%. Most of the participants of the first round of the Delphi were married, male experts, with a M.Sc. degree and/or managers of the health system. Aged between 36 to 45.

for 15 criteria consensus was around 50 to 70. Therefore, at the second round of the Delphi, 18 experts and policy-makers were asked to rate their answers on the Likert scale (Most of the participants were married, male experts, with a B.Sc. degree and/or health system managers. Aged from 46 to 55. At the next step, criteria that were identified through Delphi were prioritized by using a paired comparison questionnaire. Hierarchical

analysis was used to prioritize, in a sample of 18 participants. At this step, most of participants were married females with a professional degree. As shown in table 2, identifying local needs by investigating incidence and prevalence of different diseases and using operational structures of leading countries, obtained the highest and lowest weights, respectively.

Table 2 Final weights of criteria to effectively allocate resources that are mobilized by donors

Row	Theme	Sub-theme	Weight
1	Attraction, maintenance, and active participation of donors	Providing feedbacks to donors;	0.071
		Culture building between donors and the public.	0.046
2	Organization and Planning	Establishing a special fund;	0.069
		Coordination of governmental organizations;	0.063
		Organizing collection of donations;	0.021
		Establishing hospital donors' assembly.	0.003
3	Operational issues	Using operational structures of leading countries;	0.055
		Providing technical and scientific consultations to donors;	0.005
4	Investment method	Providing care of hard to cure diseases;	0.075
		Helping to the poor;	0.067
		Investing in hospital and clinical equipment, based on levelling rules.	0.066
5	Identifying real needs	Identifying local needs by investigating incidence and prevalence of different diseases;	0.09
		Conducting research to identify real needs;	0.082
		Identifying socio-economic status and demographic characteristics of the area.	0.016
6	Need-based criteria to make decisions	Prioritizing preventive services, instead of treatment and universal health coverage;	0.084
		Prioritizing deprived areas;	0.079
		Anticipating regional needs;	0.077
		Aligning donors' desire with identified needs	0.031

Discussion

According to findings of the current study, the first step of optimal allocation of resources mobilized by donors is attraction, maintenance, and active participation of donors through providing feedback to them and building an appropriate culture between donors and the public. In this line, lack of appropriate feedback as well as appropriate informing of donors are among the most important reasons of donors' distrust to healthcare centers (8, 9). Ward and Mackillop (2011) in a study in Ireland found that management of resources mobilized by donors and its continuation can be achieved through providing appropriate feedbacks(10). In other words, providing quality healthcare services and providing appropriate feedbacks to donors about the impacts of their donations on patients' health, have a significant impact over continuation of donations(9). Previous studies also mentioned to reputation and credibility of NGOs as important factors to obtain donors' trust(11, 12).

As participating experts in the current study mentioned, establishing a special fund can be a great step for sustainability of financial resources provided by donors. As well, it is necessary to monitor the whole process of the project, both in terms of occurred costs and progress. A study in Cameroon and Chad reported that applying appropriate management and good leadership along with effective use of human resources can potentially improve efficiency of donations made to health systems of these two countries(13).

Findings of the current study show that in investing resources from donor's partnerships Consideration should be given to the providing care of hard to cure diseases; Helping to the poor and Investing in hospital and clinical equipment, based on levelling rules. Donors pay a fraction or total treatment expenditures of poor patients(3). Based on the experts' opinions, inappropriate management of resources leads into waste, and real needs of hospitals and patients will not be met. Therefore, if this method is selected as a way to allocate resources mobilized by donors, it will require exact monitoring of health facilities' needs. Yousefi et al. (2010) in a study in Iran found that the most important indicators to estimate resources required by health facilities are: catchment population; mortality; socioeconomic indicators; costs

related to common diseases; excessive costs related to rural and remote areas; historical expenditures; family physician services; and drugs expenditures(14).

All around the world policy-makers consider incidence and severity of diseases as important criteria to allocate resources. The current study also revealed the importance of investigating incidence and prevalence of different diseases in the catchment area and diseases severity as important factors. Patients with severe diseases need immediate medical interventions, therefore high priority must be given to such patients (6, 15, 16). Various studies emphasized on prioritizing patients based on the disease severity(17, 18).

Finally, based on the findings of the current study, prioritizing preventive services to treatment and universal health coverage, prioritizing deprived areas, anticipating regional needs, and aligning donors' desire with identified needs are mentioned as criteria for need-based decision making. Financial resources mobilized by donors must be allocated based on the society's priorities and needs. Mosadeghrad (2019) also reported that in Iran resources mobilized by donors are spending for expansion of physical infrastructures, supplying equipment and supplies, paying salaries and wages of health personnel, and for utilities(3). Nekoe Mogadam also noted that donors tend to concentrate their donations on treatment costs, instead of preventive and public health services(4), which is different from findings of the current study. Identifying deprived areas can be a great help to allocate resources based on the needs. Rice & Smith showed that deprived areas, disability, rural areas, lack of shelter are macro indicators of resource allocation.

Conclusion

The current study employed a qualitative approach to collect opinion's of managers, policy-makers, and experts of the IHS about donors' participation in the financing of IHS and allocation method of such resources. Policy-makers and managers of the health system must channel the mobilized resources through appropriate planning, organizing, and monitoring. Furthermore, parallel activities must be avoided. Lack of appropriate management and good organization of donations result in waste of resources, which distract donors' attention from the health system. Policy-makers

and managers of the health system must prioritize real needs of the health system and plan mobilized resources regarding such needs.

Acknowledgment: The current study is a part of a Ph.D. Thesis in healthcare management. The authors are grateful to the all the participants.

Conflict of Interest: Authors declare no conflict of interests during the study period.

Ethical Clearance- Taken from North Tehran Branch, Islamic Azad University, ethics committee

Source of Funding; Islamic Azad University, Tehran, Iran

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The Utilization of Sugarcane Bagasse to Remove Cr (VI) Heavy Metal Waste with Adsorption

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Abstract

Sugarcane bagasse obtained from sugar factories is the residue that is usually left behind and considered useless. In fact, sugarcane bagasse can be made nanopore-activated carbon in the form of powder and tablet, which is effective as adsorbent of Cr (VI) in heavy metal waste pollution. The production in this study started from drying using sunlight, crushing sugarcane bagasse into powder, carbonizing the powder at 300⁰ C, activating it using HCL5N, sieving with 200 mesh and sonicating in 15 minutes with 40% amplitude. After accomplishing those steps, nanopore powder was obtained and then pressed into a tablet. Adsorption capacity testing of Cr (VI) heavy metal was performed with an artificial sample using K₂Cr₂O₇ solution. Sugarcane bagasse nanopore powder was tested for its contact time by adding 0.1 gram of nanopore powder into the sample solution, leaving the sample for a while, and analyzing the sample using spectrophotometry. The results show that the optimum contact time of nanopore powder was six hours to reduce 91.80% of Cr (VI) level and the optimum contact time of the tablet was five hours to remove 56.35% of Cr (VI). Testing on a fixed variable of 105 rpm stirring speed and various contact times produced an optimum result with 90 minutes stirring duration and adsorption capacity of 91.80% for removing Cr (VI). Examination on fixed variable of stirring time and independent variable of stirring speed resulted in an optimum adsorption capacity of 90.07% in Cr (VI) removal, with 105 rpm stirring speed. This study concludes that powder had a greater adsorption capacity than a tablet, while the tablet was more practical for usage.

Keywords: *sugarcane bagasse, nanopore powder and tablet, adsorption, chromium heavy metal.*

Introduction

The environmental order system needs to be preserved and maintained well so as not to be damaged by various pollutions caused by hazardous and toxic waste that is included in the category of Toxic and Hazardous Material, which will disturb the environmental balance, such as heavy metal pollution. Some heavy metals obtained from industrial byproducts that have polluted the environment and are poisonous are lead (Pb), chromium (Cr), cadmium (Cd), mercury (Hg), silver

(Ag), nickel (Ni), zinc (Zn), cobalt (Co), lead (Sn), copper (Cu), iron (Fe), molybdate (Mo) and several other metal substances. Heavy metals are metallic elements that have a specific gravity higher than 5 or 6 g/cm³. Heavy metal pollution has become a serious problem that will threaten the global environment ⁽¹⁾.

Chromium (Cr VI) is a heavy metal with an atomic weight of 7.19 g/cm³, which is potential to contaminate the environment and harmful. In the natural environment, Cr (III) metal is the least active, less soluble and stable, but Cr (VI) is very active, easily dissolved and biologically available (Choppala et al., 2013). The heavy metal pollution of chromium or Cr (VI) has a high toxicity level and it can poison and damage human organs such as the liver, kidneys, and others so that it can interfere with human health ⁽²⁾. Chromium Cr (VI) enters

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