



Budgeting in Healthcare Systems and Organizations: A Systematic Review

Abbas Homauni¹, Nader Markazi-Moghaddam^{1,2}, Ali Mosadeghkhah³, Majid Noori⁴, Kourosh Abbasiyan¹, *Sanaz Zargar Balaye Jame¹

1. Department of Health Management and Economics, School of Medicine, Aja University of Medical Sciences, Tehran, Iran
2. Critical Care Quality Improvement Research Center, Shabid Modarres Hospital, Shabid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Endocrinology, Aja University of Medical Science, Tehran, Iran
4. Infectious Diseases Research Center, Aja University of Medical Sciences, Tehran, Iran

***Corresponding Author:** Email: sanazzargar@gmail.com

(Received 24 Dec 2022; accepted 16 Mar 2023)

Abstract

Background: Budgeting is the process resource allocation to produce the best output according to the revenue levels involved. Among the constraints that healthcare organizations, including hospitals, both in the public and private sectors, grapple with is budgetary constraints. Therefore, cost control and resource management should be considered in healthcare organizations under such circumstances.

Methods: We aimed to identify methods of budgeting in healthcare systems and organizations as a systematic review. To extract and analyze the data, a form was designed by the researcher to define budgeting methods proposed in the literature and to identify their strengths, weaknesses, and dimensions. The search was conducted in Google Scholar, Web of science, Pub med and Scopus databases covering the period 1990-2022.

Results: Overall, 33 articles were included in the study for extraction and final analysis. The study results were reported in four main themes: healthcare system budgeting, capital budgeting, global budgeting, and performance-based budgeting.

Conclusion: Each budgeting approach has its own pros and cons and requires meeting certain requirements. These approaches are selected and implemented depending on each country's infrastructure and conditions as well as its organizations. These infrastructures need to be thoroughly examined before implementing any budgeting method, and then a budgeting method should be selected accordingly.

Keywords: Budget; Budgeting; Health system; Healthcare organization

Introduction

A budget is a key lever in organizational planning and management (1). It can be defined as an estimate of revenues/expenditures over a given time (2). Budgeting is the process of resource al-

location to produce the best outputs according to the revenue levels involved (3). If done properly, budgeting can help managers better manage and control the organization (4). As a management



planning/control tool, budgeting helps coordinate activity concentration and control in organizations. Budgeting shows financial management orientation to organizations. Therefore, every organization has revenue and expenses that need budget and budgeting (5).

The health (healthcare) sector is considered as one of the basic sectors in the process of economic (6) and social development in each country (7).

The bulk of countries' budgets goes to the healthcare system. About 10% of the GDP of many countries is allocated to the healthcare system (8). Moreover, examining the costs of healthcare systems and organizations indicates an increase in the costs allocated to healthcare services (9). This can be due to several reasons, including population aging and the adoption of state-of-the-art healthcare technologies (10). The improved quality of healthcare services is a double-edged sword, both increasing life expectancy and making the aging population in need of more healthcare, which, in turn, increases the cost of healthcare services. Accordingly, policymakers are increasingly motivated to reduce healthcare costs (11).

Numerous studies have been conducted on healthcare cost control over the past three decades, and various economic models have been developed for this purpose, especially in hospitals. These models are more focused on cost structure, cost-effectiveness analysis, cost-utility analysis, and cost-benefit analysis. Numerous measures have been taken to control the cost of healthcare systems and organizations in recent years, including changing accounting approaches, a modified approach to budgeting, and service cost control in hospitals and other healthcare organizations (12).

Among the constraints that healthcare organizations, including hospitals, both in the public and private sectors, grapple with is budgetary constraints (13). Therefore, cost control and resource management should be considered in healthcare organizations under such circumstances. They need to consider budget/resource management such that the quality of healthcare services is not

affected as their actions directly affect human health (14).

Various budgeting methods have been addressed in many previous studies. In global budgeting, a certain amount of budget is allocated to services offered to a given population for a certain time (usually one year). The global budgeting method has its advantages and disadvantages, which will be mentioned below. Many studies have evaluated the performance of the global budgeting approach and its practical results (15-18).

Furthermore, the capital budgeting approach is employed to meet capital needs in healthcare organizations (19). Surgical operations are becoming more complex and reliant on specialized equipment and techniques, necessitating increased investment by hospitals and other healthcare organizations (20). During normal periods, a large portion of hospitals' capital budget and investment decisions relating to the capital raising practices required to provide replacement/upgrade costs for outdated equipment and facilities. In many hospitals, specifically older hospitals, a lot of capital is needed to upgrade the existing physical space, including facilities and equipment, reduced liquidity and increased the debt ratio with financial problems, and the bankruptcy of these hospitals. Therefore, funding seems to be essential for healthcare organizations, especially hospitals (21).

Performance-based budgeting (also called program budgeting) is another budgeting approach that has recently gained popularity. It is a planning, budgeting, and evaluation system that emphasizes the association between budget spent and outcomes. It has been widely discussed in the budgeting literature. This approach has certain features, such as flexible budgeting associated with performance goals and program outcome measures (22).

Despite all efforts to improve budgeting practices in the healthcare systems and organizations, the healthcare system still seems to suffer from increased costs and inefficient resource utilization. We aimed to explore budgeting methods, dimensions, and strengths and weaknesses, as well as to provide several solutions to improve it.

Methods

We aimed to identify methods of budgeting in healthcare systems and organizations as a systematic review. For this purpose, the keywords Hospital OR teaching hospital OR poly clinic OR clinic OR public hospital OR non-profit hospital OR health OR health system OR health care system OR healthcare OR health service OR healthcare service AND budget OR budgeting OR budgeting model OR cost estimation OR income estimation OR revenue estimation OR financial management OR capital budgeting OR global budgeting OR periodic financial forecast OR resource allocation OR budget planning OR budget process OR budget format OR budget framework OR budgeting planning OR operational budgeting OR operational budgeting model OR budget forecast OR operational based budgeting OR zero based budgeting OR budgeting component OR operational budgeting component OR performance budgeting OR personnel budgeting OR equipment budgeting OR employee budgeting OR budget allocation OR zero based budget OR contract-based budgeting OR performance-based budgeting OR budgeting steps OR activity-based budgeting OR population budgeting OR facility budgeting OR case-mix budgeting OR global budgeting OR line by line budgeting OR policy budgeting OR project budgeting, as well as the Google Scholar, Pub

Med, Web of Science, and Scopus databases were used. The period of studies was from 1990-2022. The final papers were selected for inclusion in a three-step process. In the first step, the titles of all articles were reviewed, and articles unrelated to the research subject were excluded. In the second stage, the abstracts were studied, and irrelevant articles were excluded. Finally, the remaining articles were read in full text, and articles tailored to the research purpose were included in the study.

Inclusion and exclusion criteria

- 1- Articles and reports published from 1990-2022
- 2- Studies written in Persian or English
- 3- Articles and reports on budgeting in the healthcare system or healthcare organizations
- 4- Articles and reports on the budgeting process, budgeting approaches, and their strengths and weaknesses

Articles that did not have the above characteristics were excluded from the study.

Data extraction/analysis method

To extract and analyze the data, a form was designed by the researcher to define budgeting methods proposed in the literature and to identify their strengths, weaknesses, and dimensions. The information on each budgeting method was then put on the form. Fig. 1 illustrates the article selection process:

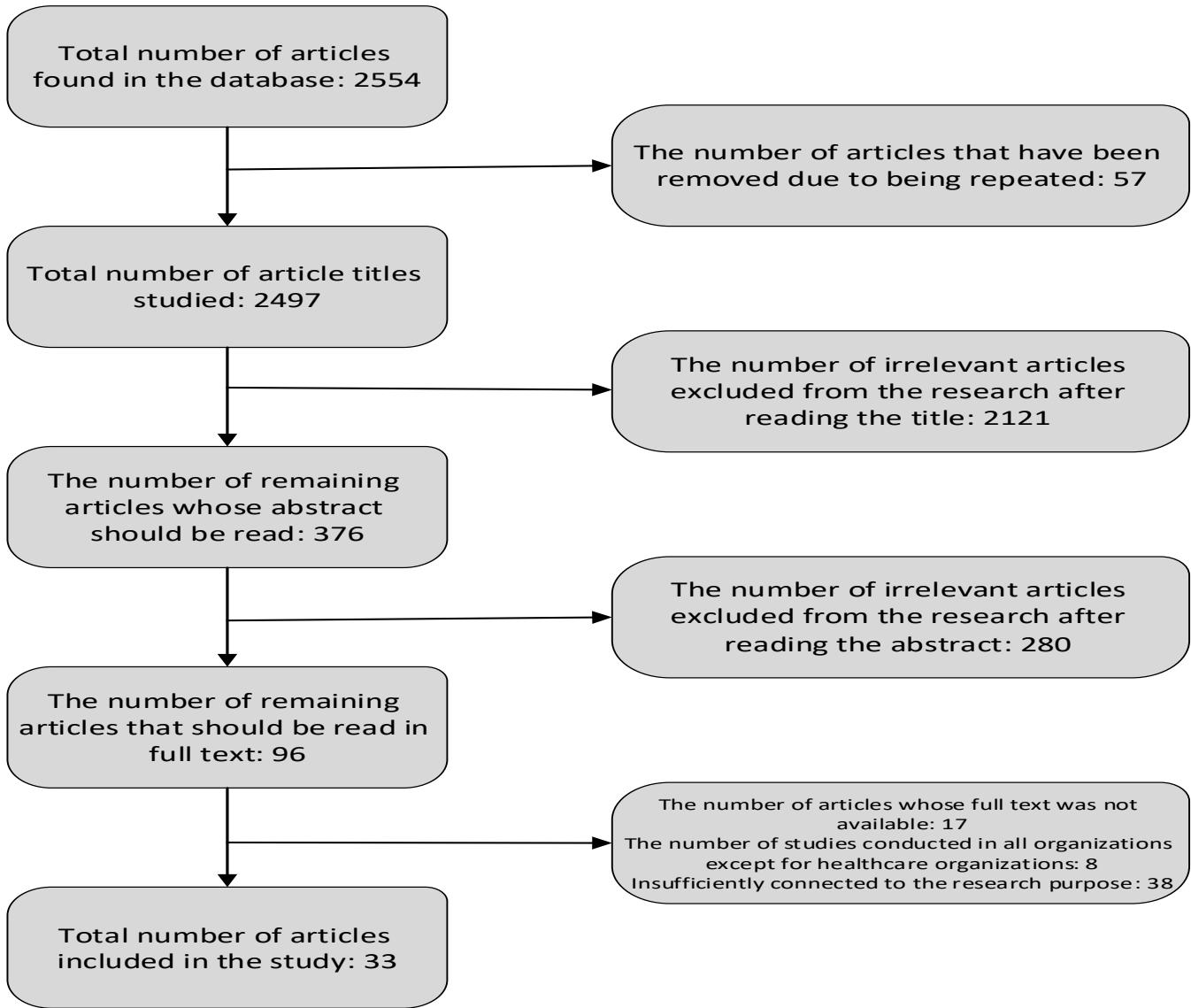


Fig. 1: article selection process

Results

Overall, 33 articles were included in the study for extraction and final analysis. Table 1 lists various budgeting methods identified in the literature:

Table 1: Various methods of budgeting in healthcare systems

<i>No.</i>	<i>Budgeting type</i>	<i>No.</i>	<i>%</i>
1	Global budgeting	12	36.4
2	Healthcare system budgeting	10	30.3
3	Performance-based budgeting	7	21.2
4	Capital budgeting	4	12.1
Total		33	100

Budgeting in healthcare systems

To ensure health budgeting is in line with health priorities, health planning beneficiaries must be strategically involved in the process and be prepared to support it (23). Department and operating unit managers in healthcare organizations are regarded as the main budget-makers (budgeteers) of these organizations, involved in budgeting (24). A standard budget cycle consists of four phases:

Preparation and submission;

Approval (authorization);

Execution;

Audit and evaluation (authorization) (25).

The following principles must be followed for successful budget planning and execution in healthcare systems and organizations:

Employees' and managers' participation in the budgeting process can enhance their commitment to budget execution (26). Part of the budgeting process should be delegated to managers to do budgeting with their employees' assistance (27). The need for identifying and preventing various biases in the budgeting process in hospitals and healthcare organizations, including unintentional cognitive bias (due to cognitive errors, information asymmetry, and limited information),

intentional bias (upward bias and reciprocity bias), and blame avoidance approach (28). One of the possible errors when budgeting is mere cost control and disregarding service quality. Cost control is a double-edged sword, leading to a decline in service quality and customer dissatisfaction (29).

Budget performance feedback should be provided to managers and officials periodically so that they can timely identify budget variance and modify their performance (26). Budgeters should consider their stakeholder satisfaction when budgeting because stakeholders are the organization's key customers whose dissatisfaction can significantly damage the organization (30). Among the criteria used in the studies are national priorities (preferences), essential services, historical budget, health needs, the feasibility analysis of international priorities (preferences), personal relationships, and generation of income (31).

Table 2 lists the methods/approaches identified in a healthcare system as well as the dimensions/characteristics and practical results of implementing each of them.

Table 2: Budgeting methods/approaches in the healthcare system

<i>Budgeting type</i>	<i>Characteristics</i>	<i>Practical results</i>
Global budgeting	<ul style="list-style-type: none"> ✓ Allocating a certain part of the budget for a certain period (usually one year) to a certain population rather than fixed rates for certain services or items (32) ✓ Determining the volume/total cost of services provided (32) ✓ Administrative mechanism management using a specific type of contract; volume, price, service type, and its quality must be specified in this contract (17) . ✓ Lowering costs for the healthcare organization (33) ✓ More flexible than the line- items method (34) ✓ Applied for cost control and increased health officials' authority regarding it (17) ✓ Motivating service providers to enhance the efficiency of non-medical activities, causing the payer to 	<ul style="list-style-type: none"> ✓ Failure to contribute to reducing hospital services or increasing primary care visits among service users after two years have passed since the application of this method in Maryland Hospital (16) ✓ Most physicians developed a negative view of certain cost control measures based on global budgeting in 110 hospitals in China. This can be attributed mainly to concerns about the effects of these measures on physicians' healthcare performance and patient satisfaction. Cost control measures with a significant impact on

-
- avoid their justification of activities (33).
 - ✓ Potentially reduced service quality due to the budget ceiling (35)
 - ✓ This method can be employed as an independent tool to strengthen budget structure sustainability (17).
 - ✓ Compatibility with population-based payment (PBP) methods, e.g., shared savings (32)
 - ✓ Reduced hospital's motivation to increase service volume (33)
 - ✓ Financial risk on the service provider side in full (34)
 - ✓ Motivating hospitals and other organizations to improve service efficiency and Creating cost predictability for healthcare payers/policymakers (33)
 - ✓ Simple to implement (34)
 - ✓ Reducing competition between hospitals and failing to determine rewards to increase hospital market share (33)
 - ✓ Payers may base allowances for annual budget increases on factors unrelated to health, such as growth in inflation or GDP, or on budgetary constraints outside of the healthcare sector, thereby eroding the global budget's purchasing power (33) .
 - ✓ Ability to combine administrative simplification with strong motives to enhance performance; here, real progress can be achieved cost-effectively by obtaining less complex information (32).
- physicians' performance included lowering the average prescription drug costs for outpatients as well as limiting access to examinations, medications, and surgeries. Decreased patient satisfaction was associated with lower admission of patients with deteriorating conditions, reduced usage of commercial drugs, and increased total patient costs due to increased referrals (36).
- ✓ In Taiwan, hospital wards that used more drugs as part of their regular healthcare increased their prescription drug costs following the government's implementation of global budgeting in hospitals. Group therapy departments also increased the average monthly cost of medication in each case following the introduction of the global budget system in 2002 (37).
 - ✓ Experimental results indicate that global budgeting has failed to enhance the efficiency of Taiwanese hospitals (38).
 - ✓ While global budgeting is an effective tool for curbing costs, severe financial stress can result in unintended consequences, including impaired quality, due to the altered performance of service providers following financial rewards (35) .
 - ✓ GB can help reduce healthcare costs and increase healthcare quality compared to the FFS method. While service volume, length of hospital stays, and monthly hospital admissions decreased, the number of drugs per antibiotic treatment case remained unaffected (39).
 - ✓ A significant reduction in emergency admissions accompanied the implementation of global budgeting in Maryland compared to hospitals under the payment service structure (40).
 - ✓ In Taiwan, the global budget system was associated with longer hospital stay lengths, increased healthcare
-

Capital budgeting

- ✓ Capital budgeting is the summarized financial statements of investment in fixed assets (42).
- ✓ The repayment method is the main criterion for evaluating long-term investment projects in the hospital (43)
- ✓ A significant number of hospitals whose approaches seem to be dealing incorrectly with the effects of inflation (42).
- ✓ To implement capital budgeting, the discounted cash flow (DCF) method of valuation has been widely utilized with negligence, such as net present value (NPV) and internal rate of return (IRR) methods. Detailed instructions on their usage are available (43).
- ✓ As one of the errors that occurred during capital budgeting implementation, the management compares the project revenue with the status quo, while it is unacceptable to apply this approach in the current situation under which we see intense competition and rapid technological changes. There is also a strong desire for measurable aspects of projects compared to intangibles, benefits, and costs (42).
- ✓ Among the items that need to be considered in capital budgeting are unrealistic assumptions on re-investment rate and inflation effects accounting (42).
- ✓ A capital budgeting problem in hospitals is the prominent role played by physicians in accepting or rejecting investment offers because they are not liable for subsequent losses. Thus, the hospital management should make the necessary decisions regardless of the physicians' desire for venture projects (21).
- ✓ Decisions are made on choosing a project as a hospital investment because direct cash flows from the project are more than investment costs in domestic investment, and there is sufficient cash flow to cover costs in foreign investment (44).

Performance-based budgeting

- ✓ In performance-based budgeting, the budget allocated to each activity is determined based on its purpose and outcome rather than the previous year's expense (45)
- ✓ Performance-based budgeting is a useful tool for aligning planning and budgeting (46).
- ✓ This budgeting method's technical elements are setting short-term, medium-term, and strategic goals (46).

costs, and improved healthcare quality for patients treated for acute pancreatitis (41).

- ✓ A small sample of US hospitals suggests that applying capital budgeting techniques is problematic. The most important concern is probably the prioritized repayment, by which total return on investment (ROI) and time value of money (TVM) are explicitly ignored in the budgeting decision processes (42).
- ✓ A significant number of hospitals whose approach seems to be dealing incorrectly with the effects of inflation and the use of discount rates that seem excessive (42).
- ✓ As hospitals are likely to take advantage of the many financial resources available to fund their general capital budget, the projects they evaluated are expected to cover the different average cost of capital (aka the weighted average cost of capital (WACC)). WACC refers to the rate at which obstacles must be overcome before being accepted by the finance team and implemented by the company (44).
- ✓ In the aftermath of the COVID-19 global crisis, multihospital systems appear to have been more successful in project management and less damaged than smaller hospitals (44).

- ✓ Despite the many benefits of implementing a performance-based budgeting approach, there have been some reports of failure to implement this approach successfully. Unsuccessful implementation of this method can be attributed to several reasons; for example, budgetary and executive institutions operate quite

-
- ✓ One of the most important advantages is the higher flexibility of this budgeting method than other methods. Other benefits include participatory management in the budgeting process increasing commitment to budget execution (47).
 - separately in many cases, leading to disharmony and disruption of budget execution. To solve this problem, planning and budgeting institutions must be integrated and act in full coordination (48).
 - ✓ Another reason for disrupted performance-based budgeting in healthcare organizations/systems is the rapidly changing planning and budgeting environment. In many cases, goal-setting is not performed due to a lack of reliable data; instead, it is conducted by key stakeholders involved, including the top-down approach (49).
 - ✓ The last reason for the poor implementation of performance-based budgeting, addressed in relevant studies, is the failure to update the hospital financial management system to implement this method (50)
 - ✓ Four requirements must be met to implement the above system in hospitals and healthcare organizations in Iran:
 - 1- The accounting approach shifting from cash to accrual
 - 2- Developing a cost price system
 - 3- Implementing performance-based budgeting
 - 4- Productivity management, evidence-based analysis, and decision making (51)
-

Discussion

This study analyzed the different budgeting methods used in healthcare systems. Various studies have examined the method of global budgeting. In Roberts study, the application of the global budgeting method does not directly affect the increase of primary healthcare and the decrease of hospital services (16). Cost control measures resulting from the global budget with a significant impact on physician performance included lowering the average prescription drug costs for outpatients and limiting access to examinations, drugs, and surgeries. Decreased patient

satisfaction was associated with decreased admission of patients with deteriorating conditions, decreased access to commercial drugs, and increased patients' total cost due to an increased number of referrals (36). In Berenson study, maintaining services quality through executing global budgeting was emphasized. As Petrou study, also global budgeting execution must be accompanied by explicit service coverage guidelines (33). In Dredge Report, the benefits of global budgeting were introduced, which in this sense is consistent with Petrou study. As in the previous study, this study also discussed applying historical, normative, and per capita approaches.

This study enumerates other benefits of global budgeting, including the elimination of inessential services and improved service coordination/planning, in addition to its previous benefits (32).

Global budgets can provide strong financial incentives for cost control. Properly structured, the global budget can guarantee some degree of financial stability for hospitals, especially in rural areas. This study also enumerates global budgeting services, including covered services, covered patient population, solutions to ensure third-party payer participation, base year budgeting method, updating base year budget in the next taxable years, identifying any base budget adjustment, budget management method. The mechanism for calculating market share changes, monitoring hospital performance and the general system, and developing/implementing a contract between the global budget hospitals and the institution (s) that administer the global budget system. One research suggestion was that pay for performance (P4P) could be increased by implementing supplemental incentive programs to ensure that service quality is not compromised by providers trying to control prices (34).

GB could further contribute to reducing healthcare costs and increasing healthcare quality compared to FFS. Regarding service volume, while the length of stay (LOS) and monthly hospital admissions decreased the number of drugs in each case and cases containing antibiotics remained unchanged (39). Moreover, executing global budgeting in Maryland was associated with ED admissions significantly reduced compared to hospitals under payment service structure (40). Although the results of another study showed that, the global budget system was associated with longer length of stay, higher healthcare costs, and higher healthcare quality in patients treated for acute pancreatitis (41).

Another approach to budgeting is capital budgeting, addressed in four studies, the results of Ho study showed that the repayment method was the main criterion for evaluating long-term hospital investment projects in a sample of small hospitals in the United States. There are also a considera-

ble number of hospitals whose approach seems to be incorrectly dealing with the effects of inflation. On the other hand, sample hospitals seem to be aware of the need for tangible and intangible costs/benefits (42).

Physicians have an important role in developing and validating offers in most healthcare systems. Physicians who play do not significantly contribute to the success of their preferred hospital, direct investment costs, and budget deficit compensation do not affect healthcare systems in multiple institutions (21).

As hospitals are likely to benefit from multiple funding sources to meet their general capital budget, the projects evaluated by them are expected to cover the average cost of capital (called weighted average cost of capital (WACC)). WACC refers to the rate at which obstacles must be overcome before being accepted by the finance team and implemented by the company. The severity of the COVID-19 crisis is likely to be much greater in smaller hospitals with less access to different financial resources rather than larger hospitals or hospital systems likely to have significant financial resources and good relationships with financial service providers for financing (44).

Another approach to budgeting is performance-based budgeting. In this approach, the technical elements of performance-based budgeting are setting short-term, medium-term, and strategic goals. In the early 2000s, the International Monetary Fund (IMF) and the World Bank (WB) defined the Medium Term Expenditure Framework (MTEF) as a framework for guiding public sector planning and budgeting, especially in low- and middle-income countries. One of the lessons learned from the Kenyan experience is that LMICs that adopt PPBs should develop clear guidelines for implementing and updating financial management systems to align with the PBB framework (46). The importance of MTEF in performance-based budgeting was addressed (3). It is difficult to align planning and budgeting in Kenya. This can be attributed to several factors, including poor oversight of the Ministry of Health and Medical Education, institutionalized

segregation of rapidly changing planning/budgeting, planning and budgeting environments, lack of reliable goal-setting data, and poor involvement of key stakeholders in the process. Including a top-down approach to goal-setting. Increasing the effectiveness of performance-based budgeting requires the institutional integration of planning and budgeting processes into a shared cycle/framework with shared reporting lines, data recovery, and local input for information on appropriate and realistic settings (49).

Flexibility with responsiveness, are the key features of performance-based budgeting. Public healthcare budgets and expenditures could be categorized and clearly described descriptively. A framework can also be provided to support program budgeting and performance measurement. Public health policymakers/specialists may then initiate an important discussion to prioritize actions and outcomes (50).

The steps of setting up a performance-based budgeting system were described, including changing the accounting approach from cash to accrual, developing a cost price system, executing performance-based budgeting, productivity management, evidence-based analysis, and decision making (47). Moreover, despite adequate admission and cost-effective execution of performance-based budgeting, Shiraz University of Medical Sciences (SUMS) lacks the necessary capabilities and authority. SUMS lacked sufficient infrastructure to execute performance-based budgeting while conducting research (51).

Budgeting in healthcare systems

Managers and heads of operational units and departments are considered the main decision-makers of hospitals that should be involved in the budgeting process (28). The involvement of budget executors in budgeting was also discussed in one study (25). The importance of participation in budgeting was discussed in another study. The budget participation (followed by budget control and feedback) and budget complexity had the greatest and least impact on budget performance in Kenyan state-owned hospitals (26). In

Kenya, delegation of authority allows local prioritization and public participation in planning and budgeting in the healthcare sector, leading to an increase in equal opportunities for local resource allocation. In this study, health policymakers were recommended to develop a broad understanding of countries' political context while designing and implementing technical strategies for decentralizing the healthcare sector (27). In the budgeting process, providing budget feedback to department/unit managers and supervisors is second only to participation. Since budget feedback information is effective in monitoring, controlling, and encouraging budget managers, budget feedback will positively affect managers' budget incentives (sense of success and promotion). The presence of a division manager in budgetary planning indicates the high capability of the organization for budget execution. In addition, the advice of the division manager and the consideration of his views in budgetary planning will lead to an increase in the positive/acceptable attitude towards budget participation, which will have a positive effect on the budget incentive (24).

The stages of budgeting in healthcare systems in Ghana were described in Arthur study, including informing the goals, identifying limiting factors, initial budgeting based on goals and limiting factors, budget negotiation (a participatory process), budget approval, budget participation, and budget management (29).

Eight budgeting methods in healthcare organizations, including population-based, facility-based, case mix-based, global, line-by-line, policy-based, project-based, and ministerial discretion. (31).

The following conclusions were drawn from a study:

- Hospital-level prioritization can be improved by aligning budgeting and planning, combining the clear role of decision-making structures, and applying explicit and formal decision-making criteria.
- Hospital-level prioritization methods can be improved in terms of efficiency and equality in decision making and yielding intermediate results, including stakeholder satisfaction/understanding, changed priorities, and implemented decisions.

- Cooperation includes the following conditional democratic principles: participation/empowerment of stakeholders, transparency, use of evidence, reconsideration, and application/combination of community values. It can improve hospital-level prioritization practices (23).

Conclusion

The healthcare system is one of the most expensive sectors in any country; therefore, it is necessary to monitor closely this sector's costs. The experience of different countries has shown that just increasing the costs of the healthcare system does not necessarily lead to improving public health. Therefore, the method of budget allocation to different health departments is very important. Healthcare systems and organizations use different budgeting approaches, three of described in this study. Each budgeting method has its own pros and cons and must meet certain requirements. Each of these methods is selected and implemented depending on the infrastructure and conditions of each country and its organizations. For this purpose, before implementing any of the methods above, these infrastructures are first analyzed, and then one of the abovementioned methods is selected accordingly.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgements

We are grateful to the study participants for their time and viewpoints. This study was not supported by any financial sources

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Wildavsky A (2018). Budgeting as a political process. *The Revolt Against the Masses. Routledge*, 24(1): 338-49.
2. Aziz H, Shah N (2021). Participatory budgeting: Models and approaches. *Pathways Between Social Science and Computational Social Science. Springer*, 215-36.
3. Ostaev GY, Gogolev I, Kondratiev D, et al (2019). Strategic budgeting in the accounting and management system of agricultural enterprises. *Indo American Journal of Pharmaceutical Sciences*, 6(4):8180-6.
4. Talmon N, Faliszewski P (2019). *A framework for approval-based budgeting methods*. Proceedings of the AAAI Conference on Artificial Intelligence: 33(1):2181-88.
5. Anessi-Pessina E, Barbera C, Langella C, et al (2020). Reconsidering public budgeting after the COVID-19 outbreak: key lessons and future challenges. *Journal of Public Budgeting, Accounting & Financial Management*, 32(5):957-65.
6. Angerer-Fuenzalida FM (2018). Quality and importance of health policy, reform, and public health topics: a study in physician assistant education. *J Physician Assist Educ*, 29(2):89-98.
7. Massuda A, Hone T, Leles FAG, De Castro MC, Atun R (2018). The Brazilian health system at crossroads: progress, crisis and resilience. *BMJ Glob Health*, 3(4):e000829.
8. Pourmohammadi K, Shojaei P, Rahimi H, Bastani P (2018). Evaluating the health system financing of the Eastern Mediterranean Region (EMR) countries using

- Grey Relation Analysis and Shannon Entropy. *Cost Eff Resour Alloc*, 16:31.
9. Safarani S, Ravaghi H, Raieisi P, Maleki M (2018). Financial challenges of teaching hospitals and providing solutions. *J Educ Health Promot*, 7:155.
 10. Hofmarcher MM, Quentin W (2013). World Health Organization. Austria: health system review.
 11. Gupta KS, Rokade V (2016). Importance of quality in health care sector: a review. *J Health Manag*, 18(1):84-94.
 12. Chernichovsky D (1995). Health system reforms in industrialized democracies: an emerging paradigm. *Milbank Q*, 73(3):339-72.
 13. Casanovas GLI (2019). Health care and cost containment in Spain. Health care and cost containment in the European Union: *Routledge*, 401-41.
 14. Mossialos E, Le Grand J (2019). *Cost containment in the EU: an overview*. Health care and cost containment in the European Union, pp: 1-154.
 15. Sharfstein JM, Stuart EA, Antos J (2018). Global budgets in Maryland: assessing results to date. *JAMA*, 319(24):2475-6.
 16. Roberts ET, McWilliams JM, Hatfield LA, et al (2018). Changes in health care use associated with the introduction of hospital global budgets in Maryland. *JAMA Intern Med*, 178(2):260-8.
 17. Petrou P (2016). Global Budget for Cyprus' National Health System: The Promised Land or a No Man's Land? *Value Health Reg Issues*, 10:67-72.
 18. Lai HP, Tang MC (2018). Hospital efficiency under global budgeting: evidence from Taiwan. *Empir Econ*, 55:937-63.
 19. Burgos JAM, Kittler M, Walsh M (2020). Bounded rationality, capital budgeting decisions and small business. *Qualitative Research in Accounting & Management*, 17(2): 293-318.
 20. Reiter KL, Song PH (2013). Hospital capital budgeting in an era of transformation. *J Health Care Finance*, 39(3):14-22.
 21. Smith DG, Wynne J (2006). Capital budgeting practices in hospitals. *Int J Health Technol Manag*, 7(1-2):117-28.
 22. Emami A, Jalalian A, Sadeghi SH (2020). Review of Operational Budgeting System in Iran and USA. *Polit Res Q*, 11(43):25-49.
 23. Barasa EW, Cleary S, Molyneux S, English M (2017). Setting healthcare priorities: a description and evaluation of the budgeting and planning process in county hospitals in Kenya. *Health Policy Plan*, 32(3):329-37.
 24. Lu CT (2011). Relationships among budgeting control system, budgetary perceptions, and performance: A study of public hospitals. *Afr J Bus Manag*, 5(15):6261-70.
 25. Rajan D, Barroy H, Stenberg K (2016). *Budgeting for health. Strategizing National Health in the 21st Century*. A Handbook Geneva, pp: 393-444.
 26. Kamau JK, Rotich G, Anyango W (2017). Effect of budgeting process on budget performance of state corporations in Kenya: A case of Kenyatta National Hospital. *International Academic Journal of Human Resource and Business Administration*, 2(3):255-81.
 27. Tsofa B, Molyneux S, Gilson L, Goodman C (2017). How does decentralisation affect health sector planning and financial management? a case study of early effects of devolution in Kilifi County, Kenya. *Int J Equity Health*, 16(1):151.
 28. Karila A, Vakkuri J, Lehto J (2020). Budgetary bias in the Finnish public hospital system. *International Journal of Public Sector Management*, 33(4):401-18.
 29. Arthur FE (2016). Budgeting in Budget Management Centres (BMCs) in Sekondi/Takoradi Metro Health Directorate. *Journal of Social Science for Policy Implications*, 4(1):63-90.
 30. Atuilik WA, Peregrino-Brimah RA, Salia H, Adafula B (2019). Budgeting and budgetary control in the Ghana health service. *J Econ Int Finance*, 11(6):60-67.
 31. Tomblin S, Braun-Jackson J (2001). Health budgeting models and the experience of newfoundland and labrador: why haven't we moved to a needs-based system? *Institute for Health Information*, 15(2):16.
 32. Dredge R (2004). *Hospital global budgeting*. World Bank, Washington, DC.
 33. Berenson RA, Upadhyay DK, Delbanco SF, Murray R (2016). Global Budgets for Hospitals. *Milbank Quarterly*, 94(2):255-59.

34. Murray J (2018). *Toward hospital global budgeting: State considerations*. State health and value strategies: Driving innovation across states. https://www.shvs.org/wp-content/uploads/2018/05/SHVS_Global-Hospital-Budgets_FINAL.pdf
35. Chen B, Chen CS, Liu TC (2018). Impact of provider competition under global budgeting on the use of cesarean delivery. *Health Serv Res*, 53(2):747-67.
36. Yan J, Lin H-H, Zhao D, Hu Y, Shao R (2019). China's new policy for healthcare cost-control based on global budget: a survey of 110 clinicians in hospitals. *BMC Health Serv Res*, 19(1):1-11.
37. Chou SY, Deily ME, Lien HM, Zhang JH (2010). Global budgets and provider incentives: Hospitals' drug expenditures in Taiwan. Pharmaceutical markets and insurance worldwide: *Emerald Group Publishing Limited*, pp:103-122.
38. Lai HP, Tang MC (2018). Hospital efficiency under global budgeting: evidence from Taiwan. *Empir Econ*, 55(3):937-63.
39. Guan X, Zhang C, Hu H, Shi L (2020). The impact of global budget on expenditure, service volume, and quality of care among patients with pneumonia in a secondary hospital in China: a retrospective study. *BMC Public Health*, 20(1):522.
40. Galarraga JE, Frohna WJ, Pines JM (2019). The impact of Maryland's global budget payment reform on emergency department admission rates in a single health system. *Acad Emerg Med*, 26(1):68-78.
41. Ko YL, Wang JW, Hsu HM, Kao CH, Lin CY (2018). What happened to health service utilization, health care expenditures, and quality of care in patients with acute pancreatitis after implementation of global budgeting in Taiwan? *Medicine (Baltimore)*, 97(41): e12620.
42. Ho S-JK, Chan L, Tompkins DL (2003). Capital budgeting and entrepreneurial organizations: A survey of hospital practices. *The Journal of Entrepreneurial Finance*, 8(1):111-27.
43. Mukherjee T, Al Rahahleh N, Lane W (2016). The capital budgeting process of healthcare organizations: A review of surveys. *J Healthc Manag*, 61(1):58-76.
44. Holcomb AJ, Smith DG (2020). Hospital capital budgeting during a public health crisis. *J Health Care Finance*, 46(4):23-36
45. Mitton C, Dionne F, Donaldson C (2014). Managing healthcare budgets in times of austerity: the role of program budgeting and marginal analysis. *Appl Health Econ Health Policy*, 12(2):95-102.
46. Tsofa B, Musotsi P, Kagwanja N, et al (2021). Examining health sector application and utility of program-based budgeting: County level experiences in Kenya. *Int J Health Plann Manage*, 36(5):1521-32.
47. Abolhallaje M, Mousavi SM, Jafari M (2014). Implementation of performance-based budgeting in the health system: luxury or necessity? *Iran J Public Health*, 43(11):1593-4.
48. Waithaka D, Tsofa B, Kabia E, Barasa E (2018). Describing and evaluating healthcare priority setting practices at the county level in Kenya. *Int J Health Plann Manage*, 33(3):e733-e50.
49. Tsofa B, Molyneux S, Goodman C (2016). Health sector operational planning and budgeting processes in Kenya—"never the twain shall meet". *Int J Health Plann Manage*, 31(3):260-76.
50. Hepburn VA, Eger III R, Kim J, Slade C (2007). Structuring a framework for public health performance-based budgeting: a Georgia case study. *J Public Health Manag Pract*, 13(2):173-9.
51. Keshavarzi MH JA (2015). Feasibility study of performance-based budgeting in Shiraz University of Medical Sciences and Health Services. *Health Accounting*, 1(7):83-61.