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Unlocking value: a comprehensive costing study of primary health care service delivery in Tanzania

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Abstract

Background Tanzania has long prioritized primary health care (PHC) as the pathway to achieving universal health coverage. However, greater, and more effective investments are needed to expand access to quality PHC services and further improve population health outcomes. Furthermore, as Tanzania graduated to lower-middle-income country status, the Government is expected to move towards full domestic financing of health services. To support this aim, there is a need to estimate the current expenditure of PHC services, the resources needed to deliver quality PHC services according to nationally defined standards, and the gap between the two.

Methods A top-down approach was used to understand the costs incurred by the government to provide PHC services in public health facilities. All facility and community-level expenditures incurred by the government and development partners on human resources, medicines, medical supplies, and facility operations were collected and included in the costing. The total funding gap was calculated as the difference between actual expenditure and estimated normative cost. The gap analysis was undertaken by input categories and level of facility.

Results Government expenditure on PHC substantially increased between fiscal year (FY) 2021/22 and 2022/23. Nevertheless, the spending level is significantly lower than global benchmarks, and the resources required to deliver quality PHC services according to the basic service standards. Moreover, the analysis revealed there are important differences in the levels of spending per capita across regions and health service delivery productivity.

Conclusions The Government of Tanzania's PHC spending increased significantly over the two years, raising the per capita PHC expenditure and the expenditure per outpatient visit. As the Government of Tanzania increasingly finances health services from domestic sources, a key consideration for long-term planning in the context of declining partner funding is the total amount of funding required to provide quality PHC services equitably to the population. At the same time, a more detailed understanding of current PHC expenditure informs the calculation and estimation of the funding gap.

Keywords Primary Health Care, Service Delivery, Costing, Economic Analysis, Tanzania, Africa

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Background

Tanzania has made significant strides in improving the health of its population over the last two decades. The neo-natal mortality ratio declined from 112 deaths per 1,000 live births (LBs) in 2004–2005 to 43 deaths per 1,000 LBs in 2022; similarly, infant mortality halved, dropping from 68 to 33 deaths per 1,000 LBs during the same period, and skilled attendance during delivery increased from 47% in 2004–2005 to 85% in 2022 [1, 2]. These enhancements stemmed from an expansion in the number of health facilities, improved medicines availability, greater domestic funding, and the strengthening of governance by implementing decentralisation by devolution [3]. However, further progress is needed to improve health outcomes and achieve the Sustainable Development Goals.

Tanzania has made commendable progress in maternal and child health, yet health outcomes remain below regional benchmarks [4]. Despite innovations such as Direct Health Facility Financing (DHFF) and efforts to expand insurance coverage, progress toward UHC is constrained by low-risk pooling and persistent out-of-pocket expenditures [5]. Government health spending remains below the 15% Abuja target, with donor funding still accounting for a significant share of total health expenditure [6]. In comparison to regional peers, Tanzania's reliance on external financing and limited domestic resource mobilization underscore the need for stronger health financing reforms to sustain gains and advance toward UHC [7, 8].

Tanzania remains heavily reliant on donor funding for health service delivery. Such funding is highly fragmented with only a fraction of the resources directed through the Health Basket Fund, the health sector's on-budget donor fund pooling mechanism. Foreign-funded projects that are implemented through government authorities are reported by the Accounting Officers through the Direct to Project Funds Modality (D-Funds) and do not appear on the Medium-Term Expenditure Framework. Private expenditure on healthcare is also high, representing 27% of the current health expenditure in 2022 [9]. Out-of-pocket expenditures account for the largest share (26%) of private expenditures in the form of user fees collected and retained at the health facility level [10].

Tanzania has long prioritized PHC as the pathway to achieving universal health coverage [11]. PHC is defined as a whole-of-society approach to effectively organize and strengthen national health systems to bring services for health and wellbeing closer to communities [12]. In addition to service delivery, it includes the broader determinants of health through multisectoral policy and action empowering individuals, families and communities to take charge of their own health. For this study, we

focused on essential primary care services, as the core of the service-fronting component of PHC.

In the Tanzania context, greater, and better investments are needed to expand access to quality PHC services and further improve population health outcomes. As Tanzania graduated to lower-middle-income country status in 2020, the government is expected to incrementally increase domestic financing of health services. To support this aim, there is a need to estimate the current expenditure of primary care services, the resources needed to deliver quality PHC services according to Government-defined standards, and the gap between the two.

Several studies have been conducted on the Tanzania mainland to estimate the costs of delivering individual health interventions [13, 14]. However, no comprehensive costing exercise has been recently conducted to estimate government expenditure on PHC service delivery and the gap vis à vis the resources needed to deliver quality PHC services. To address this information gap, the President's Office Regional Administration and Local Government (PORALG) and the Ministry of Health (MoH) partnered with UNICEF to undertake a comprehensive PHC costing exercise. A PHC advisory committee was established to oversee the study with representatives from the MoH and PORALG. The study aimed to generate estimates to inform domestic resource allocation for the equitable delivery of quality PHC services. The study was intended to aid the Tanzania government considering what is realistic in a given context and what a feasible roadmap towards the goal might look like.

Methods

Study setting

In Tanzania, the public health sector is divided between the central and local government, encompassing both the ministerial and the regional administration tier. The MoH leads health policy development and implementation. At the sub-national level, the Tanzania mainland is divided into 25 regions that are an administrative extension of the central government. The local government is divided into Local Government Authorities (LGA) and District Councils responsible for decentralised public services delivery, including health, and report to the PORALG [15]. Regional population varies from approximately 890,000 to 5,387,000 based on the most recent national census [16].

In mainland Tanzania, PHC services are delivered through a multi-layered system. This comprises over 6,000 public dispensaries, health centers, and district hospitals, offering a comprehensive approach to health encompassing promotion, prevention, treatment, rehabilitation, and palliative care. A detailed description of the services provided at the different levels is contained

in various policy documents [17, 18], but a summary of responsibilities is as follows:

- At the community level, health workers engage in health promotion and prevention activities in neighbourhoods and villages.
- The village level provides preventive and curative outpatient services through dispensaries serving between 6,000 and 10,000 people. Clinical assistants and enrolled nurses supervise dispensaries.
- The ward level serves as the referral point for the village level, with health centers offering more extensive services, including inpatient care. Health centers are led by clinical officers, supported by enrolled nurses, and serve approximately 50,000 people.
- District hospitals represent the next level, providing specialised medical care and function as teaching hospitals for medical, paramedical, and nursing training. District hospitals employ medical doctors and nursing officers and cater to the district population, which varies significantly by district.
- Multiple districts are clustered into zones, each of which has a regional hospital, and at the top of the pyramid are specialised hospitals overseen by the MoH.

Scope of the costing exercise

The overarching aim of this study was to develop national estimates of the total financial costs for the full package of PHC services. The study had three specific objectives. First, to understand the expenditure incurred by the government to deliver PHC services (i.e. actual costs) in FY 2021/22 and 2022/23; secondly to estimate the total resources needed to deliver quality PHC services as per the Basic Health Service Standards (i.e. normative costs); and finally, to calculate the gap between actual costs and the normative costs.

The costing assumed a provider's perspective and estimated the expenditure incurred by the government to provide health services in public health facilities. As a first step, actual total expenditure was estimated for PHC service delivery by the level of the facility. The second step consisted of the estimation of total resources needed, using normative costing, to provide PHC services. The final step involved the calculation of the resource gap between the actual cost of providing PHC services and the estimated total resource need.

Scenarios for costing

The cost of PHC service delivery was estimated for two different scenarios: the current scenario using actual expenditure in FY 2021/22 and 2022/23, and the normative scenario.

- In the Actual Expenditure Scenario, the actual government expenditure incurred in PHC facilities was used to indicate the total expenditure incurred by the government to provide PHC services.
- The Normative Scenario considered the resource requirement for service delivery using the 2017 Basic Service Standards, fully implemented, at all PHC levels without any adjustment.

The difference between the current and the normative scenarios allowed for the estimate of the total resource gap across the different levels of service delivery and service delivery inputs. The inclusion of two FYs was done to identify possible outliers in the data.

Costing approach

A top-down approach was used to understand the costs incurred by the government to provide PHC services in public health facilities. All facility and community-level expenditures incurred by the government and development partners on human resources, medicines, medical supplies, and facility operations were collected and included. Costs incurred at the regional and national levels (e.g. supportive supervision), and by off-budget development partners to support PHC services were excluded from the analysis. These costs were excluded due to lack of data on expenditure by off-budget partners and national and regional levels on PHC.

Approach for estimating costs under the actual expenditure scenario

All facility and community-level expenditures incurred by the government in dispensaries, health centers, and district hospitals on human resources, medicines, medical supplies, and facility operations in FY 2021/22 and 2022/23 were collected and included.

Approach for estimating costs under the normative scenario

The resources needed for human resources (HR) were estimated using facilities as the unit of analysis. The number of HR in the staff establishment of the Basic Health Services Standards was multiplied by the government remuneration by cadre. The total normative HR cost per facility was a summation of the total computed remuneration of all cadres, and the total normative HR cost for PHC services per level of facility was obtained by multiplying all government facilities of that level by the HR cost of a standard facility. The country's normative HR cost comprised the summation across all the facility types.

The cost of health commodities was based on the current estimated requirements by facilities, captured in the national quantification, supplemented by the programme quantifications for HIV, malaria, tuberculosis, and

leprosy. The national quantification for essential medicines was adjusted to reflect the reported underestimation by 28% in FY 2021/22 and 26% in FY 2022/23.

Normative operational costs were assumed to be equal to the actual expenditure on operations incurred by the facilities.

Data sources

The study relied on secondary data generated largely through government routine systems. The normative costing entailed estimating the cost of HR using the Basic Health Services Standards. HR costs were added to the health commodities resource requirements obtained from the national quantification reports for FY 2021/22 and 2022/23 and operation costs from the Facility Financing and Accounting Reporting System (FFARS). The data sources consisted of FFARS for facility expenditure, Plan-Rep for HR expenditure incurred directly by the Ministry of Finance (MoF), the Medical Stores Department (MSD) for health commodities procured and supplied through government funding, and the District Health Information Software 2 (DHIS2) for service utilisation. The national PHC advisory committee were consulted in their professional capacity to assess the accuracy of the national quantification of health commodities and appropriate adjustments made. Table 1 provides an overview of the different types of data, sources, and uses of the data.

Table 1 Data type, sources, and uses of the data

Data type	Sources	Uses of the data
Expenditure by facility type (HR, health commodities, facility operations)	FFARS	Actual expenditure on medicines, supplies, operating costs, and HR directly procured by the facility.
Expenditure on medicines and supplies	MSD reports and FFARS	Estimate actual expenditure on commodities incurred via MSD and procurement from private vendors by facilities.
Personnel emoluments	PlanRep	Budget values as proxy for expenditure on centrally remunerated staff, which was not included in FFARS for PHC facilities
Normative estimate for personnel emolument	Basic Health Service Standards	Guides the analysis of total HR needs at facilities to underpin the normative costing
Normative estimate of medical supplies, reagents, medical equipment and pharmaceuticals	National quantification report, vertical programme quantification for ARVs and malaria	Used to estimate the normative value of health commodities and supplies
Capital expenditure for future facility development and infrastructure expansion	Number of health facilities registered on FFARS	Supports estimates for capital development costs and other capital expenditure

Data analysis

The costing was undertaken using Excel-based analysis tools. Estimates were compiled for individual cost inputs (i.e. HR, health commodities, and facility operating costs) by region and by level of facility (i.e. dispensary, health centre, and district hospital) and aggregated to generate national and regional estimates. In addition, high-level unit costs were calculated for outpatient equivalent visits for each region and nationally. In-patient days were adjusted by a factor of four to convert them to outpatient equivalent days.

All estimates were converted to USD using the exchange rate of 1 USD = 2,298 TZS for FY 2021/22 and 1 USD = 2,310 TZS for FY 2022/23 (Bank of Tanzania average mean exchange rate).

Quality assurance and validation

The data obtained from the described sources were triangulated with others (e.g. the National Health Accounts) and other costing studies employing different methodologies to assess their quality and identify anomalies. The cost calculations and analysis spreadsheets were also checked for accuracy, completeness, and reasonableness. Representatives from the PORALG Health, Social Welfare, and Nutrition Services Directorate, the MoH, the MoF, UNICEF, and other development partners validated data and outputs during a technical review session.

Ethical approval

Ethical approval was initially granted by the National Institute for Medical Research in Tanzania on October 7th, 2021, with reference number NIMRHQR8a/Vol/IX/3797. Subsequently, a protocol amendment was approved on January 25th, 2024 with reference number NIMR/HQ/R.8b/Vol.I/1199.

Results

Health facility service utilization

In FY 2021/22 and FY 2022/23 there were 5,719 and 6,042 government-owned PHC facilities across Tanzania mainland respectively. Over the two years, 61,302,737 and 39,008,713 outpatient visits were provided, as well as 619,614 and 659,005 inpatient visits (Figs. 1 and 2). The significant reduction in the number of outpatient visits could, at least in part, be attributed to systematic challenges related to the quality, completeness and consistency of routine data information systems.

Actual government spending on PHC

The study found that total expenditure on PHC from the central government, the National Health Insurance Fund, the Community Health Fund, the Health Basket Fund, and other on-budget donors grew from TZS 801 billion (USD 349 million) to TZS 1,158 billion (USD 501 million)

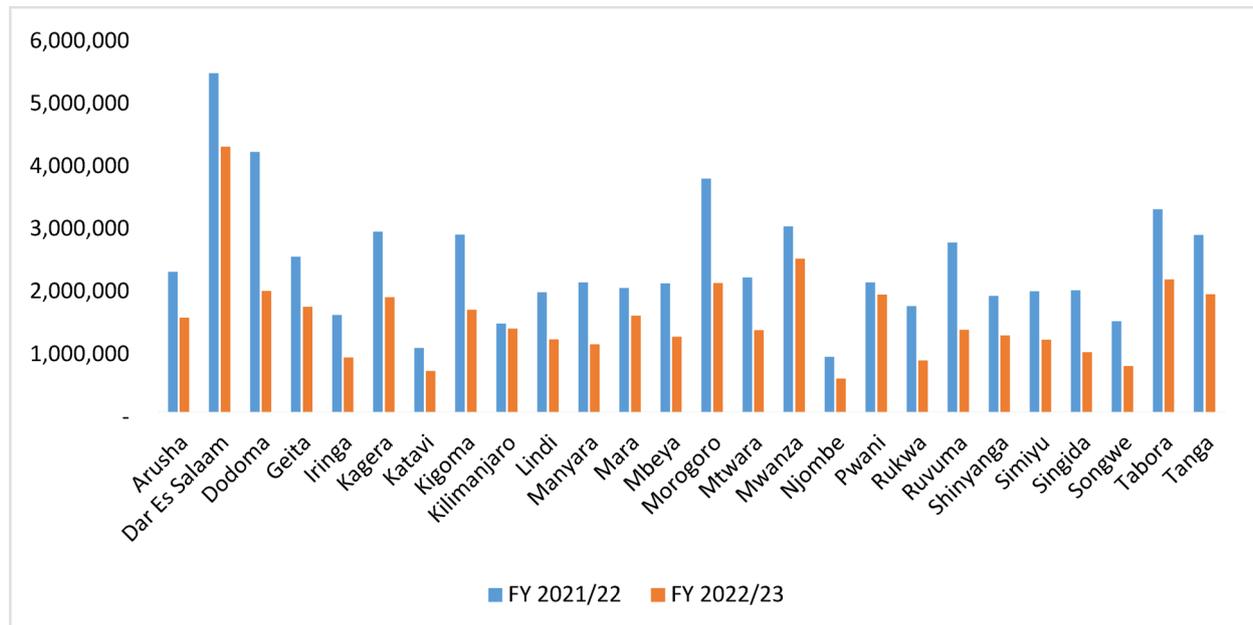


Fig. 1 Number of OPD visits in FY 2021/22 and 2022/23 by region

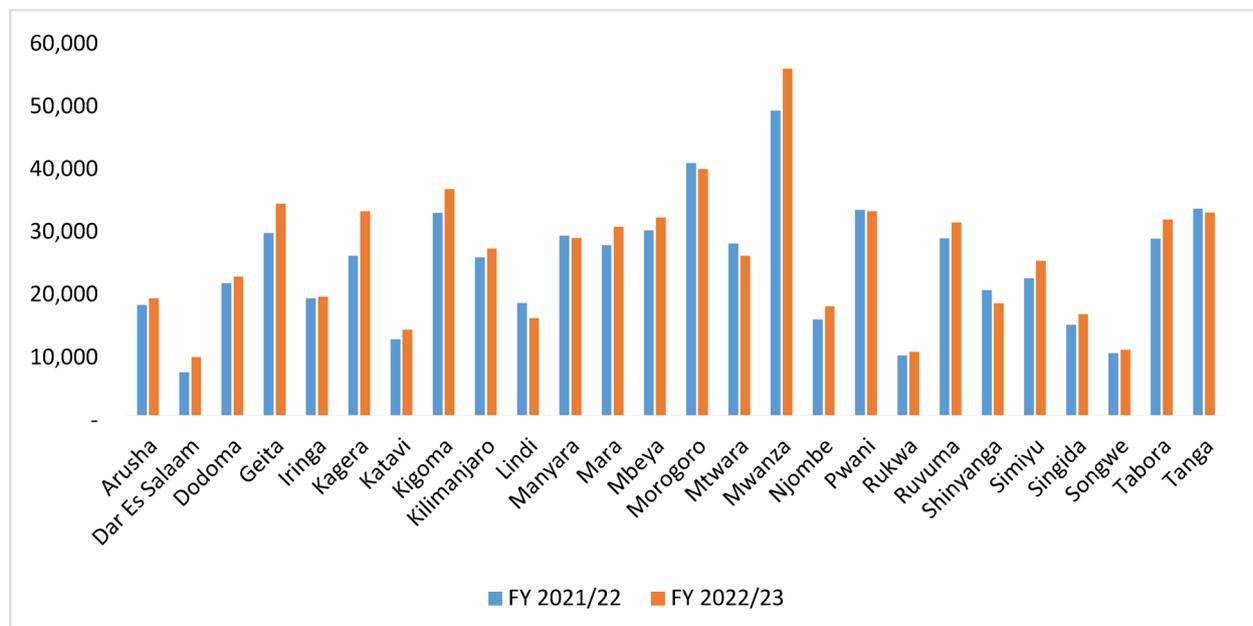


Fig. 2 Number of IPD admissions in FY 2021/22 and 2022/23 by region

between FY 2021/22 and FY 2022/23 (Fig. 3). The significant growth is attributed to the rise in the expenditure on HR due to the increase in the health personnel employed, mostly at the level of district hospitals, in FY 2022/23, and the growth in facility operating costs resulting from the operationalisation and upgrade of 310 health facilities. Expenditure on health commodities, comprising pharmaceuticals, reagents, and equipment, marginally decreased between the two years, especially in dispensaries. No reasons were attributed to this beyond those

related to the operationalisation and upgrade of 310 health facilities.

While total per capita expenditure on PHC increased from TZS 12,891 (USD 5.61) to TZS 18,215 (USD 7.89) between the two years, implying a more than proportional increase compared to the population growth, it remained significantly lower than the WHO recurrent PHC benchmark of TZS 136,900 (USD 59) [19]. The analysis of government expenditure in PHC at the regional level also revealed significant disparities. The lowest

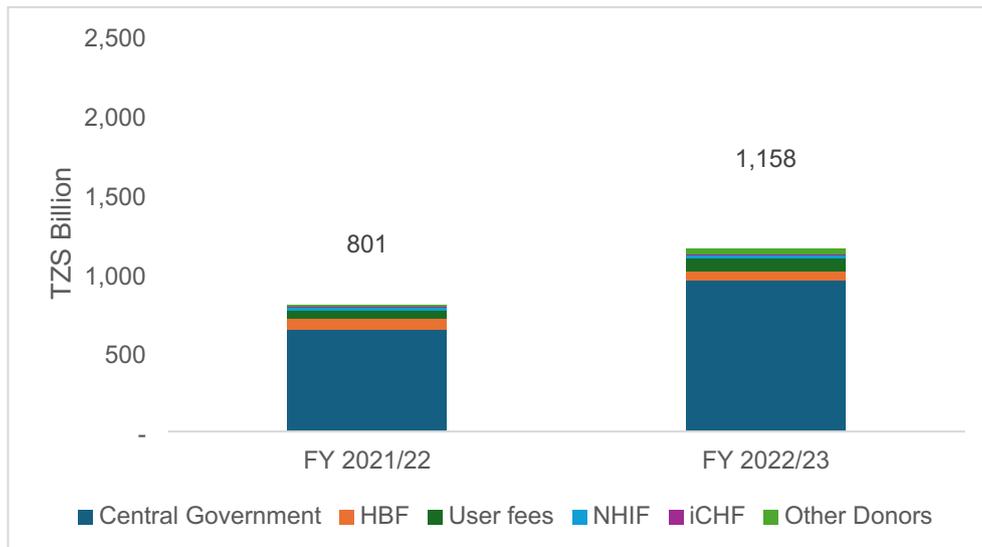


Fig. 3 Total actual Government and donors on budget expenditure on PHC in FY 2021/22 and 2022/23

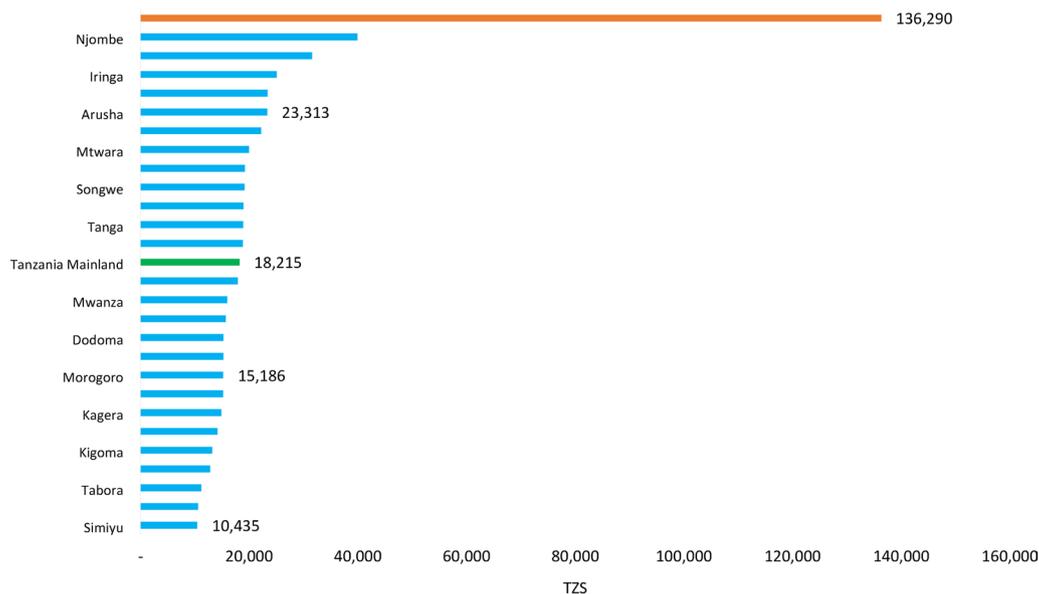


Fig. 4 Total actual Government spending on PHC in FY 2022/23

government expenditure on PHC was reported in Simiyu and was less than a third of the expenditure in Njombe, the region with the highest level of government spending (Fig. 4).

Expenditure per standard unit of output, measured using outpatient visits, nearly doubled in all regions between FY 2021/22 and FY 2022/23. This finding suggests that despite increased expenditure on PHC, there was no significant improvement in health service access.

Normative costing for PHC

The normative costing revealed that TZS 4,519 billion (USD 1,966 million) and TZS 6,384 billion (USD 2,997 million) are needed to deliver quality PHC services

according to the national Basic Health Services Standards. The sharp increase between the two years was primarily driven by the health commodity needs which grew due in response to the increased number of health facilities. The greater growth in commodity needs was reported at the dispensary level, followed by district hospitals. The analysis reveals that normative HR costs rose with the increase in registered facilities. The increase in HR needs between FY 2021/22 and FY 2022/23 was 10%, 10%, and 7% for dispensaries, health centres, and district hospitals, respectively (Fig. 5).

The estimate of normative per capita cost shows that if the Government of Tanzania aligned its investment in PHC to the FY 2023/24 normative estimate of TZS

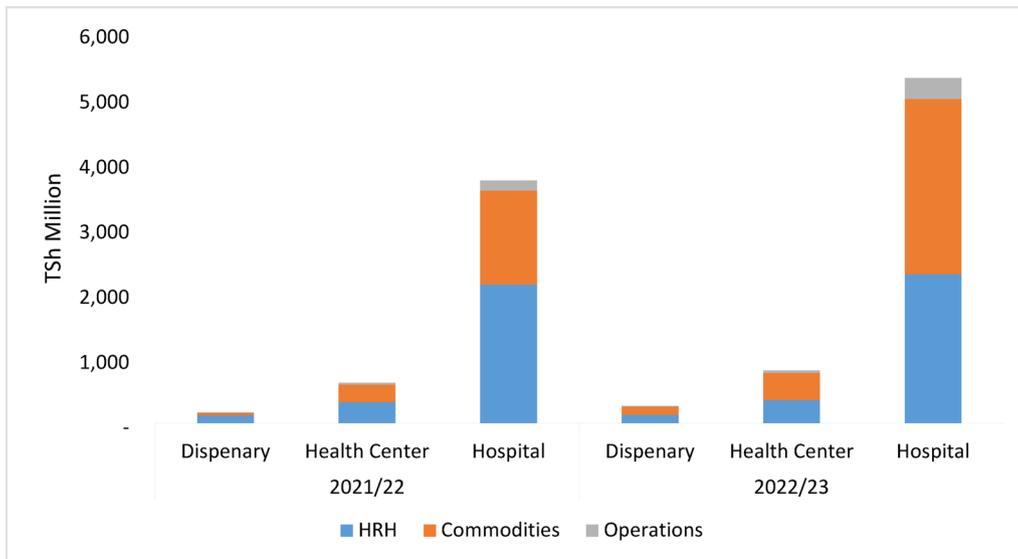


Fig. 5 Normative cost estimated for FY 2021/22 and 2022/23

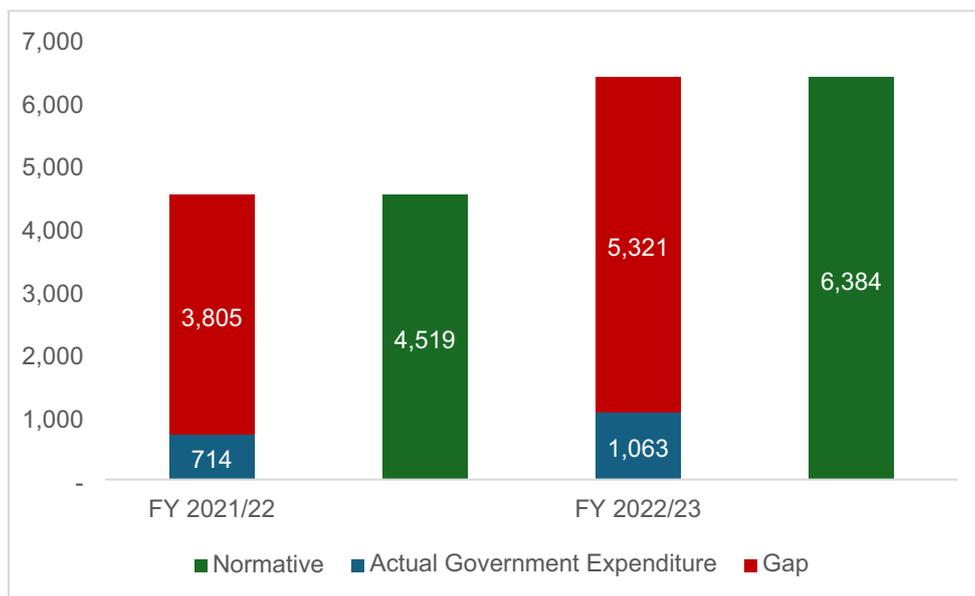


Fig. 6 Overview of the funding gap analysis in FY 2021/22 and 2022/23

50,797 per capita, it would move towards achieving the WHO target of per capita PHC recurrent expenditure of TZS 136,900 (USD 59) [19].

Funding gap analysis

The gap analysis revealed that in FY 2021/22 and FY 2022/23, there was an 84% and 83% government funding gap for the delivery of quality PHC services, estimated as the difference between the normative costs and the sum of central government, Community Health Fund, and National Health Insurance Fund contributions. Due to the contributions of development partners and individuals paying for services out-of-pocket, the actual gap

is likely lower than this estimate but remains significant (Fig. 6).

While district hospitals had the highest proportional funding gap in FY 2021/22, dispensaries accounted for 49% of the total funding gap in FY 2022/23. This change in proportions can be attributed to the increased number of facilities and the disproportionate increase in the commodity and staffing costs in FY 2022/23 in dispensaries (Table 2).

Relationship between spending, outputs, and outcomes

Figures 7, 8 and 9 show the relationship between current per capita expenditure for each region and skilled

Table 2 Funding gap analysis by level of service delivery

Level	FY 2021/22			FY 2022/23		
	Actual	Normative	Funding gap	Actual	Normative	Funding gap
Dispensary	287	847	560	394	1,141	747
Health Centre	171	357	186	260	535	275
Hospital	255	526	271	409	887	478
Total	713	1,730	1,017	1,063	2,563	1,500

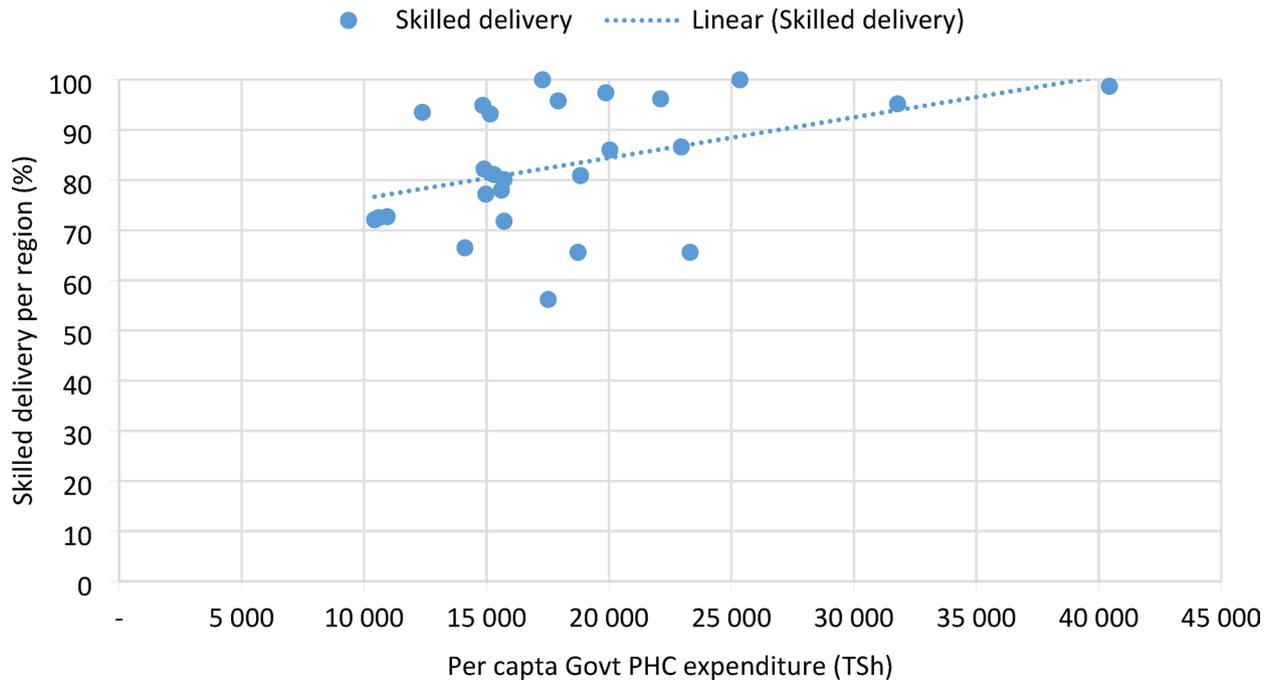


Fig. 7 Relationship between Government PHC spending and skilled delivery

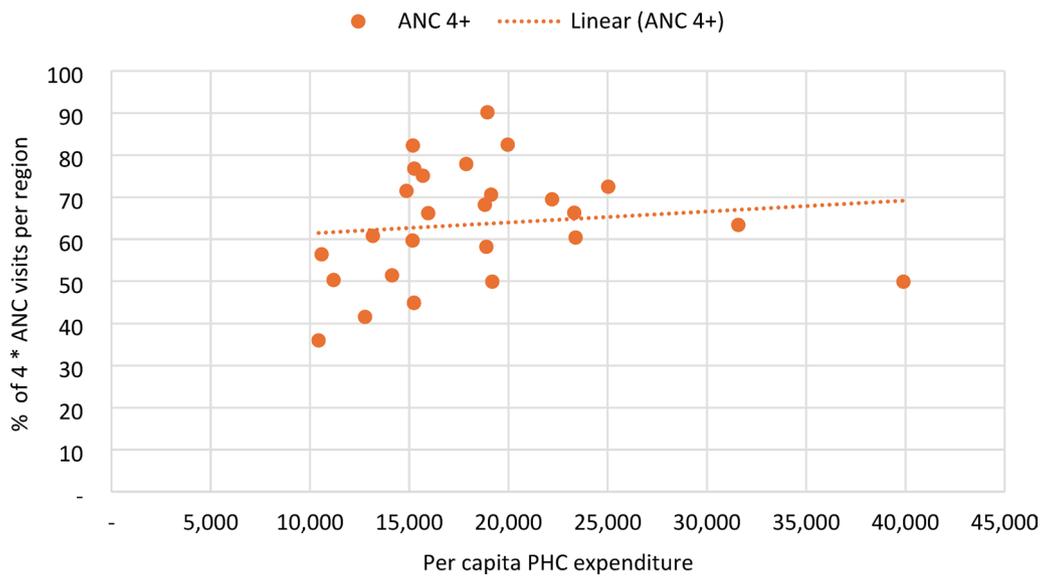


Fig. 8 Relationship between Government PHC spending and U5 mortality

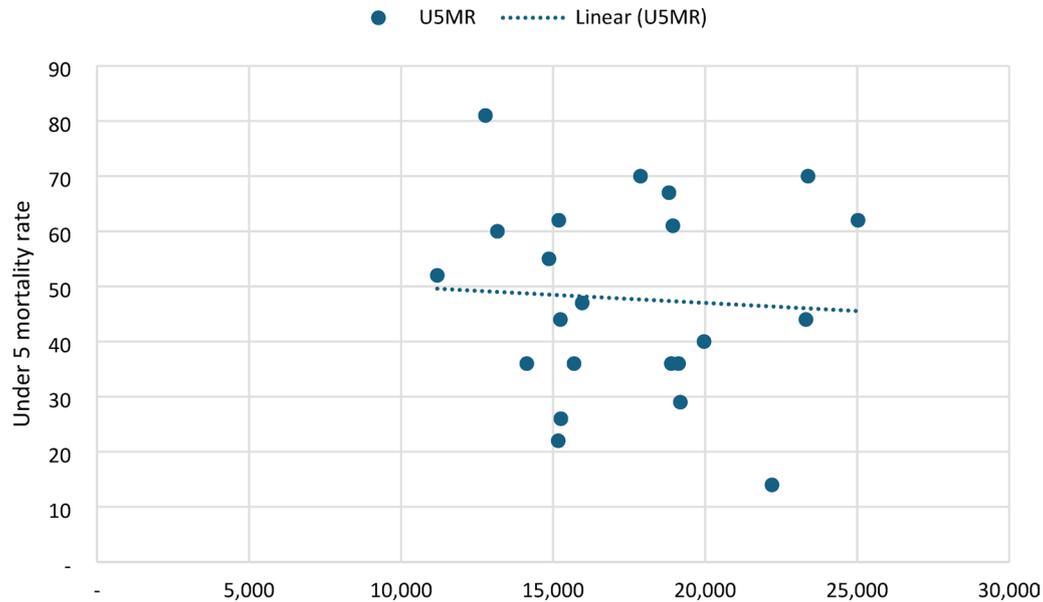


Fig. 9 Relationship between Government PHC spending in regions and under-5 mortality

delivery, antenatal care (ANC) utilisation and mortality for children under-5 years for the same regions. A trend line has been included based on the observations.

For the first two indicators, there is a clustering of regions in terms of per capita expenditure but significant variability in health indicator values. There seems little correlation between per capita expenditure and under-5 mortality. Notwithstanding that funding plays a critical role in increasing the availability of and access to health services, it should be noted that service utilisation for skilled delivery and ANC depends on many factors, including health-seeking behaviour. Under-five mortality depends on previous spending and other factors, and it may not be possible to draw conclusions from this analysis. Overall, the results show a positive relationship between government PHC per capita spending and service utilisation (skilled delivery and ANC 4+) and a weak, negative relationship with under-five mortality with high variability around the trend line. Nevertheless, these results underscore the important role of government financing in improving the welfare of its population.

Discussion

The study found that total per capita expenditure on PHC increased in the two years, implying a more than proportional increase compared to the population growth. However, expenditure remained significantly lower than the WHO per capita spending benchmark. The study also found high variation in expenditure and productivity across regions in Tanzania with implications for equitable access to PHC services. In-country variation may be partly attributed to the extent of donor off-budget support channelled to specific regions. Some inequity may

be mitigated through such support, but further analysis is required to accurately assess the situation.

Per capita health expenditure is an indicator that can be used to assess equity in funding health services across geographies and populations and is commonly reported in national costing and expenditure tracking. It is particularly helpful when it is combined with the burden of diseases in different regions. Relative benchmarking with other PHC systems within the region may also serve to highlight areas for improvement, recognizing that substantial variation exists in PHC models among countries. As noted very little work has been done to develop detailed definitions of what PHC encompasses making comparison difficult [19]. The Primary Health Care Performance Initiative was designed to support the measurement of PHC-related variables, including PHC expenditure per capita as one recommended indicator with the understanding that PHC is the 'cornerstone' of sustainable development, and improvement is premised on better data and measurement [20].

Costing studies are an important tool to reduce gaps in coverage of populations, services, and expenditures. They are particularly important sources of information in contexts of transition from donor to domestic financing. In Tanzania, there is no domestic resource mobilization strategy for the health sector and the government's allocation lags that of most neighbouring countries in the region. While domestic healthcare financing has improved, resources have not kept pace with inflation and population demand. Given changing donor resource availability, coupled with Tanzania's transition to lower middle-income status, more work is needed to identify effective financing mechanisms for the health sector.

Increasingly costing studies of PHC services are available and can be used as 'guide posts' for investment and projected resource needs [19].

The study highlights the importance of increased government investment in health in response to declining donor contributions and the national commitment to financial risk protection through mandatory UHC. The evidence generated by this study can be used to develop a robust advocacy strategy for more government and domestic resources for PHC services. Additionally, there is a need to reevaluate allocation to regions where the current PHC spending was indicative of unequal per capita expenditure, noting that it may not be possible to reduce historical allocations. Lastly, institutionalisation of the costing approach and related reporting is recommended so that MoH and PORALG can use it routinely to inform planning and ongoing management of health facilities.

Limitations

There were some limitations to the study. The data on direct payment for HR by the central Government contained only personnel emoluments and did not capture allowances paid by the MoF. Therefore, the allowances were estimated based on the results of phase one of the costing study which include a sample of 70 facilities.

The estimated need for commodities was taken from the quantification reports and adjusted for underestimation based on expert opinion and comparisons of estimates with actual expenditure. Additionally, there was a big difference between the estimated commodities needs for the two years which points to a forecasting and estimation process which is maturing and may contain inaccuracies. In theory, quantification starts as a process which considers prior year consumption and as such, may imbed inefficiencies and not be a true reflection of need. However, quantities for vertical programmes are based on the burden of disease and population coverage.

The analysis also relied on service data reported from the DHIS2, which may be subject to completeness errors in reporting by health facilities. However, these data were used only for the estimation of cost per outpatient equivalent visit and do not impact on other reported results.

Ideally, the analysis would consider a scenario that considers affordability and other constraints, referred to as a Feasible Scenario. This scenario would generate a total resource need below that generated by the normative costing and would adjust, for example, staff establishments for output and setting, which the Basic Health Services Standards do not go beyond the classification of the health facility. It was not possible to generate a Feasible Scenario due to the lack of reliable data to underpin assumptions. This could be an area for future study as part of the development of a feasible roadmap for

financing PHC, particularly in light of recent donor contraction (e.g. United States Government funding cuts).

Conclusion

The study shows that the central government plays a critical role in financing PHC in the country. The government's PHC spending increased significantly over the two-year period, raising the per capita PHC expenditure and the expenditure per outpatient visit. The increase was largely attributable to the salaries of public servants and the increased numbers of staff employed by the government. Reaching WHO per capita spending benchmarks for lower-middle-income countries will nevertheless require significantly more sustainable domestic resources and investment. As the Government of Tanzania increasingly finances health services from domestic sources, a key consideration for long-term planning in the context of declining partner funding is the total amount of funding required to provide quality services equitably to the population. At the same time, a more detailed understanding of current PHC expenditure informs the calculation and estimation of the funding gap. The study underscores the importance of systematically using routine health information, budget, and expenditure data, as their regular use can help improve the accuracy and consistency of reporting over time.

Abbreviations

ANC	Antenatal care
D-Funds	Direct to Project Funds Modality
DHIS2	District Health Information System
FFARS	Facility Financing and Accounting Reporting System
FY	Fiscal year
HR	Human resources
LB	Live births
MOF	Ministry of Finance
MOH	Ministry of Health
MSD	Medical Stores Department
PHC	primary health care
PORALG	President's Office Regional Administration and Local Government
TZS	Tanzania Shillings
USD	United States Dollar

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Author contributions

Design of the study was done by FM, WCM, NK, JTK, DM, RK, CS. Acquisition and analysis for the study was done by FM and CS. Interpretation of findings was done by FM, WCM, NK, JTK, DM, RK and CS. The study was written by FM and CS with inputs from WCM, NK, JTK, DM, RK, GA and WE. The manuscript was written by FM and GA. All authors reviewed the manuscript.

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Data availability

All data came from the Government financial systems.

Declarations

Ethics approval

Ethical approval was granted by the National Institute for Medical Research in Tanzania on October 7th, 2021, with reference number NIMRHQR8a/Vol/IX / 3797. Subsequently, a protocol amendment was approved on January 25th, 2024.

Consent to publish

Not applicable.

Competing interests

The authors declare no competing interests.

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