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Migrants and refugees' health financing in Morocco: How much is the hidden contribution of the government through free services?

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Abstract

Background The health of migrants and refugees is a key component in achieving Universal Health Coverage (UHC). This paper aims to assess the scale of financing mobilized by the Moroccan government for migrants and refugees health, and addressing health issues related to these populations within the ongoing health reforms.

Methods The primary objective of this study was to estimate the financial resources allocated by the government for migrants' and refugees' healthcare. A bottom-up approach was used to assess the unit costs of all services provided across five primary healthcare (PHC) centers and three hospitals in two regions of Morocco. A detailed costing methodology was applied, accounting for all cost components at the health facility level, including depreciation of capital assets. By combining unit costs and service volumes, we estimated the total government expenditure on healthcare for migrants and refugees. As the free service provision shifts to a third-party payment system with the expansion of health insurance, this financing must be accounted for. To better prepare for future contracting, we also calculated the disease-specific costs for migrants and refugees using activity-based costing (ABC) methods, which allowed us to develop a database of costs per disease associated with migrant and refugee healthcare. Data from 2022 were used for the analysis.

Results The study found that the government mobilizes approximately 5% of its total annual primary healthcare budget for migrants and refugees, amounting to $141,652.66. For secondary-level care, the cost was $184,921.92 (3% of total hospital costs) for one hospital, $46,778.20 (0.37% of the total cost) for a second hospital, and $78,193.53 for a teaching hospital. These findings are crucial for informing the development of alternative financing mechanisms following the expansion of health insurance coverage, with the cost per pathology serving as a foundation for designing these mechanisms.

Conclusion The study also highlighted that hospitals across different levels of care manage costly diseases, further underscoring the importance of government investment in migrant and refugee healthcare. The nondiscriminatory

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access to healthcare services and the model of care established in Morocco could serve as a foundation for developing sustainable healthcare financing models for migrants and refugees.

Keywords Migrants' and refugees health financing, Universal health coverage

Background

Universal Health Coverage is about ensuring access to quality health services for the entire population, irrespective of individuals' social background and economic status, while also ensuring financial protection [1]. Strengthening the health system is a prerequisite to improving access for all, including the most vulnerable groups [2]. A scoping review in Africa highlighted the importance of investing in health financing to cover the needs of underprivileged communities [3]. Vulnerable populations are heterogeneous and vary from one context to another. Refugees and migrants are among vulnerable populations that often remain invisible in public policies and academic research due to insufficient understanding of their specific challenges and the lack of tailored approaches to respond to their special needs [4].

A recent study reviewed 77 papers from nine European countries to examine the disparities between migrants and non-migrants in accessing needed health care and assess the extent of unmet health care needs of the two groups. The study highlighted the importance of legal barriers in ensuring access to needed health care, the overuse of emergencies and underuse of Primary Health Care (PHC) by migrant populations, as well as circumstances of discrimination [5]. Addressing these inequalities remains crucial and urgent. International experience provides many strategies and policies to cover health services for migrants and refugees. For example, some countries like Malaysia are moving towards migrants' inclusion into the national health system by providing documented migrant workers access to health services. According to this experience, suggestions are made, such as expanding health insurance to include all migrant populations while broadening its scope towards more comprehensive coverage, including essential primary care [6].

Health financing is central to any UHC strategy as one of its three pillars: (1) financial protection, (2) benefits package, and (3) population covered. In this sense, innovative health financing is more than needed to improve migrants' health; it could also benefit the health system for nationals, following a win-win logic. Examining the health financing strategies and actions to facilitate access for migrants and refugees is central to any UHC policy. There is also a need for innovative financing approaches adapted to different refugee contexts [7, 8].

States' commitment to covering health services for this population will improve financial protection when accessing services. The example of Syrian refugees in Lebanon shows a high out-of-pocket expenditure facing this population and many challenges in ensuring access to health services with a good level of financial protection [9]. Inadequate financing and lack of coverage by financial protection mechanisms, e.g., health insurance, are among the main challenges in providing timely and quality services to refugees and migrants. There is a recommendation to focus on inclusion into service delivery and financing strategies and integration into surveillance and routine health information system in health policies and plans [10].

According to the United Nations Department of Economic and Social Affairs, Morocco counts approximately 103,000 international migrants in 2020, including irregular migrants, regular migrants, refugees, and asylum seekers [11]. Of this population, nearly 60% (59.3%) were male, with more than 80% (81.2%) aged between 15 and 44. Over half of the migrants (54.1%) were in this age range. The average household size among migrants was four individuals. Education levels showed that 27.3% of migrants had attained higher education. The largest migrant groups came from Côte d'Ivoire (16.7%), Senegal (15.9%), Guinea (13.2%), the Democratic Republic of Congo (10.1%), Cameroon (8.7%), Mali (4.9%), and the Central African Republic (2.3%), with 15.1% originating from other African countries. Among refugees, more than half (54.4%) were of Syrian origin. Approximately 47.5% of Syrian migrants cited security concerns or the desire for better living conditions in Morocco as their reasons for migration. Regarding migration status, 36.6% of migrants in Morocco were in an irregular situation, with a slightly higher proportion among women (37.7%) compared to men (35.9%) [12].

Morocco is among the countries facing the challenge of providing access to health care for migrants and refugees. The government has positioned migrants' health in its agenda and developed a strategic plan to improve access to health care for refugees and migrants [13]. Morocco launched its strategy for migration in 2013, with humanitarian and human rights dimensions. The strategy covered issues related to the integration of migrants and the relationship with the European Union [14]. In 2018, Morocco developed its national policy on immigration and asylum, which includes a vision of health and humanitarian assistance [15]. Specifically, Morocco has adopted free health services for the whole population at the PHC level since its independence. In theory, these services are accessible to migrants and refugees, but such information is not always shared among this population. Hospital regulations mandate non-discrimination in

patient care, ensuring that access to services is not influenced by factors such as origin, location, or religion. This inclusive approach is reinforced by the hospital's internal policies, which facilitate equitable access to healthcare for all patients [16].

Morocco's health insurance system is structured around three main schemes. The compulsory health insurance scheme covers approximately 10 million individuals, while the scheme for the poor provides coverage for nearly 9 million and another scheme for independents (informal sector). Overall, the country's health insurance coverage has expanded significantly, with the coverage rate rising from 16% at its inception in 2005 to 84% by the end of 2022 [17]. This transformation included the integration of the subsidized scheme for the poor into the broader compulsory health insurance system. A health financing strategy was developed according to policy dialogue, and the issue of migrants and refugees was not part of the debate in specific terms. Still, it was referred to as a vulnerable population [18]. The government has deployed many efforts in terms of financing for the health of migrants and refugees. These efforts are not well known, as PHC remains accessible, and the information on how much is spent on the health needs of this population category is diluted in the accounting records. This article aims to clarify how much the Moroccan public health system spends to cover the health needs of migrants and refugees in the Tetouan Tanger and the eastern region of Morocco.

The paper will examine two interrelated parts: (1) conduct a bottom-up costing to estimate the total cost for delivered services for migrants and refugees, and (2) activity-based costing to estimate the cost for a hospital stay to guide a prioritization system or future billing system to cover the cost of these services.

Method

Study objectives

A study conducted across six countries concluded that multiple mechanisms exist for covering healthcare costs through payment arrangements between financing agents and healthcare providers [19]. For payment systems to be effective, it is crucial to have evidence regarding the cost of health services [20]. Migrants and refugees currently benefit from free healthcare services in public health facilities. However, as health insurance becomes more widespread, these free services will no longer be available without an identification system. Migrants and refugees without official documentation may face significant barriers to access, particularly as decentralization of the local healthcare system increases financial accountability.

Upcoming reforms to the health system could threaten financial stability if the services provided to migrants and refugees are not compensated through a proper funding mechanism. Such a mechanism, using multiple funding flows, would ensure predictability and stability of funding for public hospitals [21]. The financing of hospitals needs to account for the complexity of cases, which is why many international systems use Diagnostic-Related Group (DRG) models for financing [22]. To prepare for the potential implementation of DRGs in Morocco, we propose analyzing the major health conditions as a first step before broader adoption of the DRG system.

Regarding Primary Health Care (PHC), Morocco is moving toward a capitation-based payment system. Understanding the financing needs for migrants and refugees will help integrate their care into the existing financing framework. The primary goal of this paper is to generate evidence for discussions on financing arrangements for migrants and refugees, specifically at the sub-national level. To achieve this, we must first determine the financing requirements, which is why we have employed a bottom-up costing approach.

To explore mechanisms for covering costs (which are currently met through free services), we need to provide cost estimates for the most prevalent health issues. This will help prioritize financing and facilitate the allocation of costs to different financing agents based on their interests in addressing specific health problems. The relationship between financing agents and healthcare providers requires a thorough understanding of costs per health issue, as this knowledge forms the basis for negotiations about a sustainable coverage system.

Figure 1 presents the articulation of both objectives to serve the goal of the paper .

Our study's objectives are to estimate the volume and nature of public-sector services used by migrants and refugees in Morocco's two regions (Tetouan-Tanger and Eastern), calculate the costs of services provided, and estimate the share of the cost covered by the government's financing in these two regions.

Calculation of unit costs for each service and the bottom-up estimation of the financing size

We considered all levels of care that concern (1) PHC in public services, (2) Regional hospitals (secondary hospitals), and (3) tertiary hospitals. Our approach was founded on the following elements: (1) Provide a map of the services consumed by migrants and refugees in the current state of the Moroccan health system, by level of care and by nature of service; (2) Estimate the costs per service received by migrants by level of care (PHC and hospitals), (3) Calculate the size of the annual cost covered by government funding for migrants in each facility and establish the percentage of financing as compared to what was offered to the total treated patients.

Our methodology benefited from our analysis of previous studies [23–28] combined with a previous study

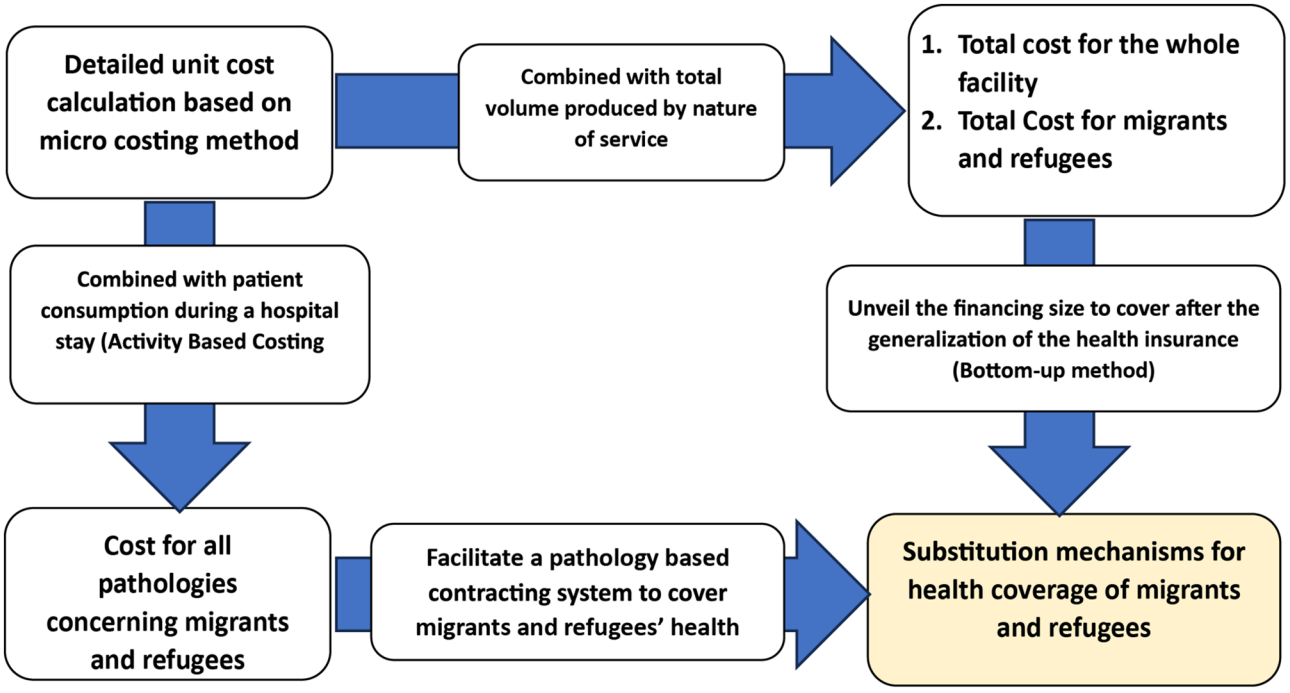

Fig. 1 The articulation of both objectives of the study

Phase 1: Unit Cost and Financing Size Calculation

1. Define the final product and determine the units of measurement (work units).
2. Identify the cost centers (activity centers, departments, units).
3. Calculate the total cost for each input.
4. Allocate inputs to the appropriate cost centers.
5. Distribute costs across the final cost centers.
6. Calculate the total cost and the cost per unit of work for each final cost center.
7. Estimate the total volume of services for each cost center and facility, both for the total patient population and specifically for migrants and refugees.

Phase 2: Cost Per Pathology

1. Compile a list of pathologies relevant to migrants and refugees.
2. Share the data collection tool with clinicians to complete and test its components.
3. Collect detailed consumption data (service volumes) for each pathology.
4. Combine the service volumes with the unit costs calculated in Phase 1.
5. Calculate the total cost for each pathology during a hospital stay across all hospital levels.

Box 1 The costing steps for all care levels

of micro-costing of hospital services; we developed an adapted approach to the Moroccan context, which allowed us to calculate the average unit cost for each service in a health facility based on what we know about available routine data sources [20]. This methodology consisted of the following steps: (1) divide the health facility into final and support services, (2) define the measurement units for each service produced in final units, (3) ventilate overheads and support services over final services, and (4) calculate the depreciation of equipment

and buildings and add it to the total cost for each unit. A Ministry of Health and Social Protection team was designated to support data collection, verification, and analysis.

Figure 2 presents the bottom-up approach used for calculating the financing size through detailed unit cost calculation.

Sample selection criteria

The sample selection was based on the following criteria: (1) All levels must be represented (PHC, secondary and tertiary hospitals), (2) The geographic areas where the demand for service from migrants and refugees is important (3) regions (sub-national level) where access to information and the degree of collaboration of local actors was favorable. Based on the national database on the number of refugees and migrants, we chose the sub-national level that delivers services to migrants and refugees.

After analysis of centralized databases, we chose the health facilities in locations with a significant concentration of migrants and refugees. They were mainly located in two regions (Tetouan and Eastern region); all health facilities that had not treated migrants and refugees were excluded from the study. The health facilities sample was defined as follows: (1) Five PHC facilities, (2) two secondary-level hospital facilities, and (3) One teaching hospital. It's important to highlight that the two regions of the north and east are the most concerned by migration, so they were both included in the study.

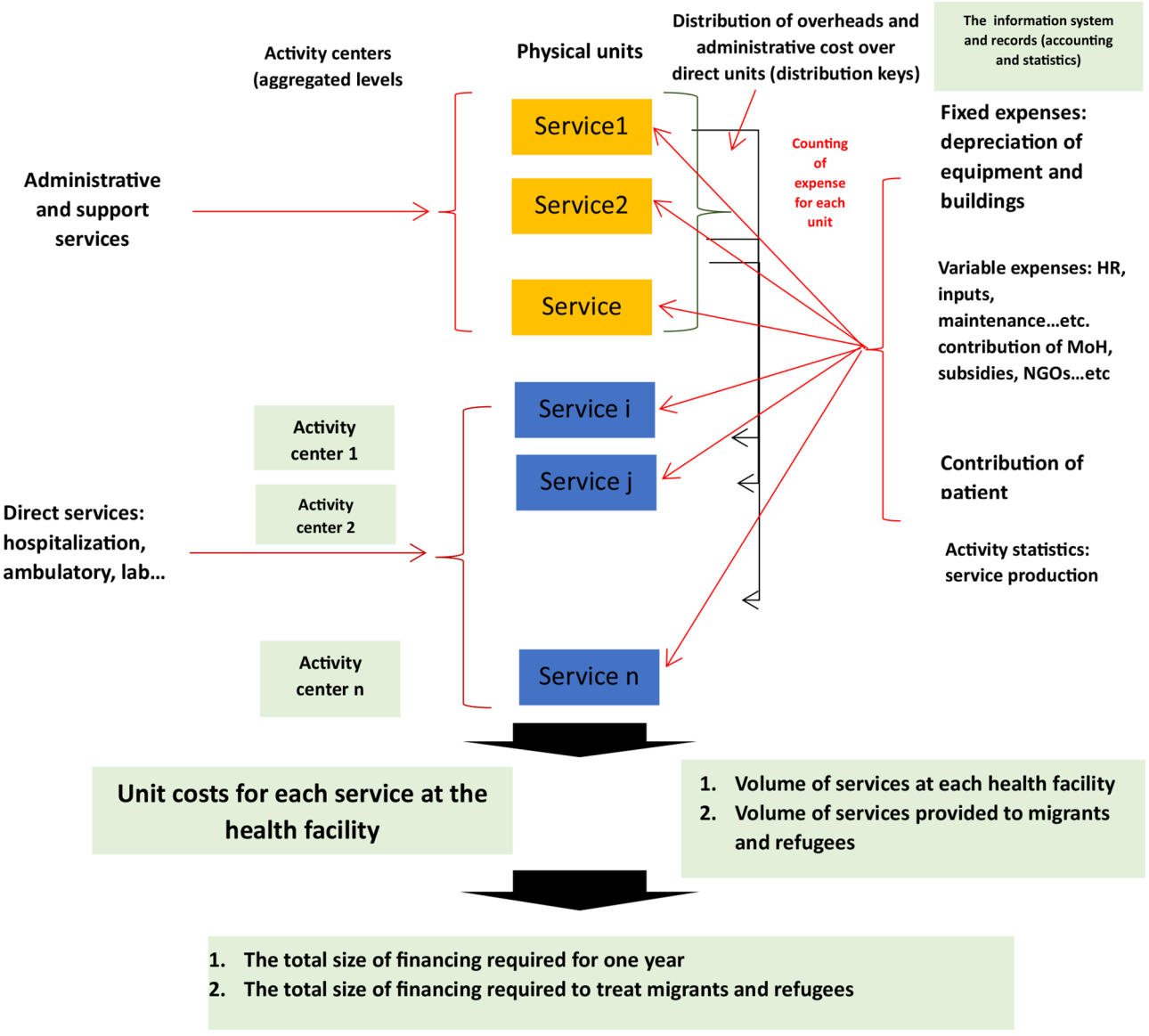

Fig. 2 Presents the bottom-up calculation approach Source: adapted from Akhnif et al. (2024)[20]

Key methodological aspects

The following elements were considered in our approach:

Capital and human resources costs

A detailed inventory of equipment and buildings was conducted at each health facility and level of care. This inventory and accounting data allowed us to estimate the economic depreciation cost. The elements used for estimations are as follows: the lifespan of equipment is fixed at ten years, the informatic equipment and transport last five years, and the buildings last up to 25 years; the annuity factor was based on an interest rate of 5%, the most used in the costing literature; and at the end of the lifespan, the equipment is not resold and is considered with a value of zero.

To estimate human resources costs, we used the national database available at each subnational level, which gave the exact salary received by each professional in a health facility. We used the method defined in our latest publication to distribute the cost among activities [20].

Allocation of overheads

We used our distribution proportions to allocate overheads and support services' costs to the final units of the health facility [20]. We collected data related to each proportion and applied it to overheads in each facility. The following proportions were used for hospitals to ventilate overheads among final units (Table 1).

Table 1 Definition of proportions to distribute overheads and support services over final units

General unit	Distribution key
Directorate of the hospital and its offices	Equivalent full-time (EFT)
Medical services (administration)	EFT of medicals
Nursing services (administration)	EFT of nurses
Reception and information	Number of patients
Financial services	Total expenditures of each unit
Accounting service	Total expenditures of each unit
The billing service	Number of patients
Supply service and stores	Total received amount from each store
Statistic services	Number of patients
Human resources services	Equivalent full-time (EFT)
Space maintenance	M2 (square meters)
Cleaning services	M2 (square meters)
Informatic service	Number of computers
Laundry	Total cleaned weight (Kg)
Catering service	Total number of served meals
Maintenance of equipment	Number of maintenance interventions
Gardening service	M2 (square meters)
Pharmacy (HR and logistics)	Number of distributed items
Electricity bill	M2 (square meters)
Water bill	Number of patients plus HR

Source: Akhnif et al., [20]

The administration cost was distributed for health centers based on the Equivalent full-time (EFT) for each analytical unit created for the costing (consultation unit, family planning unit, HIV, TB…etc.).

Calculation of the volume of services for migrants and refugees

The Ministry of Health and Social Protection disposes of a database integrating a sub-information system for migrants and refugees. We used this information to separate migrants' and refugees' patient's information from the general population data regarding the services they received in the health facility. We aggregated these data to generate an annual volume that we used later to estimate the total cost of delivered services within one year for each health facility. In this way, the migrants and refugees' population volume of services will serve to estimate the total cost once combined with unit costs per service; on the other hand, the total volume is related to homogenous production units (day stay in a service x, units of labs tests, units of surgical interventions…. etc.).

Estimation of the total cost as the size of financing allocated by the government

Combining each service's unit costs and volumes, we estimated the total cost of treating migrants and refugee patients in a health facility. We also did the same exercise for the general patients to see how much the allocated resources for migrants and refugees represent in the total cost of the health facility.

Calculation of total cost of hospital stay per disease

To understand the clinical complexity and its impact on costs, conducting a deep analysis of costs per pathology was necessary. The pathology or disease is identified through the medical records, and two levels are studied: (1) simple case and (2) complex case. The criteria of complex and simple cases were based on the clinician's appreciation according to the clinical parameters. After identifying the main diseases (diagnosis) related to migrants and refugees, we developed a data collection tool. This data collection tool was filled in by clinicians inspired by the recent real cases they treated.

We analyzed studies using activity-based costing (ABC) approaches to build our method [29–31]. We combined the ABC approach and our unit cost calculation method to create our framework to estimate the total cost per disease. The perimeter of the care process was defined to start with the patient's admission and end with the patient's discharge. The conceptual framework for the cost of diseases is presented in Fig. 3.

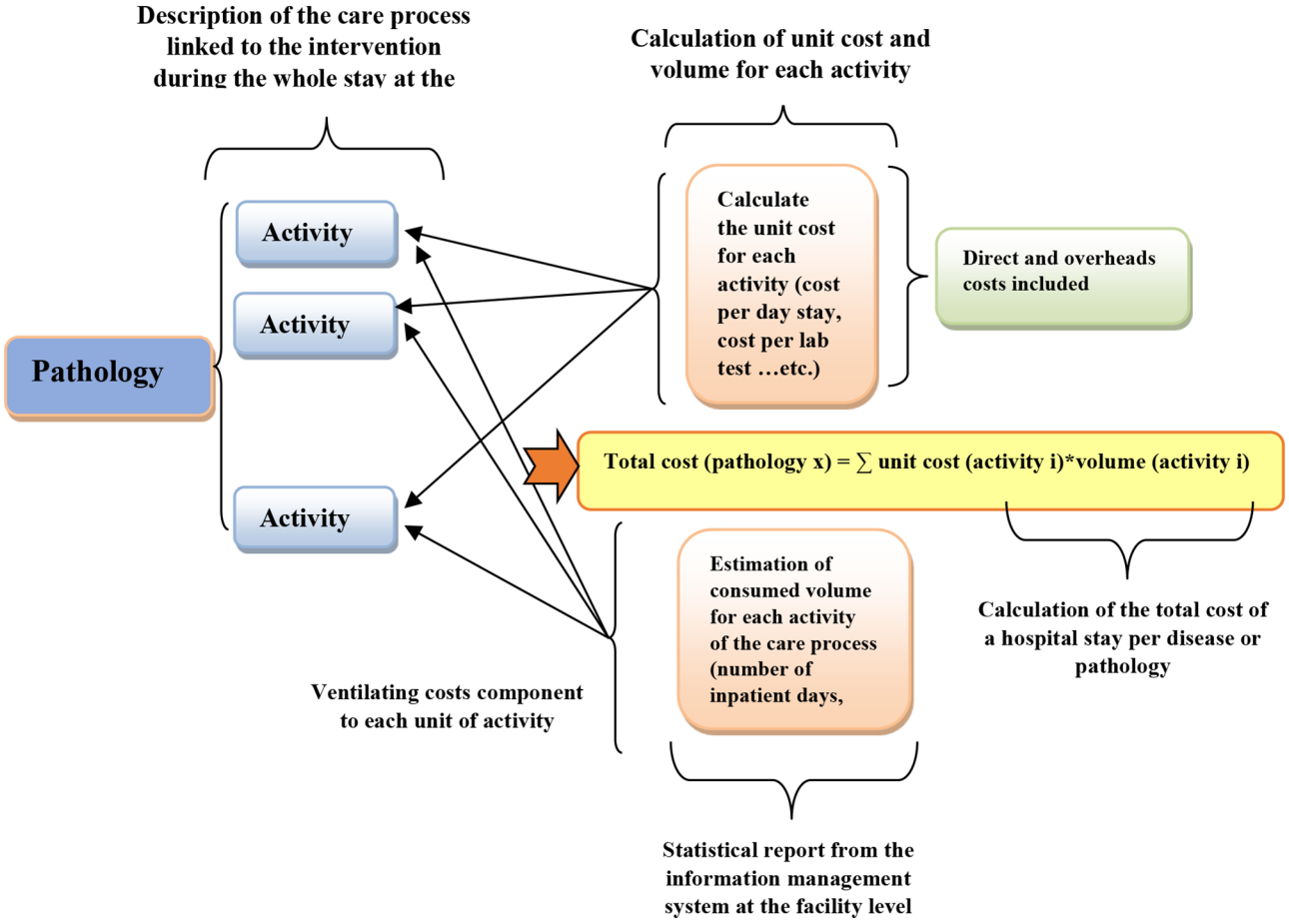

Fig. 3 The method for estimating the cost per disease

The total cost of treating a disease (diagnosis) is established through a combination of unit costs and service volumes for each segment of the case process. The care process was divided into several homogeneous activities, for which unit costs and volumes were identified and calculated. For example, if a hospitalization stay was necessary, we need the unit cost for a day stay at this specific service and how many days the patient was hospitalized. In the case of surgical interventions, each intervention is estimated through the professional nomenclature of health interventions with technical units. The total cost of the intervention is then the number of units (K), as called in Morocco's nomenclature, multiplied by the unit cost of one unit K. The same is done for all types of services consumed during the hospital stay until the patient is discharged.

Data collection

Type of data

To calculate the unit cost at all levels, we aimed to account for all types of expenditures incurred in operating a health facility over the course of a year. These included: (1) Supply costs, (2) Medicine and consumables costs, (3) Medical gas expenses, (4) Salary costs, (5) Equipment inventory and building surface areas, (6) Inventory of vehicles, computers, and other assets, (7) Fees and miscellaneous expenditures, and (8) Other costs specific to the context of the health facility. To calculate the total volume of services provided over the course of a year, we used a specialized tool to track the overall volume for each service unit. This tool allowed us to break down the data not only by the total number of patients at the health facility but also by the specific number of migrants and refugees served.

For the cost per pathology, we developed a tool to track medical consumption associated with each health issue. This tool covers: (1) Length of hospitalization, (2) Number of outpatient consultations, (3) Total laboratory tests, measured in technical units according to the established nomenclature, (4) Total radiology exams, measured by technical unit Z, (5) Surgical procedures, measured by technical unit K, (6) Total pharmaceutical consumption during hospitalization, and (7) Total consumption of other services used by the patient during their hospital stay.

Data collection tools

After establishing a standardized analytical framework for each level of care and health facility, we designed tools to systematically collect all types of expenditures and service volumes. These tools were organized in Excel sheets and consolidated into a single data collection instrument. To ensure accuracy, data collectors were selected from among the statisticians at each health facility. The data collection tools used in this process are provided in the appendix.

Data collection process

The data collection process was designed according to a collaborative approach, including cadres from the Ministry of Health, according to a structured process that described the roles and tasks of each actor involved in the study. Before data collection, meetings with local managers, information managers, and clinicians were organized in the field. Data collection tools were then tested and finalized before launching the process. Once collected from the field, questionnaires and tables were centralized in a database at the WHO country office after verification. The verification operation included revisiting local sources to check the reliability of collected data.

Data analysis

For the unit cost calculation, we used pre-designed calculation sheets that incorporated formulas for distributing overhead costs among final units, calculating depreciation, and computing all cost components. These Excel sheets are automated to ensure that any updates to input data are reflected in real-time in the results. The first phase of verification was carried out in the field by comparing the figures with our existing database (used in previous work) to identify any discrepancies. The verification process was managed by the national Ministry of Health (MoH) staff, and corrections were made after cross-checking the data sources in the field with the focal points at each sub-national level. For calculating the cost per disease, we utilized an MS Access form to collect data and facilitate analysis through queries. The unit costs calculated in Phase 1 were then used to determine the cost per pathology.

Results

We chose to present the most important results related to the research question. The following are the study's main findings.

Phase 1: Unit cost and total size of financing calculation

Unit cost for first line services

Table 2 presents the annual service volume by type and by health center, along with the average unit cost per service across the five health centers.

The results presented above illustrate the variation in service volumes across different health centers. The volume of services consumed is influenced by the location of each health center and the distribution of migrants and refugees seeking healthcare. The unit costs, which were calculated by accounting for all types of expenditures at each health center, vary by consultation type, ranging from 17 to 38 USD. Specific services, such as TB and HIV follow-up, have significantly higher costs, averaging 243 USD and 92 USD, respectively. It is important

Table 2 Volume of services in health centers and average unit cost by nature of service

Unit of service	Health center 1		Health center 2		Health center 3		Health center 4		Health center 5		
	Total Health Center	for migrants and refugees	Total Health Center	for migrants and refugees	Total Health Center	for migrants and refugees	Total Health Center	for migrants and refugees	Total Health Center	for migrants and refugees	Average unit cost / service
Adult consultation	**20.941**	**246**	**4.800**	**55**	**12.869**	**265**	**10.144**	**1.755**	**4.613**	**215**	**$35,33**
Prenatal consultation	**1.071**	**298**	**3.532**	**4**	**342**	**292**	**1.074**	**38**	**947**	**84**	**$36,96**
Dental Consultation	**1.600**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**$16,5**
Pediatric consultation	**763**	**0**	**0**	**0**	**1.134**	**110**	**2.996**	**0**	**1.105**	**16**	**$38, 04**
Vaccination	**2.050**	**10**		**20**	**2.738**	**45**	**7.883**	**377**	**7.860**	**6**	**$7,84**
Family planning service	**2.583**	**0**	**5.010**	**6**	**776**	**147**	**3.027**	**39**	**1.918**	**254**	**$13,15**
TB Service (consultation)	**188**	**0**	**76**	**2**	**25**	**0**	**14**	**2**	**21**		**$243,28**
STI, HIV screening service	**456**	**15**	**339**	**12**	**159**	**145**	**409**	**12**	**159**	**24**	**$92,39**

Table 3 Volume of services in secondary hospitals and average unit cost by nature of service

Regional hospital 1				Regional hospital 2			
Unit of measurement of the service	**Total production of the hospital**	**Production for migrants and refugees**	**Total unit cost**	**Activity (migrants)**	**Total production of the hospital**	**Production for migrants and refugees**	**Total unit cost**
Emergency consultation	198,488	143	$20,22	Emergency consultation	57,250	249	$11,96
Specialized consultation	10,986	27	$54,78	Specialized consultation	18,590	85	$24,24
day of general surgery hospitalization	2156	0	$49,57	day of general surgery hospitalization	9395	172	$34,24
day of hospitalization in maternity, gynecology-obstetrics	12,684	0	$61,96	day of hospitalization in maternity, gynecology-obstetrics	13,686	104	$24,46
day in intensive care	513	14	$425,54	day in intensive care	4173	196	$134,02
unit K of surgical interventions	372,047	950	$13,92	On unit K of surgical interventions	133,606	1700	$8,17
Hemodialysis session	4049	0	$76,85	Hemodialysis session	5256	0	$57,93
Unit Z of radiology examinations	1,779,337	7920	$0,93	Radiology examinations	316,572	17,042	$1,38
unit B of laboratory tests	5,953,010	870,000	$0,02	one unit B of laboratory tests	1,301,334	230,107	$0,33
Day hospitalization in Traumatology	1260	14	$49,67	day hospitalization in Traumatology/neurology	5018	506	$34,24
Day hospitalization in neurology	780		$64,62	Hospitalization in ophthalmology/ENT/burns	6061	52	$102,93
Day Hospitalization in Pediatric Surgery	2154	7	$40,65	Hospitalization in pediatrics	19,081	143,92	$15,87
day hospitalization in neonatology	1932	0	$76,86				
Hospitalization in pediatrics	6678	0	$40,65				

Table 4 Volume of services in tertiary hospital and average unit cost by nature of service

Teaching hospital level			
Unite of services consumed	**Quantity consumed by Migrants**	**Quantity consumed by Refugees**	**unit cost**
Emergency consultation	31	18	$89,08
Specialized consultation	8	6	$33,26
Day of medicine hospitalization	149	60	$157,17
Day of general surgery hospitalization	33	145	$163,86
Day of hospitalization in maternity, gynecology-obstetrics	6	0	$356,12
day in intensive care	13	2	$536,66
unit K of surgical interventions	405	630	$5,22
unit B of laboratory tests	19,467	19,287	$0,07

to note that the consultation costs include the expenses for exams and basic laboratory tests conducted at each facility.

Unit cost for the secondary level

The following table (Table 3) presents the service volumes for the secondary hospital level.

The results presented above provide a detailed breakdown of the service volumes produced at each hospital. The complex methodology used for these estimates was validated nationally and was published in our previous article [20]. The costs outlined above encompass all types of expenditures associated with delivering the specific services listed in the table. The analysis reveals variations in unit costs between the two hospitals, reflecting not only the size of the hospitals but also their performance levels. Specifically, capital costs are influenced both by the volume of production and the size of the available financing.

Unit cost for tertiary level

Table 4 presents the unit cost for each service consumed by migrants and refugees at the teaching hospital.

The detailed costing analysis at the tertiary-level hospital provided unit costs and service volumes for both migrants and refugees. It is important to note that the information system enabled the breakdown of service volumes specifically for migrants and refugees. The results show that unit costs at the tertiary level are higher compared to the secondary level, which is expected given the substantial investments typically required for this level of care.

Health financing size for the first level of the health system

Table 5 presents the total cost calculated using our approach for each health center and how much that represents compared to the total cost of running the health facility.

Among the five studied health centers, we unveiled the financing part related to the government contribution through free services at the PHC. The government of Morocco spends on average, 5% of the total running cost at health facilities on migrants' and refugees' health. There are health centers with good attractivity that spend

Table 5 Cost and financing for the first level of the health system

Health center	Total cost for the health center	Cost for migrants and refugees	Percentage
Health center 1	$985.835,80	$20.883,02	2%
Health center 2	$382.534,32	$3.607,74	1%
Health center 3	$517.861,94	$35.302,07	7%
Health center 4	$602.599,24	$66.299,67	11%
Health center 5	$318.875,79	$15.560,15	5%
Total cost for all health centers	**$2.807.707,09**	**$141.652,66**	**5%**

up to 11% of their budget (total cost) on this population and others with less (1%).

Secondary level

In this study, we used two secondary-level hospitals. The following table presents data on total costs related to the first hospital. Table 6 provides detailed data about the cost of services and how much it represents out of the total cost of the hospital.

Depending on the nature of the service, the consumption and resource allocation for migrants and refugees differ. For example, laboratory tests account for more than 18% of the hospital cost for migrants and refugees. The same goes for neurology and neurosurgery traumas, which are mainly related to the risks migrants face in their day-to-day lives. In total, the total cost assumed by the government for migrants and refugees represents an average of 3%, with a higher percentage for some critical services.

Table 7 represents results for the second secondary level hospital.

The above results show a meager government contribution compared to the first regional hospital. The average cost allocated for migrants and refugee patients accounts for 0,4% of the total cost of this hospital. This population uses some services more than others, especially

Table 6 Cost and financing of the regional hospital 1

Activity	The total cost for the whole hospital	The total cost for migrants and refugees	Percentage
Emergency consultation	$629.750,00	$2.739,00	0,43%
Specialist consultations	$414.557,00	$1.895,50	0,46%
Hospitalization in medicine wards	$779.549,58	$8.985,35	1,15%
Hospitalization in surgery wards	$295.942,50	$5.415,48	1,83%
Maternity/gynecology/obstetrics hospitalization	$307.935,00	$2.336,40	0,76%
Intensive care hospitalization	$514.530,90	$24.147,07	4,69%
Hemodialysis sessions	$280.144,80	$0,00	0,00%
Trauma/neuro hospitalization	$158.067,00	$15.939,00	10,08%
Pediatric hospitalization	$278.582,60	$2.101,23	0,75%
Ophthalmology /burn hospitalization	$573.976,70	$4.924,40	0,86%
Surgical procedures (operating theaters)	$1.004.049,09	$12.775,50	1,27%
Laboratory tests	$393.002,87	$69.492,55	17,68%
Radiology examinations	$401.096,72	$34.170,44	8,52%
Total for the whole hospital	**$6.031.184,76**	**$184.921,92**	**3,07%**

Table 7 Total cost for the regional hospital 2

Activity	The total cost for the whole hospital	The total cost for migrants and refugees	Percentage
Emergency consultation	$3.691.876,80	$2.659,80	0,07%
Specialized consultations	$553.694,40	$1.360,80	0,25%
General surgery hospitalization	$98.313,60	$0,00	0,00%
Maternity/gynecology/obstetrics hospitalization	$722.988,00	$0,00	0,00%
Intensive care hospitalization	$200.839,50	$5.481,00	2,73%
Surgical procedures (operating theaters)	$4.763.687,87	$12.163,80	0,26%
Hemodialysis sessions	$286.264,30	$0,00	0,00%
Radiology examinations	$1.530.229,82	$6.811,20	0,45%
Laboratory tests	$119.060,20	$17.400,00	14,61%
Traumatology hospitalization	$57.582,00	$639,80	1,11%
Neurology hospitalization	$46.371,00	$0,00	0,00%
pediatric surgery hospitalization	$80.559,60	$261,80	0,32%
Neonatology hospitalization	$136.611,72	$0,00	0,00%
Pediatrics hospitalization	$249.757,20	$0,00	0,00%
Total cost for the whole hospital	**$12.537.836,01**	**$46.778,20**	**0,37%**

Table 8 Cost and financing of the teaching hospital

Activity	Cost related to Migrants	Costs related to refugees	Total
Emergency consultation	$2.540,46	$1.475,11	$4.015,56
Specialist consultations	$244,80	$183,60	$428,40
Hospitalization in medicine wards	$21.545,40	$8.676,00	$30.221,40
Hospitalization in surgery wards	$4.974,74	$21.858,71	$26.833,45
Maternity/gynecology/obstetrics hospitalization	$1.965,77	$0,00	$1.965,77
Intensive care hospitalization	$6.418,51	$987,46	$7.405,97
Surgical procedures (operating theaters	$1.946,46	$3.027,83	$4.974,30
Laboratory tests	$1.179,80	$1.168,89	$2.348,68
Total	**$40.815,93**	**$37.377,60**	**$78.193,53**

laboratory tests. The information system explained that the utilization of services has known changes right after the COVID-19 pandemic, which is explained partially by the movement of this population.

Tertiary level

Table 8 represents the total costs of treated patients at the university hospital.

The vast activity of the teaching hospital made it difficult to compare the financing of migrants with the total cost of the hospital. The number of patients arriving at the tertiary level is, most of the time, complicated cases. The hospital spent $78.193,53 on migrants and refugees in 2022. The information system at the tertiary levels allowed the separation between migrants and refugees, which wasn't possible for the secondary and primary levels. The teaching hospital spends $40.815,93 for migrants and $37.377,60 for refugees.

Phase 2: Cost per disease or pathology

The total cost per service dilutes the complexity of cases and associated costs. Analyzing costs per disease or pathologies is essential for planning and targeting specific programs. Our study used all treated diseases for migrants and refugees at the three levels.

Figure 4 presents the detailed cost for each disease or pathology. We included cases ranging from simple to complicated, as defined by clinicians and based on clinical parameters.

The above results show that in some pathologies, hospitalization is more expensive and determines the total cost, while in other cases, surgical interventions determine the bulk of the total cost. Also, consultation services are essential in most cases. The pathology with the minimum cost is simple pneumothorax, with a total cost of $234,36. The higher cost was observed for complicated anemia, costing $1.740,12.

Figure 5 presents the cost of diseases with a simple care process at a tertiary hospital.

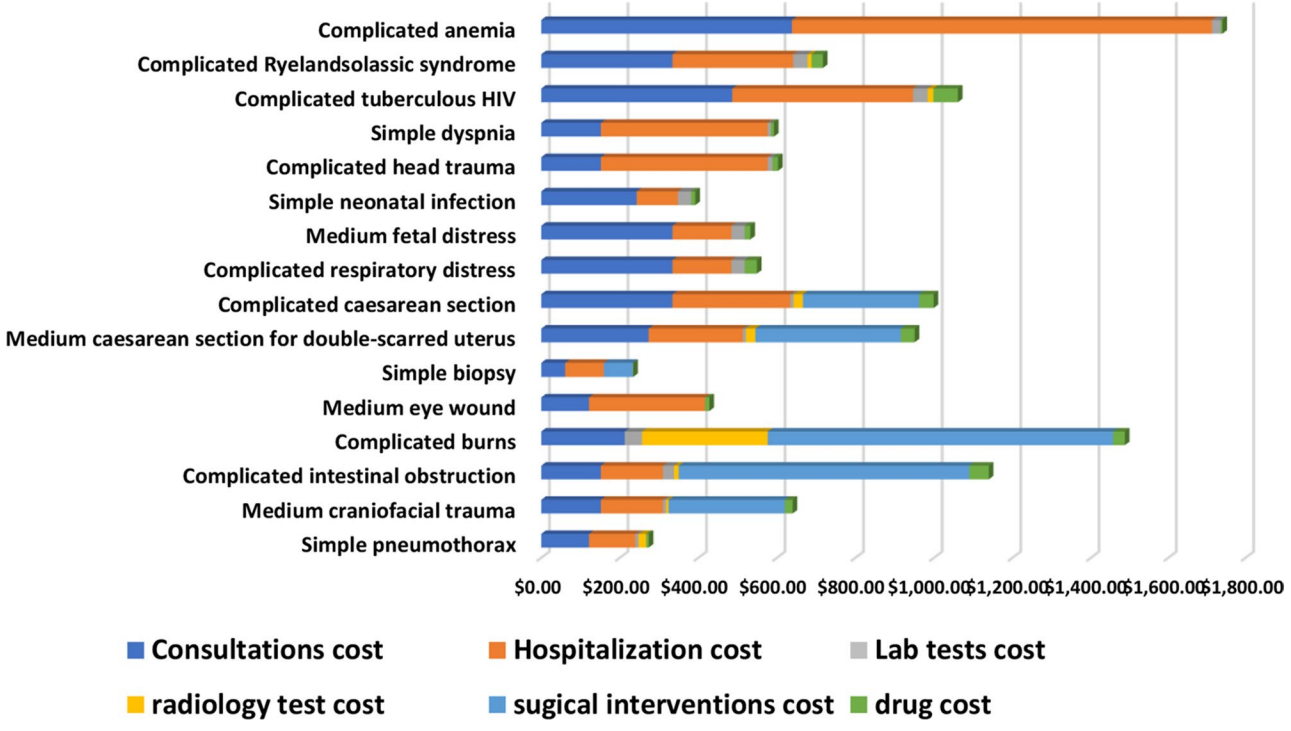

Fig. 4 Cost of pathologies related to migrants and refugees at secondary hospital level

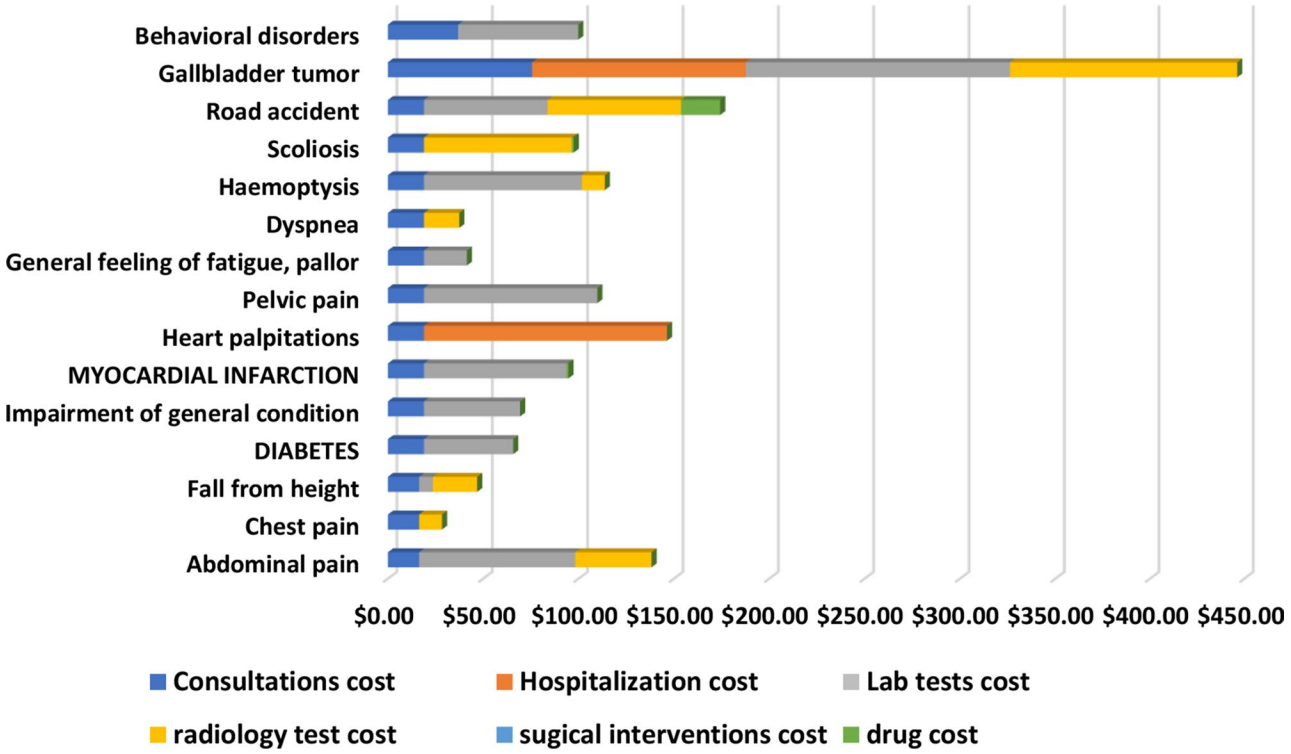

Fig. 5 Cost per pathology (simple cases) University hospital

The figure shows a variation in the cost of each disease, with high utilization of lab tests and radiology. In simple cases, surgical services are lower. The minimum cost for chest pain was $28,36. Most of the cost was mainly on consultation and radiology tests. The maximum cost was observed for the Gallbladder tumor, costing $446,22.

We also examined diseases that presented complications for migrant and refugee patients. Figure 6 provides detailed costing data on these pathologies.

Figure 5 shows that prostate cancer represents the minimum cost among studied diseases at $673,05. This could be only a follow-up or chemotherapy session, as drug cost mainly determines the total cost. The maximum cost for complicated cases is observed for paraplegia, with a total cost of the hospital stay of $12.530,05. We observe that the higher-cost component is the hospitalization services for complicated cases.

Discussion

In this study, we adopted a bottom-up approach to estimate the total cost the Moroccan government mobilizes for migrants' and refugees' health. Despite the methodological complexity, we analyzed the unit cost at each unit of the health facility and estimated the financing size (as total cost) for migrants' and refugees' health. For the five health centers examined in this study, we evidenced the use of health services for free by migrants and refugees. This consistent financial protection has certainly avoided increasing out-of-pocket expenditures for this vulnerable population. The study also showed PHC's role for Moroccans and all those using the service as migrants and refugees. WHO and its partners advocated and demonstrated the importance of PHC as an efficient way to achieve UHC, especially for low- and middle-income countries where financial constraints are important [32]. In Morocco, we observed that the cost of migrants' and refugees' services reaches 5% of the total cost of PHC facilities. This percentage is significant when comparing the Moroccan population size with migrants and refugees. The subsidized PHC in Morocco benefited migrants and refugees and constituted an equity instrument to cover this population without financial hardship at the delivery point. When we move to secondary and tertiary hospitals, even though free services are conditioned by holding the RAMED card (for the scheme for the poor and vulnerable), hospitals still accept migrants and refugee patients. This is mainly because the hospital regulation in Morocco forbids any discrimination at the entry point, and payment is not a condition for admission [16]. They showed that what has been described in hospital regulations is applied somehow on the ground. In the analysis of costs for some diseases affecting migrants and refugees, we noticed the high cost of the treatment, which indicates that the financial logic is not necessarily adopted in the hospital management mindset, especially for migrants and refugees.

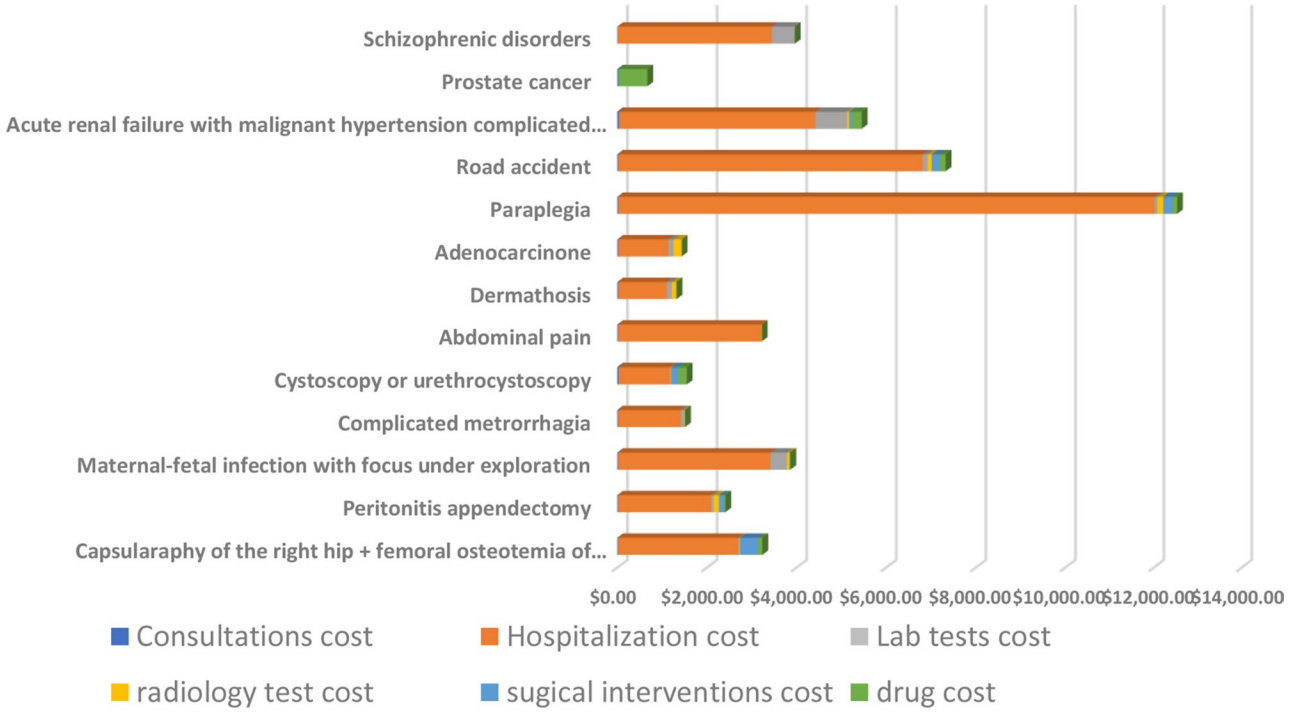

Fig. 6 Cost per pathology (complicated cases) University hospital

A study on Syrian refugees' access to healthcare in Jordan found that free services help reduce financial barriers to care [33]. In terms of the cost of medical services for migrants, a study conducted in the USA estimated that undocumented migrants spent a total of $6.4 billion on healthcare, of which only 17% ($1.1 billion) was covered by public sources [34]. Another study, conducted in the USA between 2018 and 2020, reported that the total costs of care for asylum seekers and refugees ranged from $1.9 million to $4.4 million. The number of patient visits was estimated between 15,736 and 19,236, with the cost per patient ranging from $99 to $281 [35]. Our study found that the unit cost per consultation at primary healthcare (PHC) centers ranged from 36 to 38 USD, which is lower than the costs observed in these studies. This discrepancy could be attributed to differences in salaries and healthcare infrastructure. Additionally, a 2015 study in Turkey calculated the total cost of healthcare services provided to Syrian refugees in the emergency department at $773,374.63 [36]. Our study employed a total cost approach combined with a detailed analysis of the information system to ensure the use of accurate data. We were unable to identify any studies that applied a unit costing approach across all levels of the healthcare system while considering all types of services. Additionally, we did not find any studies that provided an estimation based on a detailed unit costing methodology.

Our study explored the contribution of the government which represents the main heath provider for this population. The study will constitute a start for a solid argument to push policymakers and all actors involved in health financing to examine scenarios for decent coverage of this population. Morocco has engaged in a radical reform of its health system, accompanied by a social protection program that aims to cover the entire population in the coming two years. This will constitute an opportunity to develop a structured strategy to cover vulnerable populations that can't be identified through formal identification mechanisms due to the lack of regularity of migrants' situations. The law framework Morocco adopted in 2022 provides additional financial opportunities for the health system through generalizing health insurance and improving the State contribution [37].

The challenges of health financing in Morocco in the last years created constraints on the prioritization process, mainly because of the non-development of strategic purchasing [19]. The purchasing function must develop despite the mobilization of financial resources within the current reform. With strategic purchasing mechanisms, the coverage of migrants and refugees could be covered through contracting mechanisms between financing agents and health providers. The administrative challenge of identifying migrants obliges policy decisions to be innovative in conceptualizing health financing for migrants and refugees. This will make accountability for the quality of care and the health status follow-up feasible. Caring for migrants and refugees will financially burden the country's budget [9]. The need for contribution

of external donors will be necessary to cover some needs beyond health services that concern the social determinants of health. Once combined with other epidemiological data, the analysis of costs per type of disease will estimate financing objectives for specific programs. In the prioritization process, some diseases might be positioned higher in the policy agenda, and part of the advocacy process is the availability of data on cost and financing size.

Our study provided an accurate costing for almost all diseases treated at hospitals' secondary and tertiary levels. The public-private partnership showed promising results in reducing waiting lists for hemodialysis services in Morocco [38]. This mechanism can structure the relationship between financing agents and health providers for better performance and good health access for migrants and refugees. This type of contracting integrates the principles of strategic purchasing and needs to be explored as an alternative to improve the efficiency of funds. The cost per disease we performed in this study will help develop contractual arrangements between financing agents (government, health insurance, NGOs…etc.) to cover the cost of services in public facilities. The cost coverage can be either through integrating the health insurance scheme with special financing arrangements or covered through a subsidized system. In all cases, it's important to know how much it costs to take care of migrants and refugee patients. Lessons from other countries show the integration of migrants' health within health insurance schemes like Thailand, and others are considering this integration, like Malaysia; in the Philippines, migrants are offered portable insurance with limited benefits, and Indonesia is in the process of strengthening its company health insurance for migrants [39]. The Moroccan health system has the advantage of free services with no interest from the government to abandon this political choice. Our study showed that if free services are maintained, they can be used as an excellent mechanism to cover migrants and refugees in the first line of health services. The free services approach will avoid the administrative complications that scare non-documented migrants. For hospitals, the cost of inpatient and outpatient related to migrants from our database on cost per disease could be used to set a contractual arrangement to treat cases for free at hospitals and compensate through a solidarity fund or additional subsidies. This solidarity fund could be the health insurance fund or a special fund to be created to fund hospital activities. The knowledge about the cost per type of disease is important to set those proposals in terms of contracting for better access for migrants and refugees.

Our study revealed the financial resources required to sustain healthcare coverage following the generalization of health insurance. This estimated amount will provide clarity to healthcare financing stakeholders—including health insurers, the state, NGOs, and technical and financial partners—regarding the necessary funding to ensure the continuity of services for migrants and refugees in these two regions. The pathology database developed in this study will support the prioritization of healthcare needs and inform the creation of a results-oriented contracting mechanism.

Limitation of the study

This study focused on two sub-national regions in Morocco with the highest concentrations of migrants and refugees. The analysis is limited to the public sector, which has been less explored, as non-governmental organizations have already documented their contributions. The primary objective was to assess the government's role in providing free healthcare services and explore how this model can be leveraged to enhance coverage. Future research could further investigate the contributions of various financing agents to migrant and refugee healthcare and assess the efficiency of the complementary financing mechanisms. The lack of accurate data on the migrant and refugee population in both regions prevented us from extrapolating the total financing required to fully meet the healthcare needs of this population at the regional level. Our study was unable to propose a financing allocation system based on specific pathologies, which would involve estimating the total financing required, identifying how it is distributed across different pathologies (in terms of volume and cost), and preparing for a prioritization of financing. Further studies in this area will contribute to a deeper understanding of health financing for migrants and refugees.

Conclusion

Our study showed the total cost the government assumes through free primary health care services. Also, as access to hospitals doesn't discriminate against patients based on their race, origin, and religion, many migrants and refugees are treated for free. In some cases, the cost is very high, especially for some complicated diagnoses. Our study examined what is happening on the ground and tried to clarify the hidden contribution the government is mobilizing for migrants' and refugees' health. The Moroccan model can inspire other countries to use the free services approach to increase health services utilization for migrants and refugees.

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Author contributions

1. El Houcine AKHNIF: designed and implemented the study in the field, produced the first design, and led the article's analysis and writing. 2. Awad Mataria: contributed to the discussion and analysis of the research and writing

of the article 3. Abdelouahab Belmadani: participated in the management of the process, discussion of results and the use of data for policy decisions, as well as the discussion and analysis, and writing of the article. 4. Maryam Bigdeli: Contributed to the article's design, writing, and analysis.

Data availability
No datasets were generated or analysed during the current study.

Declarations

Competing interests
The authors declare no competing interests.

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