



ARTICLE ORIGINAL / RESEARCH ARTICLE

Mammography supply for breast cancer screening at the eve of Universal Health Coverage in Yaounde city (Cameroon, Central Africa)

Offre de service en mammographie pour le dépistage du cancer du sein à l'aube du déploiement de la Couverture Santé Universelle dans la ville de Yaoundé (Cameroun, Afrique Centrale).

MOULION TAPOUH Jean Roger^{1*}, DJANTENG SEUJI Priscille², DONGMO FOMEKONG Sylviane³, NWATSOCK Joseph Francis⁴, ONANA Yannick Richard⁵, MBEDE Maggy⁴, MALEU MBAH Félicité¹, MOIFO Boniface⁴

¹. Department of Radiology, Biophysics and Medical Imaging, Faculty of Medicine and Pharmaceutical Sciences, The University of Dschang, Cameroon

². La Rosiere Higher Institute, The University of Ngaoundere, Cameroon

³. Department of Radiology, Faculty of Health Sciences, University of Buea, Cameroon

⁴. Department of Radiology, Faculty of Medicine and Biomedical Sciences, The University of Yaounde 1, Cameroon

⁵. Faculty of Medicine and Biomedical Sciences, University of Garoua, Cameroon

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*Auteur

correspondant

Dr MOULION TAPOUH Jean Roger
Faculty of Medicine and Pharmaceutical Sciences
University of Dschang, Cameroon

ABSTRACT

Background: Breast cancer remains the most common cancer among women worldwide. Cameroon has adopted an annual mammography screening policy for women aged 40 years and over.

Objective: To evaluate the capacity of the current mammography supply to meet the needs for breast cancer screening in Yaounde City.

Methods: Cross-sectional study targeting radiology departments containing a mammography unit in Yaounde (Cameroon, Central Africa) from January 2021 to June 2021. We collected the geolocation, number of mammograms performed per month, and cost of a screening mammogram for each radiology service. We calculated mammography capacity as the number of mammography units per 10,000 women aged 40 and above.

Results: In Yaounde, 37.78% (17/45) of radiology departments had a mammography unit, and 76.47% (13/17) of these units were in operating condition at the time of the study. The median number of mammograms performed per month in each service was 15 [8 - 60], and the median cost of a screening mammogram was 53.55 US dollars [48.68 - 64.9]. Mammography units were mainly located in the administrative center, but they were accessible within an hour's drive from any location in the city. The capacity was estimated to be 0.32 per 10,000 women aged 40, which was only enough to cover 19.54% of the needs for screening mammography in eligible women.

Conclusion: Mammography service supply in Yaounde was critically insufficient to cover breast cancer screening needs in 2021. Functional mammography units were accessible but underutilized. Further research is needed to identify the barriers to mammography screening and the scarcity of mammography units in Yaounde.



PO Box 96, Dschang
Tel : +237 677395358
Email :
tapouh@gmail.com

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RÉSUMÉ

Introduction : Le cancer du sein reste le cancer le plus répandu chez les femmes dans le monde. Le Cameroun a adopté une politique annuelle de dépistage par mammographie pour les femmes âgées de 40 ans et plus.

Objectif : Évaluer la capacité de l'offre actuelle de mammographie à répondre aux besoins de dépistage du cancer du sein dans la ville de Yaoundé.

Méthodes : Etude transversale ciblant les services de radiologie comportant une unité de mammographie dans la ville de Yaoundé (Cameroun, Afrique Centrale) de janvier 2021 à juin 2021. Nous avons collecté la géolocalisation, le nombre de mammographies réalisées par mois et le coût d'une mammographie de dépistage dans chaque service radiologie. La capacité était définie comme le nombre d'unités de mammographie disponibles pour 10 000 femmes âgées de 40 ans et plus.

Résultats : A Yaoundé, 37,78% (17/45) des services de radiologie disposaient d'un appareil de mammographie, et 76,47% (13/17) de ces appareils étaient en état de fonctionnement au moment de l'étude. Le nombre médian de mammographies réalisées par mois dans chaque service était de 15 [8-60], et le coût médian d'une mammographie de dépistage était de 53.55 US dollars [48.68 - 64.9]. Les unités de mammographie étaient principalement situées dans le centre administratif, mais elles étaient accessibles à moins d'une heure de route depuis n'importe quel endroit de la ville. La capacité était estimée à 0,32 pour 10 000 femmes âgées de 40 ans, ce qui suffisait à peine à couvrir 19,54 % des besoins en mammographie de dépistage chez les femmes éligibles.

Conclusion : L'offre de services de mammographie dans la ville de Yaoundé était insuffisante pour couvrir les besoins en matière de dépistage du cancer du sein en 2021. Les unités de mammographie fonctionnelles étaient accessibles mais sous-utilisées. Des recherches supplémentaires sont nécessaires pour identifier les obstacles au dépistage par mammographie et la rareté des unités de mammographie à Yaoundé.

1. Introduction

Breast cancer is the most common cancer among women worldwide, with an annual incidence rate of 47.8 per 100,000 inhabitants and a mortality rate of 13.6 per 100,000 inhabitants. It is the fourth leading cause of cancer death in the world, accounting for 6.9% of all cancer deaths (1–4). In Cameroon, breast cancer was the most common cancer in 2020 with 4,170 new cases recorded (20.1%) and the leading cause of cancer-related death (2,108 cases, 16%) (2).

Since the risk factors associated with breast cancer are immutable, screening by self-examination, clinical examination, or systematic mammography remains the best tools for early detection of suspicious lesions. Screening followed by effective treatment significantly increases the chances of survival (5). The benefits of mammography for cancer screening are well established, with about 91% 5-year survival rate and prevention of 497 deaths amongst 100,000 screened women, especially in women aged 40 to 75 years with minimal risk of death associated with radiation-induced cancer (6).

Mammography screening guidelines vary by country and issuing organization. Most guidelines recommend annual, biennial, or triennial screening

examinations for women aged 40-74 years (6,7). Cameroon has adopted an annual mammography screening policy for women aged 40 years and over (8), even though there is no governmental screening program.

For mammography to be effective, like any other healthcare service, it must be available, accessible, and affordable to the target population (9,10). Financial barriers are a major factor in patients' decisions to get screened for breast cancer (11). Addressing this major factor may significantly improve access and adherence to screening mammography. Cameroon is setting up a universal health coverage system, which could improve access to screening mammography if it is included in the package.

We conducted this study to evaluate the capacity of the current mammography supply to meet the needs for breast cancer screening in Yaoundé City.

2. Patients And Methods

2.1 Study design and timeframe.

We conducted a cross-sectional study targeting radiology departments with a mammography unit in Yaoundé city (Cameroon, Central Africa) from January 2021 to June 2021.

2.2 Study site.

Yaoundé, the capital of Cameroon, is the second most populous city in the country after Douala, the economic capital. In 2021, Yaoundé's population was estimated at 3,351,466, including 1,666,452 women (49.72%). Of these women, 400,921 were aged 40 and above (12). Yaoundé and Douala have the highest number of radiology services in Cameroon.

2.3 Study population.

We visited all known radiology departments in Yaoundé and included all those with a functioning mammography unit that agreed to participate in the study. We constructed the radiology and mammography mapping by seeking information from the National Radiation Protection Agency (licensing and regulatory body), the Regional Delegation of Public Health for the Centre Region (which covers Yaoundé City), and the Cameroonian Society of Radiology and Radiation Oncology. Our target population is all eligible women in urban Cameroon, with a focus on providing them with appropriate access to mammography screening.

2.4 Data of interest.

Data were collected using a data extraction form designed to meet the study objectives. The main variables were:

- Geolocation of radiology services
- Identification of the mammography unit: brand name, date of manufacture
- Number of screening mammograms performed each month
- Cost of a screening mammogram

We used the KoboCollect mobile app to record geolocation (longitude and latitude) of mammography units.

2.5 Study procedure.

At the regional delegation of public health, we obtained the administrative and health map of the city, as well as the population of each health district. In each radiology department, we conducted face-to-face interviews with the head of staff to collect data on equipment, statistics, and the cost of mammography. Finally, we recorded the GPS coordinates at the main entrance of each center.

2.6 Data analysis.

We used IBM SPSS Version 24 software to analyse the data. We estimated the median cost and monthly statistics of mammograms, with their extreme values. We estimated qualitative and ordinal variables as numbers and percentages. We calculated mammography capacity as the number of mammography units per 10,000 women aged 40 and above, as suggested by Eberth et al. (9).

We used EPI Map® software to draw a spatial distribution of mammography units.

2.7 Ethical considerations.

This study did not involve personal data, so ethics clearance was not required under local legislation. We obtained authorization for research at each study site.

3. Results

3.1 Availability of mammography

Table I: Characteristics of mammography devices in Yaoundé city

Characteristics of mammography units	n	%
Distribution per type of facility		
Public hospital	3	17,6%
Private facility	14	82,4%
Operating conditions		
Functioning	13	76.47%
Non-functioning	4	23.53%
Total	17	
Brand names of functioning devices		
General Electric	04	30.77%
Metaltronica (Lilyum)	04	30.77%
Siemens	02	15.38%
Bemems	01	7.69%
Fujifilm (Amulet)	01	7.69%
Sophie	01	7.69%
Date of manufacture of functioning devices		
< 5 years	03	23.08%
5 – 10 years	04	30.77%
11 – 15 years	02	15.38%
> 15 years	04	30.77%

In Yaounde, 17 of 45 radiology departments (37.78%) had a mammography unit, and 13 of these units (76.47%) were in operating condition at the time of the study. Functioning devices came from 06 different manufacturers and about 46.15% (-6/13) were over 10 years old. Private facilities housed most of this equipment (82.4%, 14/17). (Table I).

3.2 Capacity, spatial distribution, and accessibility of mammography in Yaounde

There were 3.88 functional mammography units/1,000,000 inhabitants [13/3,351,466] for a capacity of 0.32/10,000 women aged 40 and above in Yaounde.

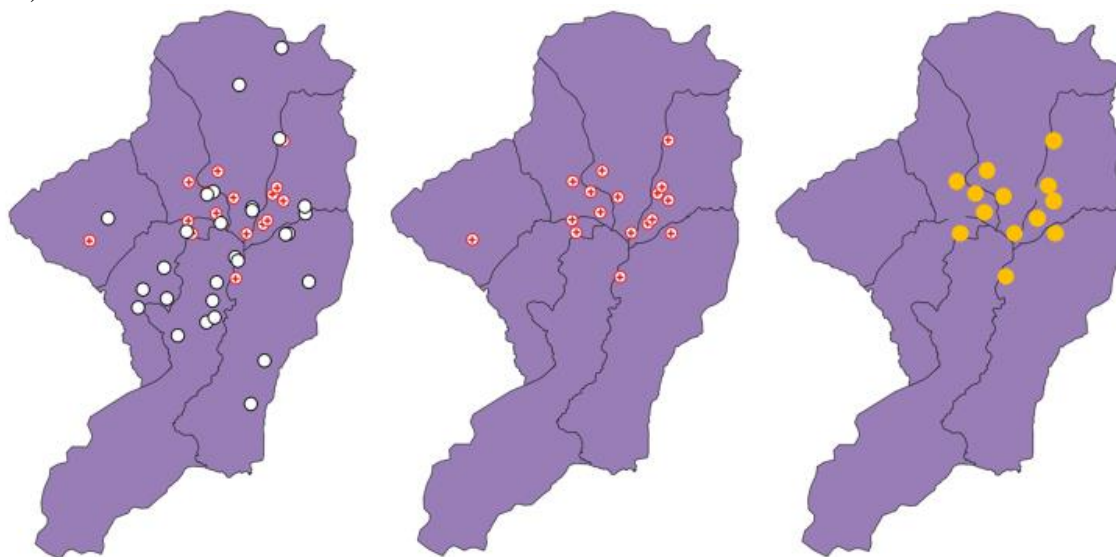


Figure 1: Mapping of mammography units in Yaoundé city.

○ Imaging units without a mammography device. ⊕ Imaging units with a mammography device
● Functioning mammography devices

The functional mammography units were mainly located in the administrative centre, but they were accessible within an hour's drive from any location in the city. (Figure 1).

3.3 Demand and cost of screening mammography

The 14 facilities with functional mammography units carried out an average of 203 mammograms each month, with a median of 15 per facility [8 – 60]. Private facilities were responsible for conducting 95% (193/203) of these mammograms. The cost of a screening mammogram ranged from XAF 30,000 (48.68 US dollars) to XAF 40,000 (64.9 US dollars), with a median of XAF 33,000 (53.55 US dollars). In public sector facilities, the single price charged was XAF 30,000 while in private facilities, the price ranged from XAF 31,000 to XAF 40,000 with a median of XAF 35,000.

4. Discussion

The objective of this study was to evaluate the capacity of mammography to cover the needs for breast cancer screening in Yaoundé city. We found a capacity of 0.32 mammography units per 10,000 women eligible for breast cancer screening. Each unit performed approximately 15 mammograms per month with a median price of 33,000 XAF (53.55 US Dollars). All devices were accessible within an hour's car drive.

4.1 Availability of mammography in Yaounde

Cameroon aims to ensure that at least 80% of women aged 40 and above have access to annual mammography screening (8). The American College of Radiology recommends annual screening mammography starting at age 40 (13). Eberth et al. estimated that 6,000 mammograms could be performed per year on a device by doing 3 examinations per hour for 8 hours/day, 5 days/week,

and 50 weeks/year (9). Based on this estimate, the 13 functional mammographs in Yaoundé City can offer only 78,000 examinations annually for 400,921 eligible women (12), leaving 322,921 (80.54%) examinations uncovered. To overcome the screening needs of all eligible women in Yaoundé City, one would need 67 fully functional mammography units, resulting in a capacity of 1.67 per 10,000 eligible women. Our study found that the capacity of mammography units in Yaoundé City is only 0.32 per 10,000 eligible women, which is significantly lower than the recommended capacity. According to the International Atomic Energy Agency, Cameroon is among the poorly supplied countries in mammography with less than 5 mammography units/million inhabitants against more than 15 mammography units/million inhabitants in high-income countries (14). In Yaoundé City, there were 3.88 mammography units/million inhabitants, confirming the severe lack of mammography coverage.

Poor mammography capacity decreases the likelihood of receiving a timely mammogram, lowers mammography adherence, and increases the likelihood of a late-stage diagnosis. Conversely, living in an area with adequate mammography capacity increases the likelihood of women with breast cancer being diagnosed at an earlier stage and benefiting from curative therapy (9,15).

Before the implementation of universal health coverage and a systematic breast cancer screening policy, at least 67 functional mammography units would be needed in the city of Yaoundé. Public and private health facilities can combine their efforts to achieve this goal.

Additionally, the 13 mammography units in our study came from 6 different manufacturers, and nearly half of them were over 10 years old. This diversity of brands and models can make it difficult and costly to maintain and repair the equipment, as each brand has its own specifications and requires specialized engineers. To improve access to mammography, the government could acquire devices from a limited number of manufacturers and train more engineers to maintain them. The National Radiation Protection Agency should also increase inspections to ensure that all mammography units are reliable, regardless of their age.

4.2 Affordability of mammography

The median cost of screening mammograms in our study was 33,000 XAF (53.55 US Dollars), which is relatively high in a country where a quarter of the population (25.7%) lives on less than 1.90 USD per day (16).

Without universal health coverage, the high cost of mammography is a major barrier to access for many women (17). In a setting of endemic poverty, available resources are typically devoted to basic and urgent needs such as nutrition, education, and curative care. Examinations for screening purposes are often perceived as a useless expense.

Cameroon launched a universal health coverage scheme in 2023, aiming to provide sustainable solutions to lift financial barriers to healthcare access, including mammography screening for women.

4.3 Mammography service uptake

The median number of mammograms performed monthly was 15 [8–60], which is significantly below the potential capacity of 160 exams per month for a single device (9). This suggests that existing mammography units in Yaoundé City are highly underutilized. In addition to cost and availability, other known barriers to mammography use around the world include poor accessibility, lack of referral by a physician, lack of information, wrong beliefs about cancer or screening, and negative prior experiences in healthcare settings (7,17). In our study, all the mammography units were accessible within an hour's car drive, suggesting that accessibility is not a major barrier to mammography use in Yaoundé City.

We found that only 37.77% (17/45) of radiology departments in the city had mammography devices. The poor attendance at mammography units by women may explain the reluctance of health facilities to invest in this equipment.

Effective interventions to increase mammography attendance rates in Yaoundé City could include communication campaigns (remote and face-to-face), physician recommendations, and reducing or removing the cost barrier with insurance (7,17,18).

Study limitation

This study presents information from three years ago, and it is possible that there have been developments in mammography services in Yaoundé since then. However, considering the generally low profitability of mammography, it is improbable that there has been significant acquisition of new machines to meet the

entire demand. Thus, our results establish an important starting point for future evaluations of the availability and changes in mammography services.

5. Conclusion

Mammography service supply in Yaounde City was critically insufficient in 2021, with less than 20% coverage of breast cancer screening needs. Functional mammography units were accessible but underutilised. The cost of a screening mammogram was relatively high for the overall economic level of the population, which may be one reason for poor attendance.

With the implementation of universal health coverage in Cameroon, efforts must be made to increase the number of mammography units and encourage systematic screening of eligible women, whether voluntarily, under referral by caregivers, or through a national screening program.

Further research is needed to identify the barriers to mammography screening and the scarcity of mammography units in Yaoundé. Understanding these barriers is essential for policymakers to develop effective interventions and improve breast cancer prevention and care in Cameroon.

Conflit d'intérêt

The authors declare that they have no conflict of interest.

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