Barriers in access to care for head and neck cancer patients in Sub-Saharan Africa

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Background

Head and neck cancer is the 7th most common cancer worldwide, with the majority of new cases arising in low- and middle- income countries. Patients from low- and middle- income countries often present with advanced disease and require extensive surgical and multimodal treatment. Although the burden in Sub-Saharan Africa is well documented, no evidence-based strategies exist to identify the barriers in access to care and facilitate early detection.

Objective

Create an evidence-based approach using a theoretical framework to adequately identify barriers in access to care for patients in sub-Saharan Africa.

Methods

Patients with a diagnosis of head and neck cancer were selected from two independent university hospitals in Senegal to participate in a mixed-methods descriptive study. Data related to barriers to care were collected using tools developed based on our systematic review of the literature. A focused ethnographic qualitative approach was used to identify factors that delay presentation, referral, and treatment. Data was analyzed using a deductive approach based on our published theoretical framework.

Results

Thirty-three patients with a mean age of 57.8 years were included. Presentation delay was 5.7 months, mainly attributed to cost of consultation (39%), waiting time at the doctor's office (15%), and distance to healthcare facility (12%). Referral delay greater than 3 months was observed in 60% of participants, secondary to misdiagnosis and lack of appropriate referrals. Treatment delay was associated with limited local treatment capacity and securing the cost of treatment. Cost of transportation impacted all types of delays.

Conclusion

This is the first work that describes an evidence-based approach to identify barriers in access to care for head and neck cancer patients in sub-Saharan Africa. The insight provided by this study will be used as a guide to develop implementation strategies for early detection of head and neck cancer in low- and middle-income countries.

RÉSUMÉ

Background

Le cancer de la tête et du cou est le 7e cancer le plus commun à travers le monde et la majorité des nouveaux cas sont dans les pays à revenus faibles et intermédiaires. Les patients provenant de ces milieux se présentent fréquemment avec une maladie avancée nécessitant des chirurgies extensives et des traitements multimodaux. La situation en Afrique subsaharienne est parmi les plus difficiles, de plus aucune stratégie n'a été décrite dans la littérature pour identifier efficacement les barrières d'accès aux soins et faciliter une détection précoce de la maladie.

Objectif

Développer une approche basée sur la littérature pour identifier les barrières d'accès aux soins des patients atteints d'un cancer de la tête et du cou en Afrique subsaharienne.

Méthodes

Des patients avec un diagnostic de cancer de la tête et du cou ont été sélectionnés dans deux centres de santé au Sénégal pour participer à une étude descriptive avec une approche méthodologique mixte. Les données sur les barrières d'accès aux soins ont été recueillis à l'aide d'outils de recherche développés à partir de la revue systématique de la littérature. Une approche qualitative ethnographique ciblée a été utilisée pour identifier les barrières d'accès aux soins.

Résultats

Un total de 33 patients avec une moyenne d'âge de 57.8 ans a été inclus dans l'étude. Le délai de présentation est en moyenne de 5.7 mois, est attribué au coût de la consultation (39%), au temps d'attente pour voir un médecin (15%) ainsi qu'à la distance des institutions de santé (12%). Un délai de référence de plus de 3 mois a été observé chez 60% des participants et est attribué à un diagnostic erroné et à un manque de références aux spécialistes. Le délai de traitement est associé à la capacité de traitement limitée des institutions et au coût trop élevé de ceux-ci. Le coût du transport semble avoir un impact sur les 3 types de délais.

Conclusion

Cette étude présente pour la première fois une approche basée sur la littérature pour identifier les barrières d'accès aux soins des patients atteints d'un cancer de la tête et du cou en Afrique subsaharienne. Les résultats obtenus seront utilisés comme guide pour le développement et l'implémentation de stratégies pour la détection précoce des cancers de la tête et du cou dans les pays à revenus faibles et intermédiaires.

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CONTRIBUTION OF AUTHORS

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DISCLOSURE

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CHAPTER 1 : Introduction

1.1 Rationale

Cancer is a group of disease caused by the uncontrolled division of abnormal cells in one part of the body. These abnormal cells have the ability to invade adjacent tissues causing aggressive local damage and can spread to other parts of the body. The formation of distant metastasis usually represents an advanced disease and is a major cause of death for affected patients. The Annual Report to the Nation on the Status of Cancer estimated that a total of 606 880 people died of cancer in 2019 in the United States[1].

Cancer is not limited to high income countries. In 2018, it was the second most common cause of death globally, representing a total of 9.6 million deaths. The World Health Organization described that approximately 70% of these deaths occur in low- and middle-income countries[2]. The impact of cancer in low- and moderate-income countries cannot be overstated. In fact, the social, physical, emotional and financial burden is exacerbated by the inability of the local health system to manage this overwhelming disease. Even though more than 90% of high-income countries reported that health services in place are adequate to treat cancer patients, less than 30% of low-income countries are ready to face this challenge[2]. Again, some data suggested that less than 5% of global resources for cancer treatment are spent in low- and middle-income countries as a whole[3]. To address these multiple issues, the World Health Organization developed the National Cancer Control Programme with the intent of implementing systematic, equitable and evidence-based strategies for prevention, early detection, diagnosis and treatment of cancer in low- and middle-income countries. They propose as a first step, to perform an in-depth analysis of the situation and identify gaps in services with the goal of recognizing opportunities for cost-effective action[4].

Head and neck cancers may arise from any mucosal surface of the upper aerodigestive tract. To this, we can add the salivary glands, the paranasal sinuses, the skin and the facial skeleton. These many different locations yield diverse histopathologies that differ in terms of treatment and prognosis[5]. A total of 967 649 deaths were recorded worldwide in 2018 keeping head and neck cancer in the 7th position[6]. It is essential to understand that head and neck cancers also present an immensely imbalanced distribution in the global south. It has been estimated that up to 2/3 of yearly new diagnosed cases are from low- and middle-income countries[7]. In some endemic countries, such as Sri Lanka, Pakistan, Bangladesh and India, oral cavity cancer is the most common cancer type in male populations[8]. The preponderance of cases in the global south can be explained by a multitude of causes including a greater exposure to multiple risk factors. The many tobacco products used in some low- and middle-income countries have been found to play a major role in this epidemic. In fact, chewing tobacco, products made of areca nut, betel leaf, slaked lime, catechu and powdered tobacco have been found to be the most common causes of oral cavity squamous cell carcinoma in Southeast Asia and a leading factor in India[9]. Data suggest that areca nut-based products like *gutka* or *pan malasa* are used regularly by up to 10% of the world's population. Furthermore, areca nut alone has been found to be a carcinogen and has been associated with oral cancer[10]. Among others, alcohol consumption, occupational exposure, UV light, oral hygiene, as well as a high prevalence of EBV also have a disproportionately larger impact on the global south compared to high-income countries[11].

One key factor in the prognosis of these patients is the initiation of a rapid and adequate treatment in an early phase of the disease. In fact, early recognition of the symptoms and prompt referral to specialized centers are crucial elements in terms of improving the prognosis for patients with the disease[12]. This has been demonstrated by Murphy *et al.* who showed that head and neck cancer patients with a prolonged time of curative treatment initiation greater than 46 to 52 days had an increased risk of mortality[12]. Unfortunately, the literature shows that 50% of oral cancers are diagnosed at advanced stages (stage III or IV) globally, with a 5-year survival rates ranging from 20% to 50%[13-14-15]. Even though more recent data from the National Cancer Institute show an improvement in the United-States for the 5-year survival rates of oral cavity/pharynx and larynx to 66.2% and 60.3% respectively, the global picture is still very dark[16-17].In India, for instance, different published series showed that 71% to 80% of patients affected by the disease presented with a stage III or IV disease[18-19]. Results coming from populations in sub-Saharan Africa are worst and show that 83% to 96% of patients present with stage III or IV disease and more than 50% present with distant metastasis[20-21-22-23]. The situation in sub-Saharan Africa is further complicated by the fact that patients affected seem to be younger than in other parts of the world.

In Nigeria, oral cancer in patients under 45 years-old was reported to be 3 to 6 times higher compared to the incidences in USA and Europe[24]. The situation is daunting and surgeons working in sub-Saharan Africa not only have to cope with a highly prevalent disease but also with young patients presenting with locally advanced disease and/or distant metastasis. This represents a number of difficulties: morbid surgical resections, complex reconstructions, specialized multimodal treatments, prolonged intensive postoperative care and demanding rehabilitation. As stated earlier, it is fair to assume that such a burden cannot be addressed by the vast majority of sub-Saharan African countries[1].

One question we can ask ourselves: Why are patients presenting to care so late in this part of the world? This is in fact a fairly complex question that can be looked at from many different angles. To better understand this problem, we have to identify the challenges and the barriers limiting access to care. These barriers can be divided using the approach developed by the World Health Organization to classify the different types of delays in cancer diagnosis[25]. First, there is a set of barriers affecting the presentation delay, defined as the time from the first symptom to the first presentation to a healthcare practitioner. Then, other barriers will have an impact on the referral delay, representing the time needed from the first appointment with a healthcare practitioner to the first consultation with a head and neck cancer specialist. Finally, there is the treatment delay that can also be affected, that is the time between the first presentation to a specialist and the beginning of treatment. Each type of delay represents a different set of limitations or barriers that vary based on a multitude of factors including the psychological and emotional response to illness to more technical challenges like access to transportation to the nearest healthcare facility. Those factors are not well described for our patient population in Sub-Saharan Africa.

1.2 Objectives

As stated earlier, tremendous work needs to be done to remedy inequities in accessibility to safe, affordable and timely surgical care for head and neck cancer patients in low- and middle-income countries and more specifically in sub-Saharan Africa. Although some strategies have been put in place in countries like India to facilitate early diagnosis, there is no evidence-based approach described allowing the implementation of such strategies in sub-Saharan Africa[26]. Faced with the need for an in-depth analysis of the situation and based on the recommendation of the National Cancer Control Programmes, this work intends to describe the barriers in access to care for head and neck cancer patients in sub-Saharan Africa[4].

To achieve this goal, we developed an evidenced-based approach coming both from the literature and from direct observations. This will be detailed in the next 2 chapters of this manuscript.

1.3 Thesis Outline

Chapter 2 is a systematic review of the literature that was performed to identify all the barriers in access to care described for low- and moderate-income countries. This allows not only to fill a gap in the literature but also provide the initial framework needed to approach the research question.

Chapter 3 presents the results obtained from the field study that took place from May to August 2018 in Dakar, Senegal.

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Chapter 2: Barriers in Access to Care for Patients With Head and Neck Cancer in Resource-Limited Settings: A Systematic Review **(Manuscript 1)**

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2.1 Key Points

Question

What are the barriers to care for patients presenting with head and neck cancer in low-income and lower-middle-income countries?

Findings

In this mixed-methods systematic review of 18 studies that originated from Asia and Africa, a low level of literacy was statistically associated with a delayed presentation in 8 articles (44%), and lower socioeconomic status was statistically associated in 4 articles (22%). Qualitative articles identified misunderstanding of symptoms, use of alternative medicine, and inability to access health care as factors associated with a delayed presentation.

Meaning

Findings of this study may help identify the clinical and social validity of a given barrier to care in low-income and lower-middle-income countries and may guide future work in this understudied area.

2.2 Abstract

Importance

The identification of the barriers to care for patients with head and neck cancer in low-income and lower-middle-income countries is a crucial first step toward the identification of targets for developing and implementing cost-effective programs to increase awareness, prevention, and treatment of head and neck cancer in this setting.

Objective

To identify the barriers to care for patients presenting with head and neck cancer in low-income and lower-middle-income countries.

Evidence review

Nine databases were searched from their inception to December 21, 2017: Africa-Wide Information, the Cochrane Library, Embase, Global Health, LILACS, MEDLINE, BIOSIS Previews, and Web of Science. Search terms referred to head and neck cancer, barriers to care, and low- and lower-middle-income countries, and no temporal and linguistic restrictions were imposed. Articles were reviewed by 2 independent investigators, and differences in inclusion were resolved by discussion. Bibliographies of all included articles were screened, and all relevant articles were reviewed using the same procedure. Quantitative articles were assessed using the Methodological Index for Non-Randomized Studies tool, and articles with qualitative data used the Critical Appraisal Skills Programme qualitative checklist. This systematic review was registered in PROSPERO (registration No. CRD42018092448) and followed the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols.

Findings

Of the 44 articles selected for review, 18 (41%) met the selection criteria. All articles reported quantitative results, and 3 (17%) added some qualitative material to the study design. Most (11 [61%]) of the studies originated from India. A total of 41 different barriers to care were identified, with low level of education (cited in 8 articles [44%]), low socioeconomic status (in 4 articles [22%]), and lack of knowledge about head and neck cancer (in 3 articles [17%]) being statistically associated with a delayed presentation. Misunderstanding of signs and symptoms, use of alternative medicine, and inability to access health care were other barriers discussed in the qualitative articles.

Conclusion and relevance

This systematic review highlighted the lack of both qualitative and quantitative information for patients with head and neck cancer in low-income and lower-middle-income countries. The findings suggest that integrating the barriers to care with information from patient lives may identify the clinical and social relevance of these barriers and guide future research.

2.3 Introduction

Cancer represents a growing threat in low-income and lower- middle-income countries. In 2010, cancer cases in these countries represented more than 50% of newly diagnosed cancer worldwide but accounted for only 5% of total cancer- related expenditures.[1] Head and neck cancer is known to contribute substantially to this burden, with 630 000 new cases identified every year, two-thirds of which are from low-income and lower- middle-income countries.[2,3] In some endemic countries, such as Sri Lanka and India, oral cavity cancer is the most common cancer type in male populations.[4]

Early recognition of the symptoms and prompt referral are key to improving the prognosis after treatment of patients with head and neck cancer.[5] However, the literature shows that patients living in low-income and lower-middle-income countries often present with late-stage diseases requiring complex surgical resections and multimodal treatments.[6-11] In India, 71% to 80% of patients with head and neck cancer present with stage III or IV disease.[6,7] On the African continent, studies show that 83% to 96% of patients present with stage III or IV disease and more than 50% present with distant metastasis.[8-11] However, the current literature lacks articles that de- scribe the factors associated with limiting access to and increasing the delays in receiving care for this specific population.

The aim of this systematic review was to identify the barriers to care for patients presenting with head and neck cancer in low- and lower-middle-income countries. We explored and synthesized both the quantitative and qualitative results found in the literature.

2.4 Methods

The protocol of this mixed-methods systematic review was registered in PROSPERO (registration No. CRD42018092448). The mixed-method systematic review of the literature was conducted in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines.

Search Strategy

A complete search strategy was developed with the help of a senior librarian on our team (E.G.) from the medical center (McGill University Health Centre, Montreal, Québec, Canada). The search strategy used variations in text words found in the title, abstract or keyword fields, and relevant subject headings to retrieve articles referring to head and neck cancer; barriers to care; and low-income and lower-middle-income countries, as defined by The World Bank.[12] A total of 9 databases were searched from their inception to December 21, 2017, including the Africa-Wide Information (Ebsco), the Cochrane Library (Wiley), Embase (Ovid), Global Health (Ovid), LILACS (Latin American & Caribbean Health Sciences Literature), MEDLINE (PubMed), BIOSIS Previews, and Web of Science.

To be included in the systematic review, studies had to involve patients with head and neck cancer and identify barriers to care and/or motives for late presentation as a primary objective. Studies that only treated thyroid cancer as a head and neck cancer were not eligible for inclusion. We excluded articles dealing solely with pediatric cases. All qualitative and quantitative research articles fitting the above criteria were eligible for inclusion without temporal and linguistic restrictions. All articles from South America were excluded from this review because they were published in upper-middle-income countries, as defined by The World Bank.[12] The bibliographies of all included articles were screened, and all relevant articles were reviewed using the same procedure. EndNote, version 8 (Clarivate Analytics), was used to facilitate the search process.

Data Extraction

Two of us (S.A., R.G.) screened all the titles and abstracts from selected articles. Disagreements were resolved by discussion and settled by our principal investigator (D.P.). The full content of pre- selected articles was then analyzed by 2 of us (P.-L.B., S.A.) for final article inclusion.

The following information was extracted using a predefined data extraction sheet including study location, year of publication, period of data collection, study design, tool used for data collection, patient population, number of patients included in the study, type of data collected (qualitative or quantitative), and barriers to care identified. Data from articles containing qualitative material were treated with a different data extraction sheet that also included the patient's quotes as part of the extraction. Two of us reviewed the collected data (P.-L.B., S.A.) and settled our disagreements with discussion.

Risk-of-Bias (Quality) Assessment

The quality of the articles was assessed with 2 different tools, depending on the type of data collected. For articles presenting solely quantitative data, the Methodological Index for Non-Randomized Studies instrument was used when applicable. For articles presenting qualitative data, the Critical Appraisal Skills Programme qualitative checklist was used. All disagreements regarding both tools were resolved by discussion.

Data Analysis

Identified barriers to care were extracted from articles and classified into 2 general categories: (1) barriers that have been statistically associated with a delayed presentation and (2) barriers that have been identified but not statistically associated with a delayed presentation. Descriptive statistics for each of the barriers were not collected because the patient populations and the definitions of delayed presentation varied greatly between each article. In this con- text, a meta-analysis was not possible.

The barriers to care identified in qualitative studies were also collected along with associated quotations from the original articles. Inclusion of the original quotations ensured the meanings were not altered during data analysis. The different barriers were then combined to form a meta-aggregation, which generated independent synthesized statements for presentation.[13] Courses of action and conclusions were drawn from those specific statements. Computer-assisted data coding and analysis were performed using NVivo, version 12 Mac (QSR International), to complete the synthesized statements.

2.5 Results

Literature Review

A total of 8872 articles were found by the search, of which 6564 (74%) were identified after duplicate removal and screened for the systematic review. Forty-four articles were selected on the basis of their abstracts for a review of their full content. A total of 18 (41%) of the 44 articles met the selection criteria as outlined in the PRISMA flowchart (Figure 1- Appendix 1).

Eleven of the 18 studies (61%) originated from India. Four studies (22%) came from other Asian countries (Sri Lanka, Indonesia, Nepal, and Pakistan). Three studies (17%) were from African countries (Nigeria, Zimbabwe, and Kenya). Although we included articles without temporal limitation, all of the studies were conducted between January 1, 2001, and December 31, 2018. The patient populations studied were heterogenous, as out- lined in Table 1. All articles reported quantitative results, and 3 studies added some qualitative material to their design (Table 1).

Quality Assessment

All studies included in this systematic review were shown to have low quality, with a Methodological Index for Non-Randomized Studies median score of 6.5 out of 16. Most studies lost points owing to the lack of prospective data collection, lack of prospective calculation of the study size, and inappropriate follow-up. Detailed information on these bias assessments is presented in Table 2. The studies containing qualitative material were also analyzed using the Critical Appraisal Skills Programme tool. Our evaluation showed these studies had poor research design, lacked transparent recruitment strategies, and lacked consideration of ethical issues. The complete assessment is presented in Table 3.

Barriers to Care

A total of 49 different barriers to care were identified from the 18 articles reviewed. Duplicate barriers were merged and grouped into 41 different barriers (Table A- Appendix A). A low level of literacy and low socioeconomic status were the barriers to

Table 1. Characteristics of the Studies Included in the Systematic Review

#	Author	Year	Country	Period	Study Design	Tool for Data Collection	Pa
1	Agarwal[19]	2011	India	Jan 2006 – Dec 2007	Cross-sectional	Survey	H
2	Ahmed[20]	2012	India	Jan 2009 - June 2010	Cross-sectional	Survey	
3	Akram[21]	2014	India	Dec 2010 - June 2012	Cross-sectional	Structured questionnaire	c
4	Alahapperuma[22]	2017	Sri Lanka	2017	Cross-sectional	Interviewer-administered questionnaire	O
5	Baishya[23]	2015	India	June 2014 -Nov 2014	Cross-sectional	Interviewer-administered questionnaire	
6	Edwards[24]	2016	India	2014	Cross-sectional	Structured questionnaire	Ora
7	Fasunla[25]	2013	Nigeria	March 2006 - Feb 2011	Cross-sectional	Structured questionnaire	Si
8	Fles[26]	2017	Indonesia	March 2014 - June 2014	Qualitative research method	Semi-structured interview/ Questionnaire	
9	Joshi[27]	2013	India	2011 -2012	Cross-sectional	Structured questionnaire	T
10	Krishnatreya[28]	2014	India	Jan 2010 – Dec 2012	Retrospective	Chart review	
11	Kumar[29]	2001	India	N/A	Cross-sectional	Structured questionnaire	Ora
12	Masiiwa[30]	2016	Zimbabwe	April 2014 - March 2015	Cross-sectional	Structured questionnaire	C
13	Onyango[31]	2006	Kenya	Jan - Dec 2014	Cross-sectional	Interviewer-administered questionnaire	
14	Pokharel[32]	2016	Nepal	Jan 2015 – Jan 2016	Prospective analytical study	Structured questionnaire	
15	Pramitasri[33]	2016	India	Aug 2013 - March 2014	Cross-sectional	Questionnaire	Ora
16	Rath[34]	2018	India	May 2016 - July 2016	Qualitative research method	Semi-structured interview/ Questionnaire	
17	Subramanian[35]	2014	India	N/A	Qualitative research method	Open-ended questions/ Focus group	Ora
18	Tariq[36]	2014	Pakistan	2011 -2012	Cross sectional	Questionnaire	Ora

Table 2. Risk of bias assessment using the Methodological Index for Non-Randomized Studies (MINORS)

Articles	1. A clearly stated aim	2. Inclusion of consecutive patients	3. Prospective data collection	4. Appropr-iate endpoints	5. Unbiased assessment of endpoint	6. Appropri-ate follow-up	7. Loss of follow-up <5%	8 Prosp calcu of the si
1. Agarwal[17], 2011	1	0	2	1	1	0	0	
2. Ahmed[18], 2012	2	1	0	1	1	0	0	
3. Akram[19], 2014	1	1	0	1	2	0	0	
4. Alahapperuma[20], 2017	2	2	0	2	2	0	0	
5. Baishya[21], 2015	1	2	0	1	1	0	0	
6. Edwards[22], 2016	2	1	2	1	1	0	0	
7. Fasunla[23], 2013	1	0	0	1	1	1	0	
8. Fles[24], 2017	1	1	1	2	2	0	0	
9. Joshi[25], 2013	1	2	2	1	1	0	0	
10. Krishnatreya[26], 2014	2	0	0	2	1	0	0	
11. Kumar[27], 2001	1	2	0	2	2	0	0	
12. Masiiwa[28], 2016	2	0	0	2	1	0	0	
13. Onyango[29], 2006	1	2	2	2	1	0	0	
14. Pokharel[30], 2016	2	0	2	2	1	0	0	
15. Pramitasri[31], 2016	1	0	0	1	1	0	0	
16. Rath[32], 2018	1	0	0	2	2	0	0	
17. Subramanian[33], 2014	1	0	0	1	1	0	0	
18. Tariq[34], 2014	1	2	0	2	2	0	0	

Table 3. Critical Appraisal Skills Program (CASP) Qualitative Checklist			
CASP Articles	**8. Fles, 2017**	**16. Rath, 2018**	**17. Subramanian, 2014**
1. Clear statement of the aim	Yes	Yes	Yes
2. Appropriate qualitative methodology	Yes	Yes	Yes
3. Appropriate research design	No	No	No
4. Appropriate recruitment strategy	No	No	N/A
5. Adequate data collection	Yes	Yes	N/A
6. Relationship researcher-participants considered	No	No	No
7. Consideration of ethical issues	No	No	No
8. Rigorous data collection	Yes	Yes	No
9. Clear statement of finding	Yes	Yes	Yes
10. How valuable is the research	-	-	-

care most commonly associated with a delayed presentation, with level of literacy judged statistically significant in 8 articles (44%) and socioeconomic status considered statistically significant in 4 articles (22%). Insufficient knowledge about head and neck cancer was de- scribed as a barrier in 7 articles (39%) but found to be statistically significant in only 3 articles (17%). The health seeking behavior, including toward a wide variety of alternative medicine, was described and studied in 5 articles (28%) and found to be associated with a delayed presentation in 2 articles (11%). Other barriers, such as fate of the patient, cost of treatment, and educational status of caretakers, were also studied (Table A – Appendix 1).

Kumar et al[7] created a multiple linear regression analysis model to analyze the primary delay in presentation among patients with oral cancer. The authors found that being escorted by someone, knowing that cancer can develop from the use of tobacco, visiting a physician regularly for the past 12 years, and having available transportation were protective factors (Table A – Appendix 1)

Masiiwa et al[24] identified household income, the distance from a health care center, and the number of visits with a primary care physician before referrals as being statistically associated with a delayed presentation in Zimbabwe.[24] All of these barriers were also de- scribed in articles from Asia. The lack of confidence in orthodox therapy and the attitude of hospital staff were described only in the African literature as limiting access to care.

Meta-Aggregation of Qualitative Data

Thirty-four different barriers to care were identified in the 3 articles containing qualitative data; 2 articles were from India, and 1 was from Indonesia. All barriers identified are listed in Table B in the Appendix 1 along with the original quotations from the patients. The 34 barriers were grouped into categories and were then synthesized to create statements. This process continued until all barriers were combined and resulted in 3 synthesized statements that represented all barriers, as depicted in the Figure.

2.6 Discussion

Treatment of head and neck cancer represents a vast challenge in low- and lower-middle-income countries. Optimal management of the disease requires potential complex surgical treatments, costly technologies, a multidisciplinary team approach, and a long rehabilitation process. Early recognition of the symptoms and prompt treatment are keys to improving patient prognosis and reducing the social and economic burden of the disease.[13] In this context, identifying alterable factors that delay access to care for patients with head and neck cancer in low- and lower-middle-income countries is of utmost importance. This systematic review noted all of the barriers to care reported in the literature for this specific patient population and organized the information to highlight the barriers most clinically and socially valid.

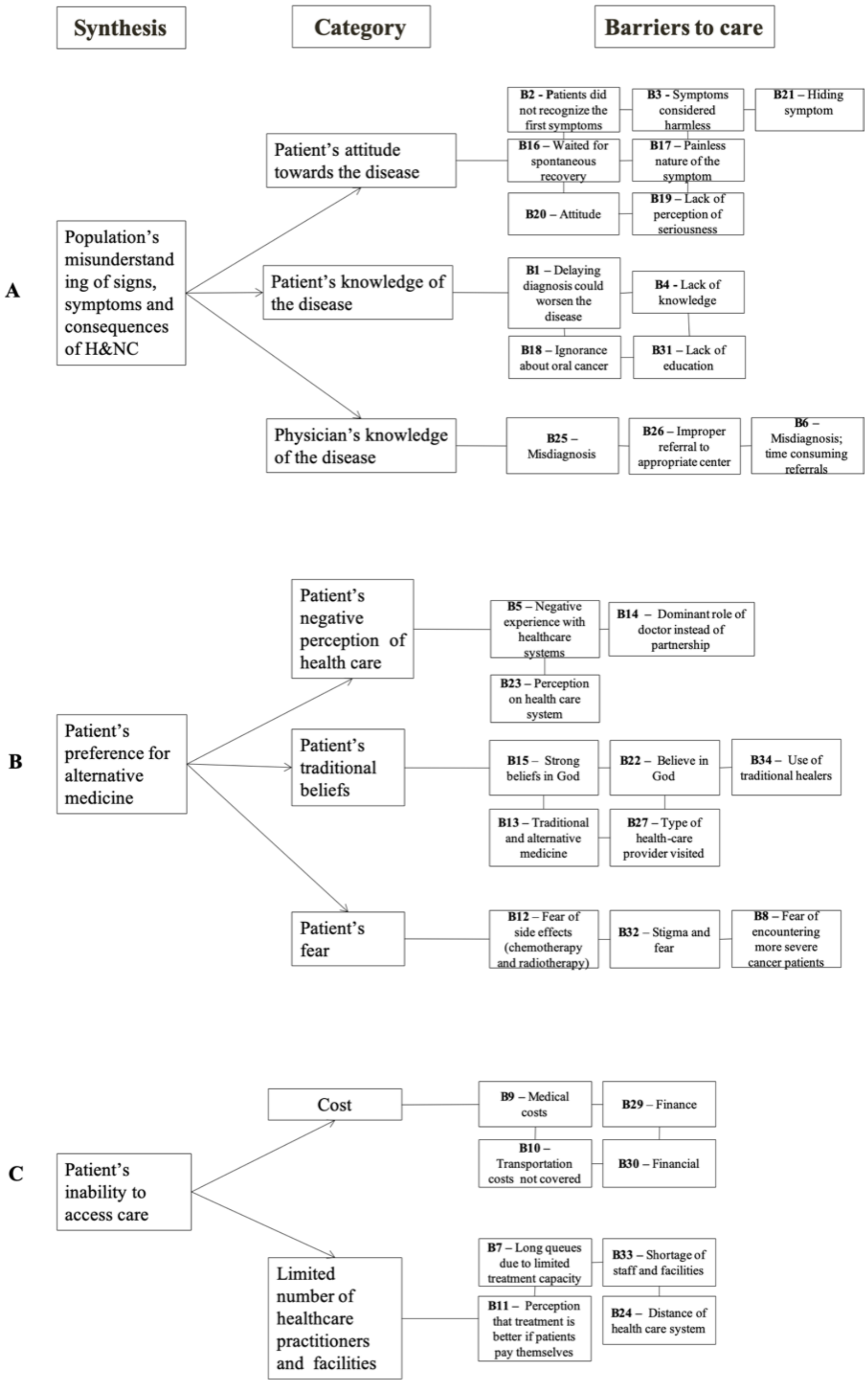

Figure 2. Synthesis of qualitative data

Our first observation was the paucity of the results. Fifteen of the 18 studies were from Asia, with 11 being from India. Thus, the results presented here are more representative of the Indian patient population than any other on the globe. The sub-Saharan African population is known to have a substantial burden of head and neck cancer but was barely represented, with only 3 articles identified in the literature. Furthermore, all articles with qualitative material came from Indonesia and India.

Three synthesized statements were generated by the meta- aggregation of the qualitative information collected (Figure 2). Even though the synthesized statements represent qualitative information, they corroborate the many barriers associated with a delayed presentation in the quantitative analysis. We highlighted the level of education, insufficient knowledge of head and neck cancer, use of alternative medicine, cost of traveling, and availability of transportation, which were all statistically associated with a delayed presentation in at least 2 articles and were represented in the 3 synthesized statements from patients (Table A – Appendix 1). The ability to support the quantitative results with the patients' experience brought an additional sense of social validity and confirmed that the barriers were the most clinically and socially important. This finding also corroborated the results from a qualitative study by Raykar et al[32] of 148 surgical practitioners from low- and lower-middle- income countries. Even though their study was not limited to head and neck cancer surgical procedures, Raykar et al[32] described the general challenges of performing surgical procedures in low- and lower-middle-income countries. The patients' incapacity to afford the long trips to the closest health care center as well as their cultural beliefs and general mistrust toward health care were high- lighted.

The 3 articles from sub-Saharan Africa originated from Nigeria, Zimbabwe, and Kenya. The study from Zimbabwe was the sole article from Africa to have identified barriers that were statistically associated with a delayed presentation. Those barriers were household income, distance from a health care center, and the number of visits with a primary care physician before referrals. These barriers were also described in articles from India. The lack of confidence in orthodox therapy and the attitude of hospital staff were described in the article from Nigeria as limiting access to care, but these 2 factors were not described in the literature from India and might play a bigger role in sub-Saharan Africa than in Asia. The absence of qualitative material contributed to the paucity of the results in the African literature. Without patients' input, the data were restricted to the institutional understanding of access to care, thus limiting the clinical and social validity of the information. Further research in the field is needed to describe the situation on the African continent.

Local and global initiatives are discussed in the literature to address these different challenges. From the local point of view, health care practitioners from low-income and lower-middle-income countries have described their involvement in medical education in institutions or with the community through seminars in villages or meetings with traditional healers to educate the population about the signs and symptoms of surgical emergencies.[32] Although this involvement has been described mostly in the global literature for surgical emergencies, such practices have also been documented in the otolaryngology community. For example, according to a team of global leaders in head and neck surgical procedures, a sustainable approach to improving the delivery of care to patients with head and neck cancer is the establishment of fellowship programs that train surgeons in accordance to local challenges.[33] Such a program is offered at the University of Cape Town and has had successful results, given that the fellows are now practicing in teaching hospitals across Africa.[34] Fagan et al[34] have also described how international collaborations can be organized to provide short educational workshops that support the local surgical community.

From the global point of view, in 2015, the Lancet Commission on Global Surgery published a series of recommendations with the intent of creating a framework for research in global surgical procedures.[35] Among those recommendations, 1 was highlighted: the necessity for the surgical community to better understand the factors associated with limiting access to surgical care for specific pathological conditions. Moreover, the first step of the National Cancer Control Programme developed by the World Health Organization was to describe the current situation for cancer patients in low- income and lower-middle-income countries.[36] The identification of the barriers to care for patients with head and neck cancer was in line with the objectives of both the

National Cancer Control Programme and the Lancet Commission on Global Surgery and was a first step toward the creation of a cancer control plan that is integrated with the sociocultural aspects of patients' lives and provides cues for the development of cost-effective programs.

Limitations

The main limitation of this systematic review was the attempt to synthesize the information coming from studies with a low level of evidence. Quality or risk-of-bias assessment showed overall poor quality for both the quantitative and qualitative articles. In this context, a meta-analysis was impossible owing to the heterogeneity of the populations studied and the outcomes measured. Some articles included all patients with head and neck cancer, whereas others studied specific populations such as patients suffering from sinonasal or nasopharyngeal malignant neoplasms. Furthermore, although the primary objective of most studies was to identify statistical associations between a specific barrier and a delayed presentation, the definitions used differed greatly between the studies. The articles commonly defined a delayed presentation as being either the time between first symptoms and presentation at 3 or more months or the size of the tumor being T3 or T4. The optimal definition of delayed presentation is still debated in the literature, and some authors have argued that most definitions are not clinically relevant and that a continuous variable may be more appropriate.[5] This point of view was not applied in any of the articles included in this systematic review.

2.7 Conclusions

To our knowledge, this mixed-methods systematic review is the first to focus on the barriers to care for patients presenting with head and neck cancer in low-income and lower-middle-income countries. The study was conducted to integrate the barriers associated with a delayed presentation with information from patients' lives. We believe this integration helps identify the clinical and social validity of a given barrier and may guide future work in this understudied area. Furthermore, this study highlighted the paucity of data and the lack of both qualitative and quantitative information for patients with head and neck cancer living in low-income and lower-middle-income countries.

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CHAPTER 3: An Evidence-Based Approach to Identify Barriers in Access to Care for Patients with Head and Neck Cancers **(Manuscript 2)**

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3.1 Key points

Question

What are the barriers to care for patients presenting with head and neck cancer in Dakar?

Findings

The presentation delay was found to be 5.3 months, mainly attributed to cost of consultation (39%), waiting time at the doctor's office (15%), and the distance to a healthcare facility (12%). A referral delay of more than 3 months was seen in 60% of patients, secondary to both misdiagnosis and lack of appropriate referral. The treatment delay was shown to be caused by limited treatment capacity as well as cost of treatment. Transportation cost was found to have an impact on all types of delays. In the majority of cases, traditional and medical treatments were used concomitantly.

Meaning

This is the first evidence-based study to use both a questionnaire as well as a qualitative design to identify barriers to care for patients presenting with head and neck cancer in Sub-Saharan Africa.

3.2 Abstract

Importance

This study developed and implemented a novel evidence-based approach to identify the barriers to care for patients with head and neck cancer (H&NC) in a low- and middle-income country (LMIC). This is a crucial first step towards the identification of targets for the development and implementation of cost-effective programs.

Objective

Identify the barriers to care for patients presenting with H&NC in Dakar, Senegal.

Design

This is a mixed-methods descriptive study with quantitative and qualitative material. A focused ethnographic qualitative approach was used. Data was analysed using a deductive approach based on a previously published theoretical framework. On-site data collection took place from May to August 2018.

Setting

Two independent university hospitals in Dakar, Senegal.

Participants

A consecutive sample of 33 patients with a diagnosis of H&NC was selected. Patients under 18 years of age, with a non-H&N primary tumour, or unable to answer the questionnaire were excluded.

Main outcomes

Factors that affect the delays to presentation, referral, and treatment were investigated. Outcomes were presented using descriptive statistics and qualitative themes accompanied with patient's statements.

Results

A total of 33 patients with a mean age of 57.8 years were included in the study. The delay to presentation to care was 5.3 months, mainly attributed to the cost of consultation (39%), the waiting time at the doctor’s office (15%), and the distance to a healthcare facility (12%). A referral delay of more than 3 months was observed in 60% of patients, secondary to misdiagnosis and lack of appropriate referrals. The treatment delay was associated with limited treatment capacity of the health care facility and securing the cost of treatment, and was further exacerbated by the multiple investigations and the time required for obtaining results. The cost of transportation had an impact on all types of delays. Traditional and medical treatments appeared to be used concomitantly in the majority of the cases.

Conclusions and Relevance

This is the first work that describes an evidence-based approach to identify the barriers in access to care for head and neck cancer patients in a low-income country of sub-Saharan Africa. The insight provided by this sample population in Dakar will be used as a guide to develop implementation strategies for early detection of head and neck cancer patients in low- and lower-middle income countries.

3.3 Introduction

Head and neck cancer is the 7th most common cancer worldwide, with the vast majority of new cases arising from low- and lower-middle income countries[1]. Literature demonstrates that patients from low- and lower-middle income countries present with advanced disease, which often requires extensive ablative procedures as well as multimodal treatments that are not typically available locally[2-4]. The heavy burden of head and neck cancer has been well described in the literature[5], and although strategies have been put in place to facilitate early diagnosis in countries like India[21], no such structures exist in Sub-Saharan Africa[6].

Using evidence-based strategies, the National Cancer Control Programmes and the World Health Organization have jointly developed a stepped approach to address the prevention and early detection of cancer[7]. However, no evidence-based approaches have been developed to identify the barriers in access to care for cancer patients in low- and lower-middle income countries. A recent systematic review published by our group gathered all the barriers in access to care described in the literature through both quantitative and qualitative studies for head and neck cancer patients in low- and lower-middle income countries[6]. This created a framework for ongoing data collection and analysis in this population of interest. Furthermore, the review highlighted the urgency of the current situation as well as the paucity of data on head and neck cancer patients available in Sub-Saharan Africa.

Based on the results of our systematic review and in collaboration with local head and neck cancer surgeons in Dakar, we conducted an onsite data collection using the previously published framework[6]. Using both quantitative and qualitative approaches, we aim to describe the barriers to care for local patients, with the goal of guiding the development and implementation of evidence-based strategies for early detection of head and neck cancer patients in this setting.

3.4 Methodology

This study was conducted in collaboration with the *Hôpital Principal de Dakar* and *Hôpital de Fann* in Dakar, Senegal. Ethics approval was provided by the McGill Institutional Review Board as well as by the local Ethic Research Committees associated with both study institutions in Dakar.

Questionnaire and semi-structured interview (SSI) development

Results from our previously published systematic review were used to create a questionnaire that consisted of 4 sections[6]. All barriers to care were organized using the approach developed by the World Health Organization to classify the different types of delays in cancer diagnosis: presentation delay, referral delay, and treatment delay[8]. For this study, presentation delay is defined as the time from the first symptom to the first presentation to a healthcare practitioner. Referral delay represents the time needed from the first appointment with a healthcare practitioner to the first consultation with a head and neck cancer specialist. The treatment delay is the time between first presentation to a specialist and the beginning of treatment. Using this approach we investigated the presentation delay (Part 1) and the referral delay (Part 2). All barriers from the systematic review were classified into the aforementioned two categories. Parts 3 and 4 were developed to describe the participant's level of knowledge concerning cancer and head and neck cancer, respectively. Key questions were identified from the literature and used to construct the semi-structured interview. Barriers described in the systematic review were used to define particular prompting elements that were asked in an iterative fashion during the semi-structured interview.

The initial visit to Senegal took place during May 2018. During this first stay at *Hôpital Principal de Dakar,* an internal pilot study was performed with ten head and neck cancer patients. To ensure the adequacy of the questionnaire, materials were modified and adapted to the local sociocultural setting. The results gathered during this internal pilot study were later included in the final dataset.

On-site data collection

Patients' inclusion criteria

Patients were included in the study if the diagnosis of head and neck cancer had been made based on a pathology report of a primary head and neck tumor. Being under 18 years of age and having a non-head and neck cancer primary tumour, concomitant disabling disease or being unable to answer the questionnaire lead to exclusion from the study.

Sample size calculation

All data were collected during a limited period of time on-site with qualitative data analysis performed subsequently. Thus, theoretical saturation was not used to define the appropriate sample size. In this context, we chose to achieve a purposive sampling using a simple quantitative calculation based on the lowest prevalence of a given theme of interest in the literature[9]. The theme with the lowest prevalence identified in the African literature was "the impact of the family decision on access to care" (5.9%)[10]. Using the tool proposed by Fugart & Pott, we thus estimated our sample size to be 32 patients. This sample size is also in agreement with the literature where a mean of 30 to 40 participants is suggested[9].

Semi-structured interview and questionnaire administration

Data were collected using a focused ethnographic qualitative approach over a period of 8 weeks, further divided between two different research periods from May to August 2018. Participants were individually interviewed by one of the investigators on site during the study period. A one-on-one encounter with each participant provided enough time to complete the questionnaire and answer all questions (45 to 60 minutes). During the process, new concepts were used to build prompting material to improve the ensuing interview in an iterative fashion. Patient demographics were completed with data from the patients' charts when needed. Five patients were asked to repeat Part 1 and 2 of the questionnaire within 7 to 10 days of the initial encounter to assess the reliability of the tool. Only Parts 1 and 2 were repeated, as Parts 3 and 4 initiated educational discussions concerning head and neck cancer. Consequently, the results were expected to be influenced by the initial exposure to the questionnaire.

Data Analysis

All semi-structured interview were audio recorded and transcribed to create a dataset. The qualitative material was then analyzed using a deductive approach based on a previously published theoretical framework[6]. New codes coming from the dataset were then added to the theoretical framework to better represent patients' lives. All qualitative analysis was done with the NVivo 12 Mac software (QSR International). Data from the questionnaire was analyzed using descriptive statistics.

3.5 Results

Population

Thirty-three patients were enrolled in the study. The average age was 57.8 years and the majority was male (73%). The primary tumor was in the larynx in 58% of patients, followed by oral cavity in 18%. In our series, 91% of patients presented with advanced (stage T3 or T4) disease.

Questionnaire Reliability

Out of the 33 participants, five patients repeated the questionnaire within 7-10 days. Both copies of the questionnaire were compared for descriptive statistics of Parts 1 and 2. Reliability ranged between 63 to 93%, with an average of 79.2%.

Table 1. Characteristics of H&NC patient population of Dakar, Senegal

		N (%)
Age (years)		
	Mean (Range)	57.8 (18-84)
Sex		
	Female	9 (27)
	Male	24 (73)
Country of origin		

	Senegal	30 (91)
	Guinea	3 (9)
Tobacco Use		
	Yes	14 (42)
	No	19 (58)
Alcohol Use		
	Yes	4 (12)
	No	29 (88)
Education		
	None	3 (9)
	Elementary school	14 (42)
	High school	10 (30)
	University	5 (15)
	Koranic School	1 (3)
Primary sites		
	Oral cavity	6 (18)
	Larynx	19 (58)
	Hypopharynx	5 (15)
	Lip	1 (3)
	Nasopharynx	1 (3)
	Facial bone	1 (3)
Tumor Size		
	T2	3 (9)
	T3	6 (18)
	T4	24 (73)
Insurance		
	None	17 (52)
	Government workers'	9 (27)
	Elderly	5 (15)
	Private	2 (6)
Medical center		
	Hôpital de Fann	21 (64)
	Hôpital Principal	12 (36)

Questionnaire results

Part 1 – Knowledge about cancer

When asked about the etiology of cancer, 36% of patients believed it was an infectious process, 30% thought it was a curse placed on one person by another, and 33% endorsed cancer as an abnormal growth of cells. Sixty-one percent of participants thought that early detection could aid in the treatment of the disease, and 58% were aware that some behaviors increase the risk of developing cancer. When prompted about treatment options, 79% thought the disease could get better with medical treatment, 33% said the disease could get better without medical treatment, and 9% believed that traditional medicine could help cure the disease.

Part 2 – Knowledge about H&NC

Prior to their own diagnosis of a head and neck cancer, 68% of participants had never heard of this cancer type. Four patients mentioned having heard of it, whether through the internet or television. Eighty-three percent of participants knew that smoking tobacco was a risk factor, however only 55% knew that smokeless tobacco was also associated with the disease. Sixty-four percent and 33% acknowledged that alcohol consumption and sun exposure, respectively, were also risk factors for the development of head and neck cancer. Eighty-two percent of patients were aware that surgery, radiotherapy, and chemotherapy were possible treatment options. However, one third of respondents believed that observation and herbal medicine were acceptable treatment options.

Part 3 – Delays to presentation

The mean delay to presentation was 5.3 months. Access to care was difficult in 17 of 33 (52%) patients. However, when given a list of possible barriers to care, all participants selected multiple different factors that had a negative impact on their access *(see Table 2)*. Of these, the cost of transportation, the cost of the consultation, and the distance to the healthcare facility were the three most common answers.

When asked specifically what single factor had the largest impact on their delay to presentation, the three most frequent answers were: cost of consultation (39%), waiting time at the doctor's office (15%), and distance to the healthcare facility (12%). *(see Table 3)* Only four patients mentioned having encountered none of these limitations - all of whom had delayed presentations that could be explained by their attitude towards disease (as described in Table A- Appendix 2).

When investigating patients' attitudes towards their cancer, 91% did not think their symptoms could be serious, while 88% were unaware that what they had could be cancer. Fear of the diagnosis of cancer and fear of surgery or treatment side effects were present in roughly half of patients. *(*Table A- Appendix 2*)*

In all circumstances, the decision to consult a doctor originated either from the patients themselves or from their families - with 39% assigning the decision to their family alone. Only six patients (18%) mentioned visiting a marabout or a traditional healer as a first point of contact when symptoms started, while the remaining 27 (82%) opted to see a doctor or a nurse as a first point of contact. Up to 30% of patients did still seek a traditional healer or a marabout for a second opinion, and two patients were advised not to consult medical services by their respective traditional healer or marabout.

Table 2. Barriers to presentation in the H&NC patients population of Dakar, Senegal

Barriers to presentation	N (%)
It is expensive to travel to the healthcare facility	23 (70)
It is expensive to see a doctor	22 (67)
The healthcare facility is far	22 (67)
I cannot leave my family duties/children	18 (55)
Long wait at the doctor's office	17 (52)
I cannot afford to miss one day of salary of work	14 (42)
There is no mean of transportation to get there	13 (39)
I cannot miss work , I am afraid of losing my job	12 (36)

Table 3. Main barriers to care selected by the H&NC patients population of Dakar, Senegal

Main Barrier to Presentation	N (%)
It is expensive to travel to the healthcare facility	3 (9)
It is expensive to see a doctor	13 (39)
The healthcare facility is far	4 (12)
I cannot leave my family duties/children	2 (6)
Long wait at the doctor's office	5 (15)
I cannot afford to miss one day of salary of work	1 (3)
There is no mean of transportation to get there	1 (3)
I cannot miss work, I am afraid of losing my job	0 (0)
None of the above	4 (12)

Part 4 – Delays to Referral

A total of 20 patients (61%) were diagnosed with a head and neck cancer more than three months after their first presentation to a medical doctor. *(Table 4)*

Out of 33 patients, 12 (36%) were misdiagnosed with a benign pathology like asthma, throat infection, gastric reflux, or allergies, and 13 (39%) were left without a diagnosis. Among these mis- and undiagnosed patients, only 12 (36%) were ultimately referred to a specialized medical center. When including patients whose initial presentation was deemed suspicious for neoplasia, a total of 20 patients (61%) were referred to specialist, 18 of which were referred to a regional hospital or a university-affiliated hospital. Thus 39% of patients were not referred to an expert after their first presentation.

Table 4. Diagnosis and referral pattern for the H&NC patients' population of Dakar

Diagnosis	Referred	Non-Referred	Total
Misdiagnosed	5	7	12 (36)
Unknown diagnosis	7	6	13 (39)
Suspicion of neoplasia	8	0	8 (24)
Total	20 (61)	13 (39)	33 (100)

Results from SSI

The qualitative material was analyzed using a deductive approach based on a previously published theoretical framework[6]. This framework described a series of barriers to care based on the following three main statements:

1. Misunderstanding in the public of signs, symptoms, and consequences of head and neck cancer
2. Inability to access care

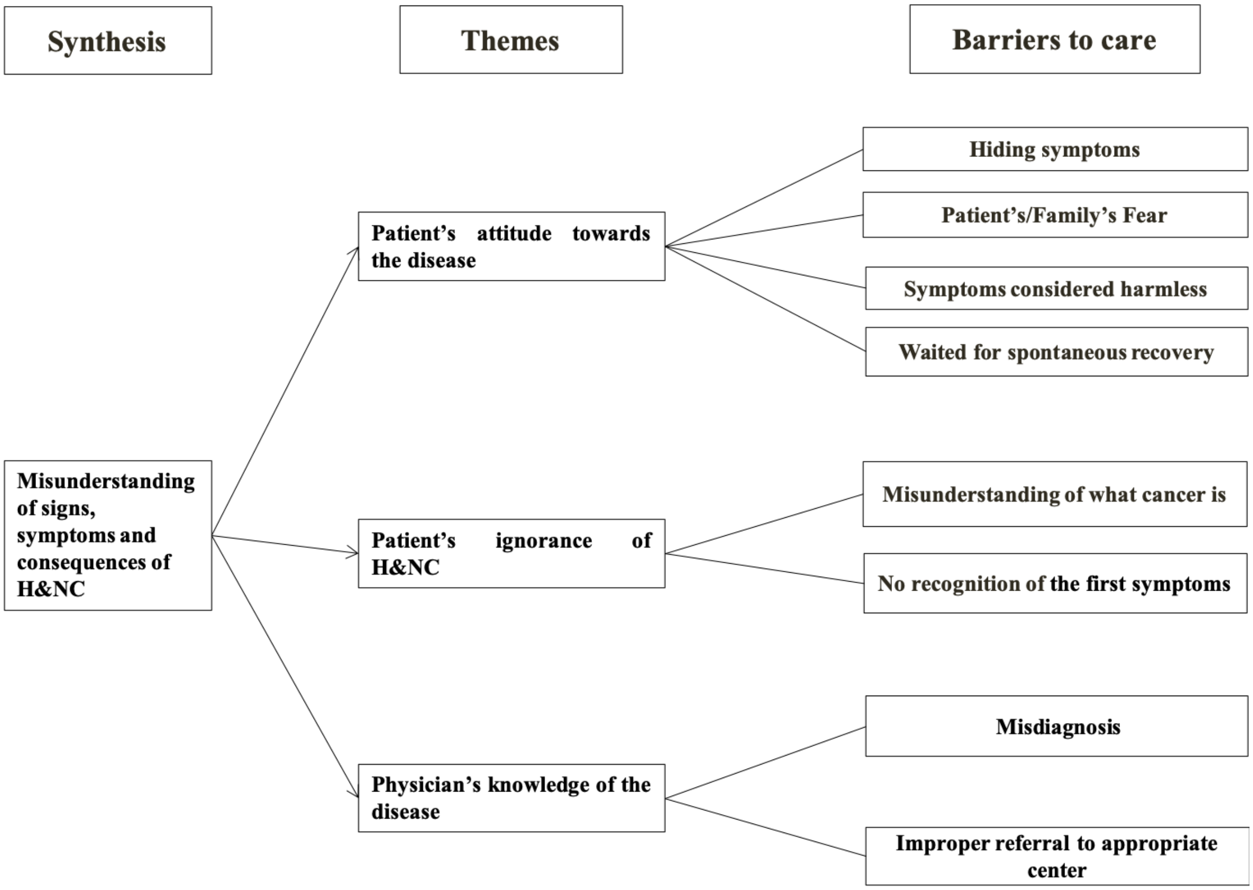
3. Preference for alternative medicine

The themes identified in the semi-structured interview were described and summarized based on these three main statements. A complete analysis, including patients' statements, can be found in the Appendix 2**.**

1. Population's misunderstanding of signs, symptoms, and consequences of head and neck cancer *(Figure 1)*

The public's misunderstanding of signs and symptoms of head and neck cancer encompasses three different themes: patient attitude towards the disease, and patient and physician ignorance of the disease. *(Figure 1)* The first of these themes is encapsulated as *patient attitude toward disease*. While some patients awaited spontaneous recovery, others considered their symptoms to be harmless, while some deliberately hid their symptoms. The act of hiding symptoms to avoid care was seen in the context of fear and pride. An underlying lack of knowledge of head and neck cancer was also a prevalent theme among patients. For many, symptoms of the disease were assumed to be associated with viral illness or chronic disease, that had been present for years.

This category of misunderstanding also includes physicians who misinterpret head and neck cancer symptoms, which consequently results in an inability to diagnose and/or refer patients. For example, treatment for asthma was given to stridorous patients, dentist referrals were made for enlarging oral lesions, and anti-acid reflux medication was prescribed for months to patients with worsening dysphagia. In many cases, this incorrect diagnosis and referral drastically exacerbated the delay before the correct diagnosis of head and neck cancer could be made.



***H&NC: Head and neck cancers**

Figure 1: Results from the semi-structure interview: Misunderstanding of signs, symptoms and consequences of head and neck cancers

1. Inability to access care (Figure 2)

Patients' inability to access care can be attributed to three main factors: high cost, long wait time, and inability to miss work. Without a doubt, the costs of transportation, consultation, hospitalization, and medical testing are at the root of this problem. Although some patients have access to government insurance which provides the consultation and hospitalization for a fifth of the cost [11], they remain unable to pay for transportation and treatment. Patients described waiting up to seven months just to collect sufficient funds to cover the cost of medical tests. Additionally, other patients described being dependent on their daily income and could therefore not afford to miss any days of work.

Even when patients could afford to pay, treatments were delayed by the long wait time associated with investigations and the prolonged intervals between appointments. The time required to obtain biopsy results was described as a main limitation in access to care. Furthermore, all patients were uniformly affected by limited access to radiotherapy. Access to chemotherapy was also limited by intermittent shortages of medication.

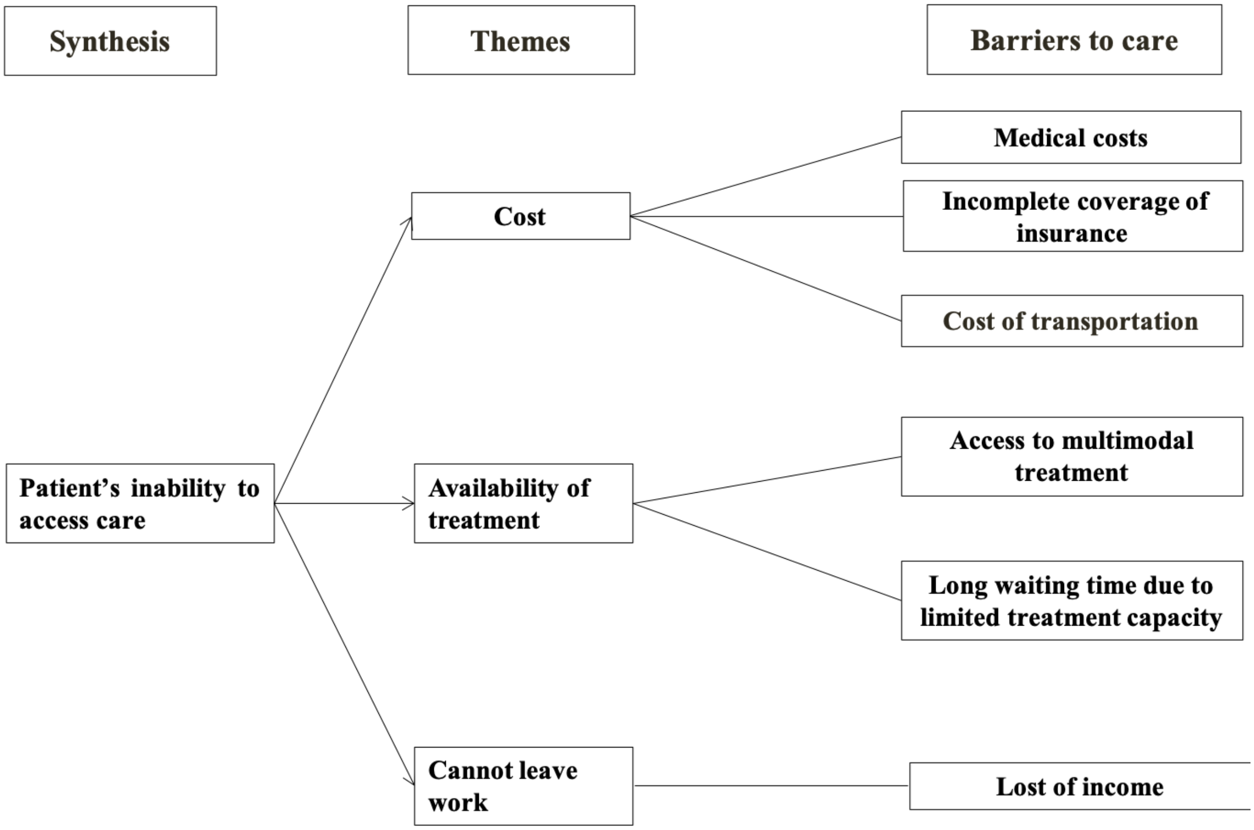


Figure 2: Results from the semi-structure interview: Inability to access care

1. Preference for alternative medicine *(Figure 3)*

The preference for alternative medicine was an ongoing theme throughout our investigation. This preference reflected both the patient's own belief system and the beliefs of their family. Multiple patients described instances where their family members deemed that seeking medical care was inappropriate. These patients' families refused to initiate medical investigations, voicing that they preferred using other approaches with the intent of avoiding mutilating surgery. For this subset of patients, initial medical attention was typically sought when advanced obstructive symptoms required urgent tracheotomy, with subsequent palliative treatment, when available. Other patients described seeking spiritual healers and traditional medicine when they felt that the medical system had failed them. That being said, most patients used traditional medicine alongside medical treatment to cover "all bases" - unfortunately a complex, inefficient, and expensive approach.

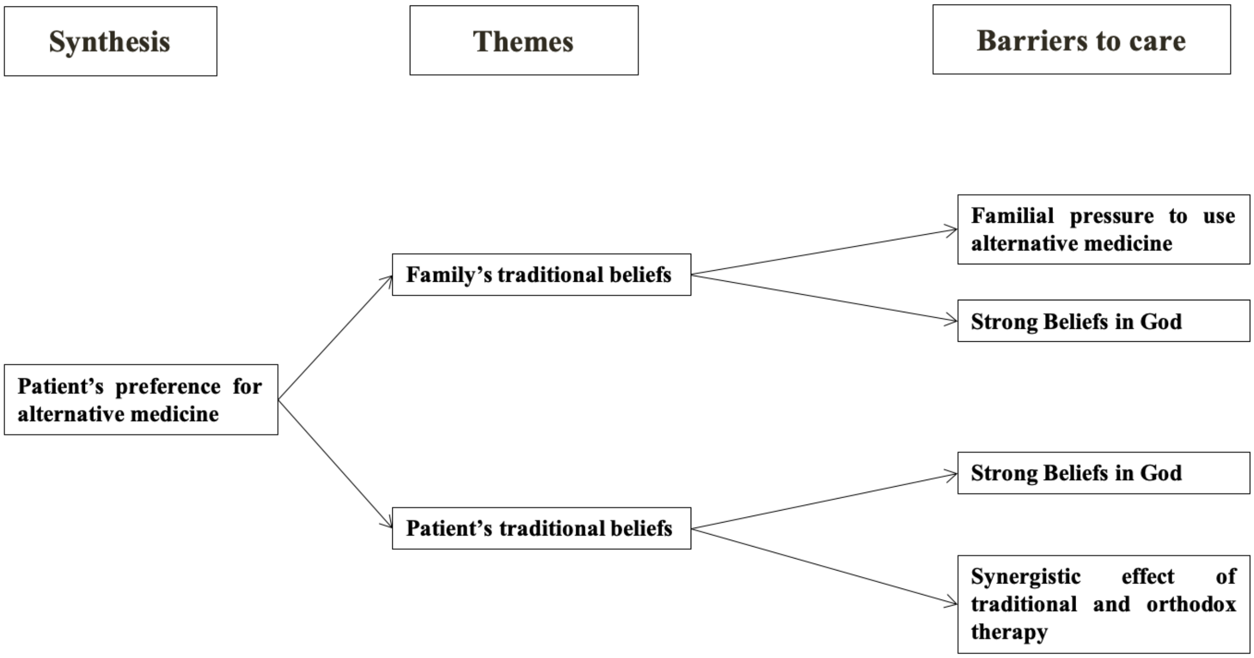


Figure 3: Results from the semi-structure interview: Patient's preference for alternative medicine

3.6 Discussion

Currently, the head and neck cancer burden in Sub-Saharan Africa is higher than anywhere else in the world. Not only do patients present to medical attention with locally advanced disease and distant metastases, but they are also younger than in any other part of the world [12-14]. Our recently published systematic review demonstrated that only three publications identified the barriers to care for this patient population, and none employed a qualitative design. In our opinion, this absence of qualitative data severely limits our understanding of the situation in Africa, as data is restricted to institutions and hence limited in clinical and social validity. Given this gap in the literature, we conducted this field study based on a theoretical framework with the intent of providing evidence-based information for future development and implementation. Dakar, Senegal was chosen as the setting for the study partly due to its relatively higher health care level within Africa, allowing it to offer medical services to most of its citizens, and even into neighboring countries. In fact, Senegal is one of the few countries in Western Africa with facilities allowing patients to receive multimodal treatment, including surgery, chemotherapy, and radiotherapy. Furthermore, no prior similar investigation has been performed in a French-speaking African country. Being based in Dakar, we expect that our patient sample will provide insights on H&NC patient experience applicable to the other French-speaking countries in West Africa.

Delays to Presentation

The first theme that was explored in the qualitative analysis was the patient misunderstanding of signs and symptoms of head and neck cancer. This theme has been widely described in the literature, and the information we gathered in this study proved highly comparable to what was described in our theoretical framework[6]. *(Figure 1)* Our results show poor patient comprehension of head and neck cancer in a population affected by the disease. Within the literature, insufficient knowledge of head and neck cancer was identified in three publications as statistically associated with delayed presentation, while level of education was the covariate in eight publications[7]. The aforementioned data comes from research based in Asia, but is also applicable to our context. In our population, patient misunderstanding of signs and symptoms of head and neck cancer may serve as a main factor fueling the delay in presentation.

When patients were asked to choose which factors had the most impact in delaying their access to care, 66% selected three barriers: cost of consultation (39%), waiting time at the doctor's office (15%), and distance to the healthcare facility (12%). *(Table 3)* Although already described in the literature, these barriers were not listed as the main limiting factors in the African literature based on quantitative studies alone. The cost of treatment was discussed in one publication from Nigeria, and distance from healthcare facility was listed in one article from Zimbabwe[15-16] - while the waiting time at the doctor's office was never described as being significant to the patient. Our qualitative data confirms those results as all three themes were widely discussed in our patient population. To these, we can add the cost of transportation as a main limiting factor. The cost of transportation served to delay care for the majority of patients, as it affected patients both with and without insurance. Cost of travel and availability of transportation are barriers associated with delayed presentation in two articles from India and Sri Lanka, but never in countries from sub-Saharan Africa.[2,18] It is fair to assume that cost of consultation and transportation, the waiting time at the doctor's office, and distance from the healthcare facility all contribute considerably to the presentation delay.

Lack of patient confidence in the medical system as well as the negative attitude of hospital staff were described in an article from Nigeria[15]. These barriers were identified in some of our patients, but they were low on the list of factors affecting presentation. Such factors must, however, be taken in consideration since they served as motivators for the use of traditional medicine, as described via our semi-structured interviews. Up to 30% of patients saw a traditional healer or a marabout for a second opinion when dissatisfied with the medical system. Even though most of our patients described using traditional medicine alongside treatment from a head and neck cancer specialist, the cost attributed to traditional medicine and specific familial beliefs threaten access to medical care. Moreover, studies show that the use of traditional medicine is associated with delayed presentation. [19-20]

Delays to Referral

In our series, 25 patients (76%) were either not diagnosed or misdiagnosed by their primary care doctor. Of them, 13 (39%) were not referred to a specialist. We learned from the interviews that some of these patients were treated and followed for months or even years for a benign diagnosis. Lack of referral to a specialist, multiple inadequate referrals and poor medical advice were all described in the literature as factors limiting access to care[7]. Lack of timely referral was shown to be statistically associated with a delayed presentation in India[17]. Our results are consistent with the literature, and we can assume that inadequate referral plays an important role in our population. Furthermore, most barriers to presentation can also be considered factors exacerbating referral delay.

Delays to treatment

Our data suggest that the costs related to transportation, consultation, hospitalization, and investigations are at the core of the problem. Some patients with public insurance have access to the consultation and hospitalization for a fraction of the cost [11], but are still unable to afford their treatments. The cost of treatment has been described in two publications, from India and Nigeria, but never statistically associated with delayed presentation in the literature [15, 21]. In our qualitative results, both the cost of the investigations and the cost of treatment were major factors in delaying the beginning of the treatment for this patient population. Furthermore, patients described waiting for months for the results of their investigations and for follow-up appointments. Furthermore, all patients were equally affected by the limited access to radiotherapy and the intermittent shortages of chemotherapy medication. These factors were not described in the literature and are factors specific to this population that need to be further explored.

Future Work

This is the first study to describe an evidence-based approach to identify barriers in access to care for patients with head and neck cancer in a low- and lower-middle income country. This approach is based on a previously described framework, and can easily be repeated in other low- and lower-middle income countries. Furthermore it fulfills the requirement of the World Health Organization National Cancer Control Programmes by generating an evidence-based description of the situation while integrating the results in the sociocultural aspect of patients' lives[7]. Additionally, it provides insight into this specific population in Dakar and will be used as a guide for the implementation of evidence-based strategies for early detection of head and neck cancer patients in this population.

Limitations

The questionnaire was developed based on the available literature, where no specific factors that delayed treatment were described. In this context, no section in the questionnaire was explicitly designed to address the treatment delay, focusing rather on presentation and referral delay. Therefore, most of the data related to the delay of treatment was gathered from the semi-structured interviews. In future studies treatment delay should also be addressed by gathering information from local healthcare practitioners and head and neck cancer surgeons. During our field study, we obtained such material via semi-structured interviews with the local staff, but decided not to combine information from this dataset as the study methodology differed.

We have defined referral delay in the questionnaire as either under or over three months. Within the literature, three months is the most commonly used definition of a late presentation. However, there is no real consensus on the length of time that defines delayed presentation.[8,22]

3.7 Conclusion

This is the first work that describes an evidence-based approach to identify the barriers in access to care for head and neck cancer patients in sub-Saharan Africa. This study advances our understanding of the barriers to care for head and neck cancer by describing factors affecting all three types of delays. It provides insight into a specific population in Dakar, Senegal, that will be used as a guide for the implementation of strategies for early detection of head and neck cancer in this patient population.

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CHAPTER 4 : Discussion

Cancer is now a major public health concern in low- and moderate-income countries[1]. Head and neck cancers play a definitive role in this burden and its importance cannot be overstated. Now described as the 7th most common cancer worldwide, it has been found to be the most common cancer type in male in Sri Lanka and India[2-3]. Currently in Sub-Saharan Africa, head and neck cancer patients are presenting late, with more advanced disease and a greater frequency of distant metastasis compared to the rest of the world[4-7]. The delayed presentation of head and neck cancer patients represents a true challenge in terms of treatment for local head and neck surgeons. This challenge is exacerbated by the vastly limited resource setting. Although strategies have been put in place to facilitate early diagnosis and prompt treatment in countries like India[8], no such structures exist in Sub-Saharan Africa. As described as part of the National Cancer Control Programmes from the World Health Organization, the first step towards the implementation of an organized structure is an in-depth analysis of the current situation[9]. In this context, the objective of our project is to identify the barriers in access to care for patients with head and neck cancer living in Sub-Saharan Africa.

4.1 Chapter 2

The first chapter of this thesis presents the results from a systematic review of the literature performed to identify all the barriers in access to care described for low- and moderate-income countries. This provided the initial framework needed to approach the research question. To incorporate all data from the literature, we chose to perform a mixed-methods systematic review with both quantitative and qualitative results.

Our first observation was the paucity of the results for the African continent. The sub-Saharan African population is known to have a substantial burden of head and neck cancer but was represented with only 3 articles. Our second observation was the absence of qualitative material in the literature from Africa. In fact, results from India were complemented by qualitative data allowing a deeper understanding of the patients' reality. Such data was not available in the African literature, thus contributing to the paucity of the results. Finally, we listed in chapter 2 all barriers to care that are described in the literature and organized them in an orderly fashion to understand their possible impact on the patients. *(Chapter 2- Online supplement) (Chapter 2- Figure. Synthesis of Qualitative Data).*

Even though the validity of this work is limited by the low level of evidence of the different studies it includes, it still provides very valuable key elements to perform an evidence-based field study. Firstly, barriers to care identified were used to create a questionnaire specifically tailored for our population. Secondly, qualitative methodologies were studied and contributed to the development of key questions and prompting material for the semi-structured interview. Lastly, the qualitative meta-synthesis was used as a theoretical framework to analyze the newly acquired qualitative data using a deductive approach. *(Chapter 2- Figure. Synthesis of Qualitative Data)*

4.2 Chapter 3

Chapter 3 presents the results obtained during the field study that took place from May to August 2018 in Dakar, Senegal. After formal consents were obtained, head and neck cancer patients participating in the study engaged in a semi-structured interview followed by an interviewer-administered questionnaire with the goal of identifying the barriers in access to care. The results were presented using the three types of delays as described by the World Health Organization: presentation delay, referral delay, and treatment delay.

Presentation delay

The average presentation delay for our population is 5.7 months. The literature from Africa shows a wide range of results with delays being on average between 1.6 and 9 months[5,10]. Furthermore, Masiiwa *et al* described that 53% of their patient population had a presentation delay between 3 months and 1 year. Our result falls within what would be expected for a population in Sub-Saharan

Africa but is significantly superior to what has been described in the Indian literature with delays varying between 2 and 3 months in 5 different articles[11-15].

As demonstrated in Chapter 2, the factors affecting the presentation delay are numerous (*Chapter 2- Online supplement*). The complexity of identifying the main factors cannot be overstated and is a major limitation to the scientific advancement on the subject. The psychological and emotional response to illness and the social and environmental determinants are all part of the equation. In this context, the approach for the investigation has to be a multidisciplinary one. In an effort to better depict the clinical and social events, some authors subdivided the presentation delay in appraisal time, illness time and behavioral time[16]. The appraisal time was defined as the time before the patient infers illness after the beginning of symptoms, the illness time is the time needed to seek medical help and the behavioral time is the time needed to schedule the appointment. These definitions are occasionally used in the literature and they add to the complexity of the data without enhancing their clinical significance. In the interest of simplicity and to allow for better reproducibility, we organized our information using the approach developed by the World Health Organization and merged all those factors into one category: Barriers to presentation[16]. However, understanding the many social, psychological and environmental factors is key. This is why a meta-synthesis of the qualitative data was performed in Chapter 2. We think that comprehensive interviews with patients during the field study are needed to generate valid and exploitable data.
From our results, the misunderstanding of signs and symptoms of head and neck cancer, the cost of consultation and transportation, the waiting time at the doctor's office, and the distance from the healthcare facility all contribute significantly to the presentation delay. Misunderstanding of signs and symptoms in the study population can be widely subdivided as presented in Figure 1 of Chapter 3 and is supported by the literature as described in Figure 1 of Chapter 2. Furthermore, we can point to the fact that the insufficient knowledge of head and neck cancer, the access to primary healthcare and the cost of travelling were listed among the 7 most common factors delaying access to care in the systematic review as shown in *Table 1.*

Referral delay

In our series, 61% of patients were diagnosed with head and neck cancer more than 3 months after their first presentation to a medical professional. Referral delays themselves are not well described in the literature and this shortage of data can be explained by a multitude of factors. First of all, there is a lack of uniformity in how authors present their data and most results from the systematic review were not easily interpretable. Furthermore, it is safe to assume that a wide variability exists depending on the inner structure of the health system, and once again, the definition used for this type of delay. However, the causes behind the referral delay (also named professional delay) are widely discussed in the literature from both Asia and Africa. Onyango *et al.* described that the multiple referrals and the wide variability in the ability of primary care physicians and dentists to diagnose head and neck cancers were major factors exacerbating the problem[5]. Accordingly, Massiwa *et al.* suggested that continuing medical education is of primary importance to fight against the lack of awareness and the failure to recognize the key symptoms of the disease in the medical community[18]. Our results are in accordance with the literature and re-emphasize the lack of referral and the misdiagnosis as being central constituents of the problem. Furthermore, the qualitative information obtained during our interviews helped us understand the pattern of referral and gave us examples of misdiagnosis for certain pathologies that will be used for further medical education in the Senegalese community.

Treatment delay

Treatment delays are not well described in the literature. In fact, no specific barriers to treatment were added to the questionnaire due to the lack of data. However, in our study many factors that were found to have an impact on the presentation delay were also contributing to this third type of delay. Consequently, our semi-structured interview opened a wide range of local difficulties that varied from the lack of transportation to the shortage of chemotherapy agents.

One thing that the study brought to light is the fact that the treatment delay can be viewed as either institution-related or patient-related. Patient factors delaying treatment are often the same barriers that have been described as part of the presentation delay. In fact, patients that are not able to pay for transportation will not be able to afford the cost of investigations or treatments thus exacerbating the treatment delay as well. Patients who cannot travel the distance to get an initial consultation will not be able to attend their radiotherapy treatment for the same reason. The other factors are institutional and add up to the difficulties encountered by the patients. As described in Chapter 3, the waiting time for pathology results, the dysfunctional radiotherapy equipment, the shortage of medication and the unavailability of beds are all institutional factors affecting treatment delay.

4.3 Limitations

The limitations of this work are a combination of what has been described earlier in Chapter 2 and Chapter 3. First of all, the structure of this thesis is based on a literature that has a low level of evidence. Chapter 2 is a systematic review that showed overall poor-quality articles with heterogeneous data limiting the validity of the results.

Another limitation to this study is our patient population. Dakar was chosen for the ability of the health care system to offer medical treatments to most of its local Senegalese population. Furthermore, their organized medical system and the availability of specialized care allow the local health system to support the care for people from many neighboring countries. By looking into this population, we were hoping to get a sample that is representative of the situation in sub-Saharan Africa. Even though it would have been ideal to collect data from different cultural backgrounds to reinforce the external validity of our results, it was not feasible for the project to cover multiple sites in Western Africa or in sub-Saharan Africa. As a result, our data emerges from a population where patients were all Senegalese (91%) or Guinean (9%). However, the framework that has been developed through our systematic review is based upon information gathered from both African and Asian countries and should be applicable to most low- and middle-income countries. Furthermore, our results, as well as adding to the African literature, reinforce some concepts that were widely discussed in the Indian literature.

4.4 Recommendations

The objective of this thesis was twofold. First, Chapter 2 was intended to create an evidence-based framework to identify the barriers in access to care for head and neck cancer patients in low- and middle-income countries. Second, the objective of Chapter 3 was to provide an insight into a specific population in Dakar, Senegal, and to use the information as a guide for the implementation of strategies for early detection of head and neck cancer in sub-Saharan Africa. By including data from all low- and moderate-income countries published in the literature, we intended to facilitate future work on the subject around the globe. We hope that this framework can be used as an inspiration for other research groups working on the field in any low- and moderate-income country.

In chapter 3, many different targets have been identified. For example, cost of transportation and unavailability of transportation are factors that are globally affecting patient care. Not only are they affecting every single type of delay but they are also having an impact on all patients independently of their insurance status. This could be considered an interesting target for the reduction in delays in access to care and could be added to already existing programs like the *Plan sésame*[19]. On a more global aspect, misunderstanding of signs and symptoms of head and neck cancer could be addressed by broad-based education campaigns. The misdiagnosis and the referral delays could be limited by promoting continuous medical education for primary care physicians or by supplementing the medical curriculum with clinical concepts related to head and neck pathologies.

Most importantly, and before making any recommendations, this work should be shared and thoughtfully discussed with people who have to face these challenges every day. Head and neck surgeons, primary care physicians, nurses and health care professionals working in low- and middle-income countries should be considered as real experts and this work is only here to give them a voice.

Finaly, this work was developed to look into a specific group of patients suffering from a non-communicable disease: cancer. However, the data obtained also represents the factors affecting the lack of access to appropriate medical care in a much broader context. In fact, it complements and reiterates a strong preexistent literature on non-communicable and communicable diseases. Factors affecting access to medical care have been discussed for years in the world of medical anthropology and ethnography. Literature has defined poverty as the main limiting factor in accessing care[20]. In fact, Paul Farmer stated: “Poverty is the great limiting factor of freedom. Indeed, (…) poverty is a far more important contributor to HIV risk than is ignorance of modes of transmission or “cultural beliefs” about HIV.” [20] This being said, the multiple factors described within this thesis are in fact related to this most relevant cause that is poverty. It is only by reversing the long process of impoverishment of these populations that inequality and poverty can be addressed.

4.5 Conclusion

Firstly, we developed an evidence-based approach to identify barriers in access to care in low- and middle-income countries throughout the world. This framework has now been described in the literature and is available to anyone wanting to study these barriers in a specific population. Secondly, we performed an on-site data collection in a community of head and neck cancer patients from Dakar. In this community, the delay to presentation to care was mainly attributed to the cost of consultation, the waiting time at the doctor’s office, and the distance to a healthcare facility. The referral delay was exacerbated by misdiagnosis and lack of appropriate referral. The treatment delay was shown to be caused by limited treatment capacity as well as cost of treatment. Transportation cost limiting access to medical consultation, investigation and treatment was described as having an impact on all types of delays by patients.

This mixed method study using both quantitative data and qualitative data coming from head and neck cancer patients in a low-income country is a first step towards the understanding of the access to care for this specific patient population. Future work is needed to further define cost-effective strategies for early detection of head and neck cancer in low- and lower-middle income countries.

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APPENDIX 1

Figure A. PRISMA flowchart of articles screened and included as partof the systematic review

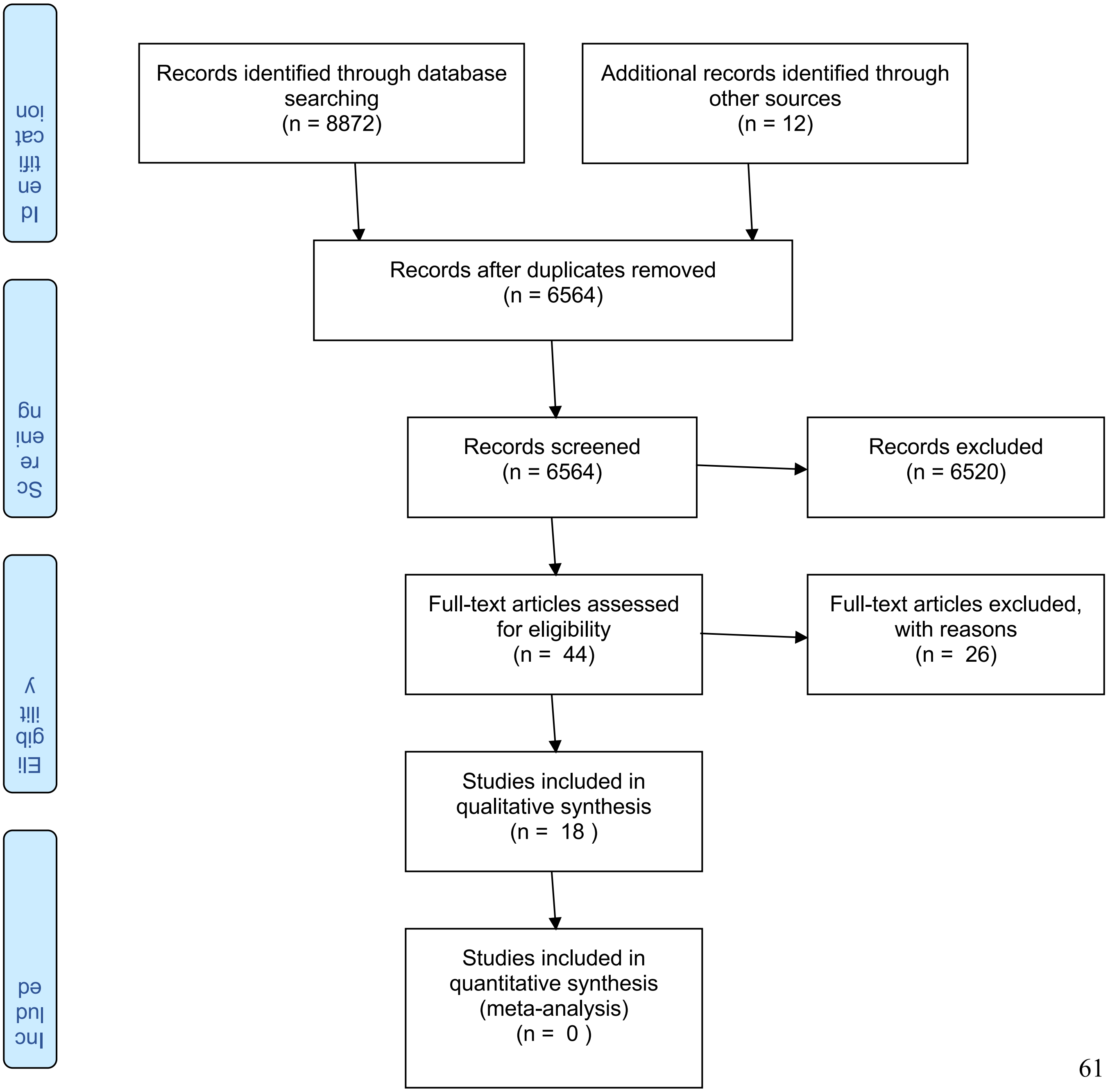

Table A. Barriers to care associated with delayed presentation

Factors investigated **Articles**	1	2	3	4	5	6	7	9	10	11	12	13	14	15	18
Older age group		▒	■											■	■
Gender (male)		▒													■
Gender (female)														■	
Stage of tumour		▒												■	
Marital Status															■
Literacy/ education	■	▒		■	■		▒		■	■			■	■	■
Socio-economic status/ Household income	■	▒	■					▒			■			▒	■
Access to primary health centre[a]	▒						▒				■				
Health-seeking behaviour[b]	▒		■					▒			▒				■
X Rural background		▒	■												
Insufficient knowledge of H&NC[c]			■		■			▒			▒	▒		▒	■
Interpreting symptoms as “minor” or “not attributed to cancer			■												
Absence of fear			■												
Cost of travelling/ Availability of transport				■		▒				■					
Cost of staying near the cancer centre						▒									
Cost of the treatment						▒	▒								
The need to get back to employment/family duties						▒									
Self-medication							▒	▒							
Poor medical advice							▒	▒							
Traditional and religious beliefs							▒							▒	
Attitude of hospital staff							▒								
Lack of confidence in orthodox therapy							▒								

Denial of disease/fear of coming to hospital								▨							
Patient's fate										■					
Escorted by someone[d]										■					
Knowledge that tobacco cause cancer[d]										■					
Regular visit to doctor in the past 12 years[d]										■					
Availability of transportation										■					
Tired of treatment										■					
Family's tension due to long treatment										■					
Though the tumour would resolve											▨				
More than 2 visits in a primary care before specialist consultation											■				
Though it is not a serious disease												▨			
Lack of direct referral to specialists[e]												▨		■	
Treatment with unspecified medication												▨			
Education status of patient caretaker													■		
Disbelief														▨	
Fear of diagnosis of cancer															▨
Fear of surgery															▨
Presenting complains of the patient															■
Addictionto Gutka, Naswar and Paan															■

■ : Barriers that have been statistically associated with a delayed presentation

▨ : Barriers that have been identified but not statistically associated with delayed presentation

[a]: Proximity of health care facility

[b] : Alternative Medicine / Consulted unqualified local practitioners / Practiced alternative medicine / Use of alternate therapy / Patients' visit to quack / Traditional Healer /Hakeem, Spiritual healer or a doctor in locality

[c]: Awareness, Ignorance

[d]: Positive association in the literature

[e]: Multiple referral/ Inability to institute urgent referrals/ time for referral

Table B. Barriers to Care Identified from Qualitative Material

Articles	#	Barriers	Quotes
Fles[8], 2017	1	**Some did not realize that delaying the diagnosis could worsen the disease**	"[...] if I would not have waited, but went straight to the dr. S*** hospital, I would still be like this [...] " (Patient ID 4)
	2	**Patients did not recognize the first symptoms of NPC**	"At first, I had a headache, I was dizzy and all the bones in my left side from the bottom are painful; then my son told me to go check it in the hospital". (Patient ID 6)
	3	**Symptoms considered harmless: they did not hinder the daily activities**	"I had a small mass in my neck, more than one year ago [...] I regularly had blood in my sputum and a headache,but I did not think that was serious." (Patient ID 5)
	4	**Lack of knowledge**	"I never heard of NPC before [...] even my doctor was surprised [...] I was just shocked". (Patient ID 7)
	5	**Negative experience with healthcare systems resulting in barrier to seeking medical help**	"I went for 8 times to dr. S*** hospital [...] until all papers were complete. I was there until I fainted [...] we had to go there and there". (Patient ID 7)
	6	**Physicians unaware of disease resulting in misdiagnosis and time-consuming referrals**	"I was diagnosed with a bronchitis [...] after several months the lumps in my neck appeared" (Patient ID 8)
	7	**Long queues due to limited treatment capacity**	"For registration I had to wait for one to two hours [...] after I got the schedule for radiotherapy, I wanted the internist to tell about the schedule [...] I had to queue from the beginning again" (Patient ID 11)
	8	**Encountering more severe cancer patients, which frightened patients**	"There was a patient from B****; she had a blackened face, I'm only afraid I will get that too when I start radiotherapy". (Patient ID 3)
	9	**Medical costs**	"My health was decreasing [...] We would do everything to be able to pay for it [...] it was money from the family". (Patient ID 10)
	10	**Insurance does not cover transportation costs**	"About the costs, it is hard [...] but the cost to go there by bus is too much [...] For the treatment we now use BPJS, the insurance before only gave us a discount, but now we do not have to pay for the treatment" (Patient ID 3)
	11	**Perception that treatment and service is better if patients pay themselves instead of using insurance**	"I would like to pay no matter what, my son told me not to use BPJS they would treat us like less important". (Patient ID 9)

	12	**Fear of side effects, of chemotherapy, of radiotherapy**	“I’m afraid of cancer…. I am afraid that I would die.” (Patient ID 11)
	13	**Patients start with traditional and alternative medicine**	“I don’t know the names of all the herbs; knowledge is inherited from previous generations [...] I’m using alternative treatment because I just want to be cured. Besides that, it is more affordable”. (Patient ID 2)
	14	**Dominant role of doctor instead of partnership communication style**	“I do want to know more clearly, well, because I am only a patient so I keep quiet [...] maybe if I asked something, the doctor would be offended.” (Patient ID 10)
	15	**Strong beliefs in God**	“I am not afraid, the most important thing is that I totally surrender to have this illness, hope God will take it away”. (Patient ID 10)
Rath[16], 2018	16	**Waited for Spontaneous recovery**	[…] I was not having serious problem, and waited for the wound to go spontaneously (Patient ID 1)
	17	**Painless nature of the symptom**	[…] I never had pain […] as the size of the wound was increasing […] I consulted a doctor […] (Patient ID 16)
	18	**Ignorance about oral cancer**	[...] when I felt burning in mouth, I thought it maybe effect of lime […] I take pan […] (Patient ID 67)
	19	**Lack of perception of seriousness**	[…] many times, I get ulcer in mouth, it comes and goes […] I didn’t take it seriously (Patient ID 26)
	20	**Attitude**	Some discomfort was there in my gum, I didn’t feel like going to doctor for such a small problem (Patient ID 22)
	21	**Hiding symptom**	It started paining […] I didn’t tell my children, the mother is not present, children are busy in their world, I have become old […] anyway I have to go one day […] god will see […] whatever he wishes will happen (Patient ID 33)
	22	**Believe in god**	[...] slowly the pain started increasing, I thought I never harmed anybody, why god will punish me […] in my life, I have never felt fever also […] (Patient ID 27)
	23	**Perception on health care system**	[…] in hospital, doctor doesn’t look at the face […] writes a long list of investigations […] I don’t believe these doctors […] (Patient ID 43)
	24	**Distance of health care system**	In my village, not a single doctor is there […] ten kilometers far a hospital is there […] in that doctor doesn’t stay always […] whom to show (Patient ID 20)
	25	**Misdiagnosis**	[…] I went to a dental clinic, the dentist did extraction, and took 100 rupees […] but the wound didn’t heal (Patient ID 28)

	26	**Improper referral to appropriate center**	**[…]** I didn’t get relief, so the doctor referred me to district hospital […] I took medicine from that doctor, didn’t get any benefit […] one of my friend told me to show in this cancer hospital […] (Patient ID 30)
	27	**Type of health-care provider visited**	[…] nobody in my family take allopathic medicine, so I showed to homeopathic doctor in my village (Patient ID 21)
	28	**Non-availability of diagnostic facility**	[…] doctor in our village hospital told my son to go to Cuttack as test can’t be done here […] (Patient ID 9)
	29	**Finance**	[…] the doctor referred me, but I reported late as it took some time to arrange money […] (Patient ID 4)
Subramanian[17], 2014	30	**Financial**	“As long as [the patients] are in the hospital, they take medicines [...] but when they go back to their villages, they may not want to spend the money to buy the medicines, or those medicines may not be available in their village.”
	31	**Lack of education**	Because of this, teaching patients about the importance of prevention, screening, and treatment is difficult.
	32	**Stigma and fear**	Interviewees reported that patients experience a range of emotions, including depression and anxiety, because of the cancer. Lack of support from family and friends can compound these problems.
	33	**Shortage of staff and facilities**	“The doctors don’t [...] spend sufficient time with [patients] since K*** is a government hospital and is overcrowded.”
	34	**Use of traditional healers**	Patients may opt for these modalities because the practitioners are local and the waiting times are shorter. However, [they] have not been formally trained in how to screen and treat cancer

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APPENDIX 2

Table A. Attitude towards disease having an impact on presentation delay in the H&NC patient population of Dakar, Senegal

Attitude towards disease	N (%)
I didn't think what I had could be serious	30 (91)
I didn't know what I had could be cancer	29 (88)
I was waiting for my symptoms to go away on their own	22 (67)
I wasn't afraid of being sick	20 (61)
My symptoms didn't cause me any pain	18 (55)
I didn't want people to know I was sick	18 (55)
I was afraid of the side effects of potential treatment	18 (55)
I didn't have medical insurance	17 (52)
I was afraid of a potential diagnosis of cancer	16 (48)
I didn't think anything could be done to help my condition	16 (48)
I was afraid of surgery	15 (45)
I was afraid of meeting people that were sick	12 (36)
I had a past negative experience with healthcare	10 (33)
I don't like the attitude of the healthcare staff	8 (24)
I have a lack of confidence in the healthcare facility	8 (24)

Qualitative Results from the Semi-Structured Interview

The qualitative material was analyzed using a deductive approach based on a previously published theoretical framework[1]. This framework described a series of barriers to care based on the following three main statements:

1) Population misunderstanding of signs and symptoms of H&NC
2) Inability to access care
3) Preference for alternative medicine.

The themes identified in the semi-structured interview have been described and summarized based on the above three main statements. Below is a complete analysis including patient statements from the transcriptions.

1. Population misunderstanding of signs, symptoms and consequences of H&NC (Figure 1)

Population misunderstanding of signs and symptoms of H&NC is an extremely large category, encompassing a wide range of barriers. In this qualitative analysis, it has been divided in three main themes which include patient attitude toward disease, patient ignorance of H&NC, as well as physician ignorance of H&NC.

1.1 Patient attitude towards disease

Patient attitude towards disease is a theme that incorporates a wide range of barriers in access to care. First, patients described that they considered the symptoms to be harmless or that they were waiting for a spontaneous recovery.

> *« We didn't know it was that [cancer], we thought it wasn't bad. That's it. They gave me lozenges for my voice, to soothe it, but nothing […] It got tired quickly. »* ***(MN)***

Other patients, who were unaware of the severity of their symptoms, hid these symptoms or avoided medical care on the basis of both personal and familial fears. One patient, who preferred hiding his symptoms, mentioned:

> *«No, no, that… you know we're African. If you're sick with something you don't have to always say I'm sick with this or that everywhere »* ***(IS)***

Another patient who has avoided surgical care for more than 1 year said:

> *« I returned home. Because I was afraid of the operation. »* ***(SS)***

1.2 Patient ignorance of H&NC

The majority of patients do not believe that their symptoms could be caused by cancer, and rather think that they are suffering from long-lasting viral symptoms. Whereas, other patients associate these symptoms to chronic illnesses they have been suffering from for years. For example, this patient thought the progressive dysphonia and dysphagia she experienced was due to a recurrent thyroid nodule that was treated with a total thyroidectomy over 10 years ago. After presenting with a stage 4 laryngeal cancer, she stated:

> *«I thought I was finished with voice problems, up until that they had told me after my second operation, they told me they took out all the sickness. »* ***(FS)***

1.3 Physician ignorance of H&NC

One of the biggest challenges that patients have to face is the lack of health care practitioner knowledge of H&NC. The aforementioned has been documented within the literature by two recurrent barriers that are ***improper referral to an appropriate health center*** and the ***misdiagnosis***. Even when patients attempt to receive treatment for their disease, their symptoms are often misinterpreted or trivialized. In many of the cases, the inadequate initial diagnosis can drastically exacerbate the delay before the proper diagnosis and treatment of the H&NC. For example, this patient who presented with a stage 4 laryngeal cancer mentioned that he had been followed for 8 months before referral:

> *"First off, our doctor from work followed me. He gave me a treatment for anti-reflux and anti-allergy pills starting October 2017 to May 2018, but nothing improved. »* ***(DB)***

Lack of referral or inappropriate referral is also part of the delay system. For example, patients with stridor secondary to advanced laryngeal tumors are referred to respirology with a working diagnosis of asthma. Similarly, patients with oral cavity cancers are often sent from one dentist to another trying different local treatments. One patient mentioned:

> *« No, because every time it hurt, we went to the dentist to be examined, and also to try to tighten, properly attach, and set the dentures. [..] But after, we didn't go back, we went to see another dentist, this one told him to go straight to the stomatologue. »* ***(EB)***

2. Inability to access care (Figure 2)

Inability to access care is one of the three main statements identified and is itself comprised of themes of inability of patients to be evaluated or treated in medical centers. There are three themes at the root of inability to access care: cost, long waiting time due to limited treatment capacity, and inability for patients to leave their work.

2.1 Cost

The different barriers that have been discussed in relation to financial burden are medical cost, transportation cost, as well as the fact that insurance does not cover transportation or medication fees.

Medical cost encompasses a wide range of expenses, ranging from the cost of the initial consultation to the cost of the treatment or hospitalization. Patients described this financial hurdle as being one of the main factors limiting their access to care. A patient's sister described the following:

> *« The first time it was the lack of money, that's why she couldn't go to the hospital from the start. She stayed at home for a month [...] the main factor that made access difficult was the cost [...] it was the price of consultation. »* ***(AB)***

Furthermore, the cost of each investigation adds to the final charge and can require a significant time delay to gather money necessary to pay, which can have a significant impact on the treatment delay. This patient, for example, stated:

> *« It was long – it took 7 months before having all the results. You have to pay. It took long putting together money to pay. »* ***(GD)***

Patients also mentioned the cost of transportation as being significant, mostly when the treatment required multiple visits like in the case of multimodal therapy. Even patients with insurance were limited in their access to care by the cost of transportation.

> *« Hospitalization? I had coverage, so it was reduced. But transport, that's expensive. They don't give you money for a car. We only take taxis to get here. »* ***(AY)***

With insurance, some patients are able to afford the hospitalization or surgery required in the treatment of their disease. However, the same patients are not necessarily able to afford their chemotherapy or radiotherapy if it is not covered by insurance.

> *«No no no, because chemotherapy, insurance doesn't cover that. Chemotherapy, here it's the patient that pays his own bills. These bills are excessively expensive. »* (***FSD)***

2.2 Availability of treatment

One of the main limiting factors that was described by the H&NC population, was the long waiting time for investigation. For example, patients waited months to get their initial workup completed. Biopsy results, which had a delay up to 3 months, were frequently described as being the main limiting factor in treatment. This patient described a delay of 8 months between her first appointment with a cancer specialist and the hospitalization for her surgery:

> *«You are there one day, and we tell you the investigation, the appointment is in two or three weeks. The endoscopy, the appointments, they also take two or three months. The wait is several months. »* ***(FS)***

This patient described the waiting time in regard to the biopsy.

> *« No, more than 3 months. It's the appointment too. In any case, I know that what we really have as a problem, is a delay problem. Really, it's a problem of delay. »* ***(AD)***

The delays described above are also exacerbated by the lack of access to multimodal therapy. In our results, all patients were equally affected by the limited access to radiotherapy. Access to chemotherapy was also limited in the context of intermittent shortages of medication.

Patients stated:

> *« To do it (radiotherapy), they told me the machine wasn't working […] you can go to Morocco to do radiotherapy. But month after month, the machines are here (in Senegal), but don't work. Apparently, these machines were bought and installed over a year ago… »* ***(IF)***

> *« Yes! And then! I had… let's say I did three treatments. When I there the three treatments, there was almost two and a half or three months where the medication where not here in Senegal. The medications where missing for three months. When they got them back, I restarted chemotherapy. »* ***(IS)***

3. Preference for alternative medicine (Figure 3)

The preference for alternative medicine was an ongoing theme that permeated throughout our investigation. This preference can be approached by looking at the beliefs of the patient himself, or the traditional beliefs of the family that are imposed on the patient.

3.1 Familial traditional beliefs

In some circumstances, patient will decide to use traditional medicine or care from spiritual healers as a first line of treatment when it is deemed not appropriate by the family to seek care through the medical system. As an example, this patient decided to treat himself with traditional medicine because his family would not allow him to pursue the investigation with his ENT doctors in the fear that it would lead to surgery. The patient mentions:

> *« It was my mom who told me, if I did the surgery there, […] I wouldn't be allowed to talk to her in life or in death, so I accepted that I'm doing that. »* ***(IF)***

He explained the perception of the surgical treatment in his family and justified that every treatment possible had to be tried before accepting the surgery, referring in this case to the prior use of traditional therapy.

> *« Because if there's a cause, for operations… in Senegal and in Africa, operations are like butchering and death. This is enough, that most people don't want interventions, it's a last resort, they want to try everything else first. »* ***(IF)***

3.2 Patient's traditional beliefs

Some patients will also describe using both systems at the same time to make sure they are treating different aspects of the disease based on their personal belief. Those patients believe in the synergetic aspect of both therapies. However, in certain circumstances, the use of traditional therapies caused a significant presentation delay as was seen with this patient:

> « *I often went to the traditional healer, at the same time as going to the hospital […].*
> *Yea, between the start of my sore throat and the visit to the doctor […] I saw the*
> *traditional healer for almost 6 months.* » ***(SS)***

Most patients will describe using both systems at the same time. However, in this patient, further questioning revealed that he had used traditional medicine for 6 months before presenting to a medical doctor. Many patients mentioned how easily accessible traditional medicine was. The traditional healers, or marabout, are often well integrated in the community and in families. They offer different services and home-based treatment. They can adapt their prices to what the patient can afford and thus create a therapeutic alliance that might last for months or years. However, some patients described spending a great amount of money in traditional recipes that limited their ability to afford medical care subsequently. In 2 different cases, Marabout suggested avoiding medical care but most patients still described both approaches as being compatible and in some cases synergistic. One of the patients interviewed was working as a healer himself and declared using the medical system as a first line of treatment and did not see any contradiction in using both systems concomitantly. In other cases, the patient would describe using traditional medicine or spiritual healers when they felt the medical system had failed them.

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