The Effect of the Distance Between Dental Structures and Localities on Preventing Periodontal Diseases in Senegalese Rural Population

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To cite this article:
Faye Daouda, Kanouté Aïda, Diop Mbathio, Lo Cheikh Mbacké, Diouf Massamba, Cisse Daouda. The Effect of the Distance Between Dental Structures and Localities on Preventing Periodontal Diseases in Senegalese Rural Population. *Science Journal of Public Health.* Vol. 4, No. 5, 2016, pp. 381-386. doi: 10.11648/j.sjph.20160405.13

Abstract: The objective of this study was to assess the effect of the distance between dental structures and localities on the access of preventive measures and periodontal diseases prevalence, by conducting a descriptive, cross-sectional and analytical survey on 2,254 people living in rural areas. Epi Info version 3.4 software allowed us to make a census of the data. A logistic regression analysis was used to identify factors associated with dependant variables. Word, Excel, SPSS software were used for data analysis and table presentations. The study showed that dental services are located more than 50 kilometers from the homes of at least 52% of the population; care is expensive for more than 75% of the population; fluoride toothpaste, which is inaccessible and unavailable (52,8%), is often replaced by the chew stick (92%) and 53.6% more than twice daily. In addition to the inaccessibility of toothpaste in rural areas, more than half of the population (52.8%) does not brush their teeth. This may be a major cause of the high prevalence of oral disease found in this study. The frequency of oral diseases is high (96,5%), half of the population (49.6%) had deep periodontal pockets, however 12.8% had tartar and 2.4% bleeding gums. This table shows that it is important not only to facilitate access to dental facilities but also to develop information, education and communication (IEC) strategies. An oral health policy focused on rural areas is necessary with the integration of indicators such as the availability and accessibility of fluoride toothpaste, the creation of a minimum service package in rural areas.

Keywords: Distance Dental Structures and Localities, Preventive, Periodontal Diseases, Rural Population

1. Introduction

Oral diseases are not necessarily life threatening, but they represent a serious public health problem because of their high prevalence, their seriousness, and the public demand for services due to their impact on the individual and on society. According to the WHO, at least 80% of the global population suffers from oral disease, 80% of who live in developing countries such as Africa [1]. These oral diseases are especially linked to unfavorable socioeconomic conditions in disadvantaged social groups. The fight against these diseases makes a significant contribution towards improving the quality of life of populations [2]. It follows a pyramidal organization in 3 levels: central, intermediary (regional) and operational. The 3rd level, operational, consists of health centers, posts and hubs [3]. The latter provide support for rural populations and lack oral health services, located mostly in national, regional and local health centers in urban areas. Thus Senegal has 27 hospitals, 105 health centers and 200 private clinics, all located in urban areas. Rural areas therefore lack oral health services despite the fact that more than half of the Senegalese population (60%) lives there [4]. The oral health services are situated far from the rural population, and the interventions are barely accessible to most communities due to constraints related to their socioeconomic situation. In this context, can we expect to improve oral health in these areas despite the investment in structures in urban areas? The aim of this paper was to

contribute to the promotion of oral health in rural areas through the identification of risk factors.

The objective of this study was to assess the effect of the distance between dental structures and localities on the access of preventive measures and periodontal diseases prevalence.

2. Methods

2.1. Type of Study

This was a descriptive, cross-sectional and analytical study on a rural population in Senegal.

2.2. Study Duration and Period

It took place over nine months from March 15 to December 15, 2014.

2.3. Sample

The size of the sample was calculated according to the Schwartz formula

n = pq /i² = standard deviation =1.96

risk of error = 0.05

p = percentage of the rural population with access to oral health care = 50%

q = complement = (1-p) = 50%

I = precision = 5% = 0.05

These parameters resulted in a sample of 384 individuals. For more accurate results, we increased the sample size to 400 individuals. To reduce the cluster effect for sex, the sample size was multiplied by 2.5 which gives 1,000 individuals and patient age was multiplied by 3. In total, the sample size was increased to 2,200 people to reduce the cluster effect. To factor in the potential loss of files, we brought it to 2,254, which is the overall size of our sample.

Senegal has 14 similar regions in terms of the size of the rural population. This is the reason why 160 people were surveyed in each region, which results in a total of 2,254 people.

2.4. Selection Criteria

The study focused on adults of both sexes, aged 18 years or under and living in selected rural communities. Any person visiting the locality and/or any person living in the locality aged less than 18 years was excluded from the study.

2.5. Data Collection Procedure

Data collection was carried out by 3 teams, each made up of 2 dental surgeons and one final year student. Each team had:

- 5 examination trays (dental explorer, mirrors);
- 10 tweezers to pick up the instruments;
- 5 pariodontal probes;
- 3 stainless steel boxes for the instruments used including a container of soapy water, a second containing antiseptic product for disinfection and a third filled with pure water to rinse the instruments;
- cloth towels to dry the instruments;
- disposable gloves and safety glasses.

The questionnaire was administered directly.

The objectives and the importance of the study were explained beforehand. The form was tested beforehand on around ten people, which made it possible to observe the reaction of respondents to the study in terms of estimating the time needed and any questions that were not clear. Any difficulties or ambiguities encountered were corrected before the final survey.

To determine periodontal health, the Community Periodontal Index of Treatment Need (CPITN) was used. This classified the subjects examined into 5 categories of dental needs in a simple, objective and quick manner. The clinical criteria were the presence of pockets, tartar and bleeding (investigated by the gingival sulcus survey). In descending order of severity, the scores related to periodontal health were noted.

4 = cul-de-sac greater than 6 mm, the black areas of the probe are invisible.

3 = cul-de-sac between 4 and 5 mm: gingival edge at the height of the black areas of the probe.

2 = tartar detected during the survey, the black areas are completely visible.

1 = bleeding observed with a mirror.

The information to collect concerned:

- Demographics: they concern sex, age, occupations;
- Distance between facilities and communities;
- Consultation with a traditional healer, self-medication, dental clinic attendance
- Use of preventive measures: toothbrush and chew stick.
- Periodontal health: this involves examining oral hygiene and periodontal problems which consisted of determining whether or not the gums were bleeding, the possible presence of tartar and the measurement of existing periodontal pockets;

2.6. Data Analysis

The Epi Info version 3.4 software allowed us to make a census of the data. Word, Excel, SPSS software was used for data analysis and table presentations. The results were expressed as a number (n) and percentage (%) for qualitative variables and as a mean for quantitative variables. A comparison of percentages was carried out using the chi-squared test. The significance threshold was set at p<0.05. An other test which depend on the chi-squared test was used: Guildford's Phi coefficient. Phi measures the strength of the relationship between two variables. If Phi = 0: there is no relationship between the two variables, if Phi = 1 the relationship that exists is perfect. The stronger the relationship between the two variables, the closer Phi is to 1. A logistic regression analysis was used to identify factors associated with dependant variables.

Correlated variables were:

- Consultation in the dental clinic / age group
- Consultation in the dental clinic / distance between locality and dental clinic
- Use of toothbrush / Use of chew stick
- Chew stick use / Periodontal health

2.7. Organizational and Ethical Consideration

Before starting the study, an information letter was sent to all prefects and sub prefects as well as heads of villages and neighborhoods of delegates to explain the benefits of such a study whose results will serve as advocacy tools health authorities to further develop and promote oral health in rural areas. These authorities after having authorized the investigation, facilitated its implementation and accompanied the whole process.

3. Results

3.1. Descriptive Results

3.1.1. Demographics

Distribution of patients according to sex

The study focused on a population of 2,254 patients, made up of 35.2% men and 64.8% women, with a sex ratio of 0.54.

Distribution according to age

The most represented age group was between 18 and 35 years with 51.2%, the 36-65 years group was 39.2% and the group aged over 65 year was 9.6%.

Distribution according to profession

The majority of the population (66.4%) was made up of farmers, 11% were middle managers and 22.6% worked in the informal sector.

3.1.2. Distance Between Facilities and Communities

More than half of the population (52%) lives more than 50 kilometers from a dental facility.

3.1.3. Use of Preventive Measures

Brushing of teeth with toothpaste: more than half of the population (52.8%) had never brushed their teeth.

Use of a chew stick: 92% of the population used the chew stick, 53.6% more than twice daily.

3.1.4. Periodontal Health

Distribution according to periodontal health: The frequency of oral diseases is 96,5%, only 3.2% had satisfactory periodontal health. Half of the population (49.6%) had deep periodontal pockets, however 12.8% had tartar and 2.4% bleeding gums.

3.2. Analytical Results

3.2.1. Consultation in Dental Clinic/Age Group

Table 1. Consultation in the dental clinic/age group.

		Age group			Total
		[18 to 35] years	[36 to 65] years	[66 and more]	
Consultation in the dental clinic	yes	127	145	36	308
	no	1,027	39	180	946
Total		1,154	884	216	2,254

Age group: Chi-squared = 14.25, p = 0.001

The 18 to 35 year olds have an odd ratio (visit a dental clinic) that is 0.61 times smaller than the other age groups, in other words the youngest group are 39% less likely to visit the dental clinic than the other age groups.

3.2.2. Consultation in Dental Clinic/Distance Between Locality and Dental Clinic

Table 2. Consultation in the dental clinic/distance between locality and dental clinic.

		Distance from dental clinic				Total	
		- 50 km		+ 50 km			
		Total	%	Total	%	Total	%
Patient who visits the dentist	yes	469	43.30%	271	23.10%	740	32.80%
	no	613	56.70%	901	76.90%	1,514	67.20%
Total		1,082	100.00%	1172	100.00%	2,254	100.00%

Distance from locality to facility: Chi-squared = 104.54, p = 0.000, Phi = 0.21
The probability of not going to the dentist is 0.67 when it is more than 50 kilometers from home. Odds ratio for dental clinic distance (- 50 km / + 50 km) = 2.54 IC (2.1 – 3.0)
Unsatisfactory oral health (96,5%): use of the service.
Satisfactory oral health: no use of the service.

3.2.3. Use of Toothbrush/Use of Chew Stick

Table 3. *Use of toothbrush/Use of chew stick (Number).*

		Use of chew stick		Total
		yes	no	
Use of toothbrush	yes	55	127	182
	no	1,189	883	2,072
Total		1,244	1,010	2,254

Chi-squared = 50.24, p = 0.00, Phi = 0.14
Odds ratio for toothbrush use = 3.14 SD (2.25 – 4.37)
The probability of not using a toothbrush is multiplied by 3 when a chew stick is used.
Satisfactory periodontal teeth (3,5%): 43% do not brush their teeth.
Unsatisfactory periodontal teeth (96,5%): 39,2% do not brush their teeth.

3.2.4. Chew Stick Use/Periodontal Health

Table 4. *Chew stick use/Periodontal health.*

		Satisfactory periodontal health		Total
		yes	no	
Chew stick	yes	163	19	182
	no	1,999	73	2,072
Total		2,162	92	2,254

Chi-squared = 18.34, P = 0.000, Phi = 0.09
Odd ratio for chew stick (0.1 or more) = 3.08 SD (1.79 – 5.29)
The risk of having poor periodontal health is three times greater when a chew stick is not used.
Satisfactory oral health (3,5%): do not brush their teeth 20% and brush their teeth 80% (p<0.01)

4. Discussion

4.1. Study Limitations

The remoteness of the sites investigated was a real problem and resulted in significant expenditure in terms of fuel, but also fatigue due to damaged tracks. In addition, the distance between the villages used up a lot of our time.

In the villages, during the day, the majority of men are preoccupied with farm work, fishing, breeding, which represents a bias in terms of the presence of men in our sample.

In addition, the translation of the questionnaire into the local languages caused a problem in terms of understanding the investigated variables.

4.2. Descriptive Results

4.2.1. Demographics and Gender

Our study sample was made up of 64.8% women and 35.2% men, which gives a sex ratio of 0.54, different to that found in the Senegalese national statistics: 50.8% women and 49.2% men, according to the National Agency of Statistics and Demography.

However, our results are comparable to those found in rural India (47.8% men and 53.2% women) and those obtained in Senegal by Diène (62% women and 48% men), and Gueyé (66.8% women and 33.3% men) [5, 6]. The female predominance in rural areas is partly due to a deficit

in investments and unfavorable socioeconomic conditions, which force African men to migrate towards towns in search of better living conditions. This rural exodus affects more men than women and is due to the poverty of rural households [7]. In Senegal, rural households represent 54.7% of the country's total, with poverty affecting 57.5% of these households [8].

4.2.2. Age

The 18-35 years old age group is the most represented in our sample (51.2%). Yet, according to the National Agency of Statistics and Demography (ANSD), 45.5% of the population is made up of people aged between 18 and 65 years. However, people under 25 years represent 64% [9].

These results are supported by a study by Diène on the accessibility of oral care in the region of Thiès: 63% were aged between 18 and 35 years, but also by a study by Gueye on the town of Fatick with 70% of patients aged between 18 and 38 years [5, 6].

Our sample is young reflecting the Senegalese population which, according to the ANSD, is made up of 52.8% of people aged between 15 and 64 years [10].

4.2.3. Occupations

More than 66% of the study population (66.4%) was farmers, including livestock farmers and fishermen. This percentage reflects the strong presence of farmers in rural areas with as many as 70-80% [11].

4.2.4. Distance from Locality to Facility

The localities are very far from dental facilities, unlike in urban areas where, according to Diène, 76% of the population lives less than 5 kilometers from dental services. Access to the latter includes not only the cost of care but also all the other expenses related to transport. The time spent availing of care is also reduced if we take all of these elements into account. These parameters reduce the use of oral health services thereby increasing the inaccessibility of care. Yet since 1978, a number of strategies have been suggested by the World Health Organization to promote oral health in Africa in disadvantaged rural areas [12].

4.2.5. Periodontal Health

The prevalence of periodontal disease is high. Indeed, 96.5% has unsatisfactory periodontal health. Furthermore, close to half of the sample has a deep periodontal pocket. This high severity indicates the severity of the disease in rural areas. Periodontal disease has always been prevalent in Africa because, according to a study carried out by Franklin since 1978, it affects 45% of children, 75% of adults between 30 and 40 years and 95% over 40 years [13]. Thus, in rural Morocco, the Democratic Republic of the Congo, Botswana and Ghana, periodontal disease has a prevalence of 88.8%, 88%, 98% and 33% respectively, while in India the figures are between 95 to 100% [14]. Conversely, in Europe, deep periodontal pockets are less severe and represent 7% in British, 10% in Dutch, and 8% in Swedish people [15].

The high prevalence of periodontal disease in Africa is directly linked to poor oral hygiene, a lack of information on oral health, a lack of motivation on the part of patients and in particular a lack of qualified dental staff. The role of malnutrition as well as parasitic infections found in rural Africa also contributes to the development of periodontal pockets.

4.2.6. Use of Preventive Measures

In addition to the inaccessibility of toothpaste in rural areas, more than half of the population (52.8%) does not brush their teeth. This may be a major cause of the high prevalence of oral disease found in this study.

In Rwanda and the Ivory Coast, studies by Catussie et al. (1990) and by Yao et al. (2001) showed that the availability of preventive measures as well as their accessibility were the reasons for their high use and the improvement in the oral health of the population [17], [18]. Moreover, the percentage of the population who use a chew stick on a daily basis is very high. And yet oral diseases are still common. The opposite has been found in urban areas where, according to studies by Kane et al. (2000) only 1.3% uses this preventive measure [19]. It is therefore important to review the chew stick method of use within the population. Indeed, this preventive measure meets the requirements of brushing methods. It should be done after every meal, from the gum to the tooth, followed by rinsing with water at the end. The stick is chewed at one end to emulsify the fibers. This type of brush is rubbed on the teeth and gums.

Epidemiological studies carried out in Rwanda and in Benin show a higher prevalence of periodontal disease in rural areas at 100% and 96.84%, respectively, despite the use of a chew stick [13], [20]. It is therefore important in Africa, not only to advocate the use of a chew stick in rural areas, but also to educate the population on its method of use so that this preventive measure, both available and accessible, can contribute towards improving oral hygiene.

4.3. Analytical Results

4.3.1. Availing of Dental Service and Age

The youngest group is 39% less likely to go to the dental clinic compared to the other age groups (Table 1). Young people attach less importance to their health than older people. Yet intercepting diseases in general and chronic diseases in particular should happen from infancy or in adulthood by preventing risk factors. A policy based on youth outreach and training will contribute towards improving the health of the elderly population.

4.3.2. Distance Between Health Facility and Locality and Periodontal Diseases

Distance is a key factor in seeking care (Table 2). People living more than 50 kilometers from facilities are 2.5 times less likely to avail of services compared to others (OR = 2.5). The study showed that the further the facility from the locality, the less the population avail of the facility. As demonstrated in the results of Bilounga in Cameroon, 30.7% of the rural population does not avail of dental services because of their distance from them.

Overall, patient reaction is motivated by oral disease. The patient responds primarily to unsatisfactory oral health. Thus, all patients who visit the dental clinic present a dental problem. We also found that when oral health is satisfactory, there is no use of the service (0.00%). Systematic visits are not developed in rural areas. Indeed, prevention is not the reason for availing of the service, which is mostly related to the presence of disease [22]. Some authors showed that not only do patients only present when they have an oral condition, but pain is the most significant reason for presenting [23], [24].

4.3.3. Relationship Between Use of Preventive Measures and Oral Health

In rural areas, the chew stick is the most used preventive measure and in a way replaces fluoride toothpaste. Indeed, the probability of not using a toothbrush is multiplied by 3 when a chew stick is used (OR = 3.14; SD (2.25 – 4.37) (Table 3)). The chew stick contributes to improving periodontal health because the study showed that the risk of unsatisfactory periodontal health is multiplied by 3 when this preventive measure is not used. This risk is also multiplied by 4 when teeth are not brushed with toothpaste. The latter is a protective factor in dental cavities (OR = 0.26 SD (0.15 – 0.45) (Table 4)).

Among those with satisfactory periodontal health, 43.3% do not brush their teeth. Similarly, for those who have unsatisfactory periodontal health, 39.2% do not brush their teeth. The fact that in the study we found people who brush their teeth and have unsatisfactory oral health (45.80%) shows that the mastery of the technique of brushing may be missing for some people. Similarly, the presence of people with satisfactory oral health (20%) among those who do not brush their teeth proves that brushing of teeth is not the only element to take into account in improving the oral health of the population. Other factors are at play such as genetics (individual susceptibility), lifestyle, environment [21]. Overall, the study showed those who used brushing methods had better oral health than the others (p < 0.01).

5. Conclusions

The prevalence of periodontal disease is very high in rural areas. In Africa, the causes are mainly related to the distance between the locality and dental services, financial difficulties accessing care, the unavailability and inaccessibility of fluoride toothpaste. To improve oral health in rural areas, efforts should be focused on the implementation of WHO strategies suggested for African countries, which are as follows:

- Primary dental health care,
- The Bamako initiative,
- The WHO's African Regional Strategy,
- The WHO's Resolution in 2007.

References

[1] World health organization, Oral Health in the African Region: Progress and perspectives of the Regional Strategy. African Journal of Oral Health, 2005; 2: 2-9.

[2] Petersen PE et al. The global burden of oral diseases and risks to oral health. Bulletin World Health Organization, 2005; 83: 661-669.

[3] Hobdell MH et al. Oral diseases and socio – economic status (SES). British Dental Journal, 2003; 194: 91-96.

[4] République du Sénégal, Ministère de la Santé et de la Prévention Médicale, CAS/PNDS, 2004 – 2008, Progamme National de Développement Sanitaire phase II, 2004, 35.

[5] Diène B. Étude de l'accessibilité des soins bucco-dentaires chez les populations du département de Thiès. Thèse Chirurgie Dentaire, Dakar, 2005; no 02.

[6] Gueye N F D. Attitude et comportement de la population de la commune de Fatick par rapport à l'accessibilité et à l'acceptabilité des soins bucco-dentaires Mémoire Certificat d'Etude Supérieure d' Odontologie Préventive et Sociale, Dakar, 1999.

[7] Harpreet Grewal, Mahesh Verma, Ashok Kumar. Prevalence of dental caries and treatment needs amongst the school children of three educational zones of urban Delhi, India; Indian Journal Dental, 2009; 22: 517-9.

[8] République du Sénégal, Ministère de l'Economie et des Finances. Agence Nationale de la Statistique et de la Démographie: la pauvreté au Sénégal: de la dévaluation de 1994 à 2001-2002; 2004; version préliminaire.

[9] République du Sénégal; Ministère de l'Economie et des Finances, Agence Nationale de la Statistique et de la Démographie, situation économique et sociale du Sénégal; Dakar, 2011; 28.

[10] République du Sénégal, Ministère de l'Economie et des Finances. Cellule de Suivi du Programme de Lutte contre la Pauvreté (CSPLP); Projet d'Appui à la Stratégie de Réduction de la Pauvreté (PASRP). Enquête villages sur l'accès aux services sociaux de base, 2009.

[11] Pellussier P. Les paysans du Sénégal. Les civilisations agraires du Cayor à la Casamance; Dakar – Paris; 2008; 37.

[12] Organisation Mondiale de la Santé, Bulletin d'information du bureau au Maroc, 2007; 5.

[13] Kamagate A et al. Prévalence des parodontites, les parodontites en Afrique noire. Influences des facteurs socio-économiques et habitudes culturelle. Odonto-Stomatologie Tropicale, Abidjan, 2001; 94: 57-59.

[14] Kumar M, Virdi K, Veeresha V B. Oral health status and treatment needs of rural population of Ambala, Haryana, India. International Journal Epidemiology, Mumbai, 2010; 8: 21–25.

[15] Patrick. B., M., Abjean, J. F. Michel. Questions d'Internat en Parodontologie: Question no 129 groupes et sujets à risque, 2012; consulté le 24/02/2012 à 16: 15. http://ancien.odonto.univ-rennes1.fr/old_site/qip129.htm,

[16] Lo CM, Cisse D, Faye D. Les dépenses en soins bucco-dentaires des populations Sénégalaises. Revue du collège d'odonto-stomatologie Africain et de Chirurgie Maxillo-Faciale, 2011; 18: 25-28.

[17] Catussier E et al. Résultats et interprétation d'une enquête épidémiologique bucco-dentaire réalisée au Rwanda en 1985 selon les critères préconisés par l'OMS; Medecine d' Afrique Noire, 1990; 30: 791-798.

[18] Yao K J, N'da NA, Koffi NM. Prévalence de la carie dentaire en milieu scolaire dans le nord-ouest de la Côte d'Ivoire. Odonto - stomatologie Tropicale, Abidjan, 2001; 61: 148-152.

[19] Kane A W et al. Habitudes d'hygiène orale et situation de la carie dentaire des étudiants: enquête auprès de 150 étudiants en résidence universitaire à Dakar – Sénégal. Odonto-Stomatologie Tropicale, Abidjan, 2001; 93: 57-62.

[20] République du Benin, Ministère de la Sante Publique, Direction Nationale de la Protection Sanitaire, Programme national de lutte contre les affections bucco-dentaires, Politique et stratégies nationales de lutte contre les affections bucco-dentaires, 1999.

[21] Samb M. L'accessibilité aux soins: le cas du Sénégal, animation régionale de Dakar, réseau des chercheurs "Droit de la Santé". Agence Universitaire de la Francophonie, Dakar, 2005; 2: 1-5.

[22] Lance T. Vernon, Anita R. Howard. Avancing health promotion in Dentistry: articulating an integrative approach to coaching oral health behavior change in the dental setting. Curr. Oral Health Rep. 2015; 2 (3): 111-122.

[23] Gorywala SN, Chavda P, Udhani S, Pathak NB, Pathak S, Ojha R. A survey on oral hygiene methods practiced by patients attending dentistry department at a tertiary care hospital from Central Gujarat. J Int Soc Prevent Communit Dent 2016; 6: 115-9.

[24] Saher A, Kousalya PS, Raju R, Gubbihal R. Dental pain among 10-15 year old children attending oral health promoting schools: a cross-sectional study. J Int Soc Prevent Communit Dent 2015; 5, Suppl S2: 101-6.