

# Evaluation of the Relationship Between Socio-economic Environment and Oro-dental Health of Children in Diourbel Health District in Senegal

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**Abstract:** The objective of this paper was to evaluate the socio economic environment influence on oral health of children in the sanitary district of Diourbel to formulate recommendations for its improvement by conducting a descriptive cross-section study. Data were registered and analyzed using Epi Info 6.04 d release. A logistic regression analysis was used to identify factors associated with dependant variables. On a theoretical target of 1600 children, 1237 have been examined: 508 in urban area and 729 in rural area. The children of the rural area were significantly younger, more scholarized, and from poorer families. They were statistically sicker than those of the urban area. Oro-dental affections were more frequent among the children of age less than nine years, no scholarized, and living in poor families. The oro-dental affections prevalence is linked to the socioeconomic environment. This confirms the correlation between bad health and poverty in one hand, and between good health and development in other hand. In the WHO international classification of the diseases, the most important death factor is extreme poverty. It exercises its harmful influence at all the stages of human life, since the conception to the death. Unfortunately, most of the world inhabitants are located facing the double threatens of poverty and in equity, and the double blight of suffering and disease. Oral Pathology represents a real public health problem, more frequent in rural areas. Thus, a multisectoral strategy with a longitudinal follow-up is needed to improve the oral health of children.

**Keywords:** Socio-economic Environment, Oro-dental Health, Children, Diourbel Health District

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## 1. Introduction

The child health problems including oro-dental diseases have always been a world widespread concern. Indeed, studies in the USA [1], Jordan [2], Ghana [3], and Gambia [4] showed the importance of the relationship between juvenile oral diseases and socio-economic environment. In general children's health is precarious in Africa especially and particularly in disadvantaged rural areas. Environment, poverty and health interact in a closed circle mutually aggravate their condition [5]. Many organizations are trying to break this circle by fighting against poverty. This is the case of the humanitarian and nonprofit Non-Governmental Organization (NGO): Christian Children Fund (CCF), located in the department of Diourbel since 1999 [6].

Diourbel health district is the western part of Diourbel Region, in Senegal. It is the only operational health structure of Diourbel department which covering an area of 1352 km<sup>2</sup>. According to the 2002 census, this sanitary district has 19,203 households for a population of about 252 862 inhabitants split up between the Diourbel Municipality, and the other districts of the Department. The town of Diourbel urban and its rural community have provided the framework for this study. The rate of scholarized children between 6 and 7 years was one of the lowest of the country: 35%. In 1995, 3352 children were registered in primary schools. Agriculture is the main economic activity, with an annual average household income of US dollars: 300. Poverty has led to the mass exodus of residents of several villages to other areas of the country, Touba and Dakar, or to Europe and America.

Health facilities consist of one health center located in urban areas, 19 health posts: 1 urban and 18 rural, and 73 health centers among which 59 functional. Health staff count 01 physician for 125,000 inhabitants, one dentist for 125 000 inhabitants, 1 nurse for 16,000 inhabitants, 1 midwife for 24,000 women of childbearing age [7]. CCF takes care of poor children and assists them in the area of health and education, through sponsorship. Children are enrolled in the project cohort according to pre-established criteria. In their follow-up, annual consultations are held and their oral health status data are collected. The objective of this paper was to evaluate the socio economic environment influence on oral health of children in the sanitary district of Diourbel to formulate recommendations for its improvement by conducting a descriptive cross-section study.

## 2. Method

### 2.1. Type of Study

It was descriptive and cross-section study on oral diseases: caries, periodontal disease and orthodontic anomalies in sponsored children under 15 years in Diourbel health district.

### 2.2. Study Period of Time

The survey was conducted from February 1 to May 31, 2014.

### 2.3. Study Population, Selection Criteria, Sample Size

The theoretical target of 1600 sponsored children shared among urban (800) and rural (800) areas. The recruitment has been exhaustive and included all children sponsored by CCF less than 15 years old. The unsponsored and those who age are 15 years old as well as the absent and those whose files were incomplete were not included in the study.

### 2.4. Variables Studied

They were represented by socio-economic profile, dwelling place or residence, ethnic group and oro-dental diseases. The socioeconomic profile was represented by the following parameters: gender, age, schooling, and family income. Scholarization has involved children who attended primary and coranic schools. The residence has been focused on urban and rural areas.

### 2.5. Oral Pathologies

Represented by dental caries, periodontal diseases: tartar, gingivitis, periodontitis and orthodontic anomalies: persistence of primary teeth and dental malposition. Indicators and Measures Dental condition: dental caries was measured by its prevalence. Periodontal condition: we used the Community periodontal Index of Treatment Needs: CPITN.

State occlusion: To record the occlusion state, we used the numerical code 0-2 of the WHO survey form.

1. there is no tips abnormality or malocclusion,

2. mild abnormalities: twist, tilt, and slight tightening,
3. more severe abnormalities: greater than 9 mm prognathism, prognathism whit a gap inferior or equal to one tooth and diastema at 4 mm.

### 2.6. Data Collection

The collection procedure was based on research of: - Temporary or permanent decayed, missing or filled teeth- Gingival bleeding, calculus socked, - Orthodontic anomalies. The collection equipment was made up of examination trays (tweezers, probes, and mirrors), periodontal probes and WHO questionnaires.

### 2.7. Data Analysis

Data were analyzed by epi info version 6.04 software. Comparisons were made by the chi-2 test with a confidence interval CI 95%. The test was significant with a  $p < 0.05$ . A logistic regression analysis was used to identify factors associated with dependant variables.

Correlated variables were:

- Place of residence and socio-economic profile
- Place of residence and oro-dental diseases
- Oro-dental pathology and socioeconomic profile.

### 2.8. Organizational and Ethical Consideration

A circular authorization with a request for information was done before the collection of information. In addition an information sheet was given to parents for their consent. Signed parental consent was obtained before the start of the study.

## 3. Results

On a theoretical target of 1600 children, 363 were excluded: 22.7%. The study population consisted in 1237 children

### 3.1. Socioeconomic Parameters

**Table 1.** Socioeconomic parameters and location (area) residence of Diourbel children.

Socio - economic parameters	setting (area) residence			Total	
	Rural area	Urban area			
Age < 9 years	419 (57,5%)	241 (47,4%)	660	(53%)	
Female gender	370 (50,8%)	242 (47,7%)	612	(49,5%)	
Non-enrollement	16 (2,2%)	33 (6,5%)	49	(4%)	
Poor income	453 (62,1%)	214 (42,1%)	667	(54%)	
Diseases	318 (43,3%)	168 (33,1%)	486	(39,3%)	

The age ranged from 2 to 14 years, with a median of 8 years: 17.3%, an average of 9.18 years and a standard deviation of 2.3 years. It was less than 9 year in 81.5% of cases. The gender ratio was 1.02 in favor of boys. There was no scholarization in 4% of the sample. The annual income varied between 120 and 1395 US dollars, with an average of less than 600 US dollars in 54% of households.

Place of residence: the place of residence was rural in 58.9% and 41.1% in urban area ( $p < 0.05$ ).

**Table 2.** Frequency of oral diseases and location (zones) dwelling in Diourbel children.

Frequency of oral diseases	setting (area) residence					
	rural area		Urban area		Total	
scale	353	(48,3%)	222	(43,6%)	575	(46,5%)
Gingivitis	22	(3,4%)	84	(17,1%)	106	(8,6%)
Periodontitis	2	(0,3%)	0	(0,0%)	2	(0,2%)
Persistence of primary teeth	51	(7,0%)	39	(7,7%)	90	(7,3%)
dental Malposition	52	(7,1%)	25	(4,9%)	77	(6,2%)
Tooth decay	257	(34,9%)	129	(25,4%)	386	(31,2%)

It was 39.3%:486 cases. The prevalence of dental caries was 31.2%.

### 3.2. Oral Diseases

Periodontal diseases:

- 46.5% of children presented tartar,
- 8.6% had gingivitis that was not related to the scale,
- 0.2% had periodontitis.

Orthodontic anomalies:

- 6.2% of children had dental malposition
- 7.3% had persistent primary teeth.

### 3.3. Correlation Between Variables

**Table 3.** Place (areas) housing and prevalence of oral diseases in Diourbel children.

Settings socio - economic Location (area) housing	Oral diseases		Khi <sup>2</sup>
	Yes	No	
Rural area	318	411	p = 0,0002
Urban area	168	340	OR = 1,57 (1,23-2,00)

The prevalence of oro-dental diseases was 29.1% in rural areas and 20.3% in urban areas: p <0.05.

Socioeconomic profile and oral dental diseases

**Table 4.** Socioeconomic Parameters and oral diseases in Diourbel children.

Socioeconomic parameters		oral diseases		Khi <sup>2</sup>
		Yes	No	
Age < 9 years	Yes	231	429	p = 0,001 OR = 0,68 (0,54-0,86)
	No	255	322	
Female gender	Yes	249	363	p = 0,319
	No	237	388	
Non-enrolled	Yes	31	18	p = 0,0005 OR = 2,77 (1,48-5,33)
	No	455	733	
Poor incomes	Yes	271	396	p = 0,02 OR = 1,32 (1,04-1,67)
	No	195	375	

- Children younger than 9 years: 231, children over 9 years: 255: p <0.05, OR = 0.68 (0.54 - 0.86).
- Anscholarized children: 455, scholarized children: 31: p <0.05; OR = 2.77 (1.48 - 5.33).
- Low income: 271, income acceptable: 195: p <0.05; OR = 1, 32 (1.04 - 1.67).

Place of residence and socio-economic profile

**Table 5.** Settings location (area) housing socioeconomic parameters of Diourbel children.

Settings Location (area) housing	Age < 9 years		Enrolled		Poor incomes	
	Yes	No	Yes	No	Yes	No
Rural area	419	310	16	713	453	276
Urban area	241	267	33	475	214	294
Khi <sup>2</sup>	p = 0,0223 OR=0,76 (0,59-0,97)		p = 0,0001 OR=0,32 (0,16-0,61)		p = 10 <sup>-7</sup> OR=2,25 (1,78-2,86)	

- Children less than 9 years: rural area: 419), urban: 241: p <0.05, OR = 0.76 (0.59 - 0.97).
- Children in school: rural: 16, urban: 33: p <0.05, OR = 0.32 (0.16 - 0.61)
- Low-income family: rural area: 453, urban: 214: p <0.05, OR = 2.25 (1.78 - 2.86).

## 4. Discussion

The limits of this work are those of the retrospective study and the sample size: 6% of the reference population, from of short duration. Nevertheless, the results provide baseline data for future research and strategies in children's oral health study.

Residential zone and oral diseases (table 3): the prevalence of oral pathology was statistically higher in rural areas: 29.1% than in urban areas: 20.3%. Oral pathology and socioeconomic profile (table 4): oral diseases were higher in anscholarized young children under 9 years from poor families.

Residential area and socio-economic profile (table 5): The children of the rural area in the sample were significantly young, more educated and from poorer families than those of urban areas.

The study population was younger in rural than in urban areas [5]. The enrollment rate, higher in rural areas, may be related to arabic and coranic teaching only found in rural areas, as described in the report of the 1992 census [6]. The annual average income per household in the district of Bambey is one of the lowest in Senegal [8]. It was estimated at 288 US dollars for a family of 12 people [9]. Families whose annual income is less than 600 US dollars are 2.25 times more frequent in rural areas. Indeed, in rural areas, the income derived from the exploitation of natural resources which, added to the effect of drought, leads every year to the destruction of 80,000 hectares of forest [5]. Poor paradoxically appear both agents and direct brunt of environmental degradation [10], in 1992, 30-50% of the population in Senegal lived below the poverty line [10]. However, poverty is not simple food inaccessibility. It extends to other deprivations such as lack of access to basic social services: health, education, training, access to drinking water and electricity that often deteriorate the living conditions of populations [8] [11]. Thus, the decline in rural incomes increases health spending in a much higher proportion than the growth of national wealth [11].

Oral disease was 1.6 times more common in children from rural area, underpinned by the lowest level of poverty in this environment. In Jordan, the effect of socioeconomic status on health and oral diseases has been established in children classified into 4 groups: high, moderate, poor and very poor. In the very poor group, the result for a healthy mouth was low whereas the result for gingival bleeding, calculus and pockets was high [4]. Similarly, in children of 12 years in Burkina Faso there is a significant difference between urban and rural areas where the need for periodontal treatment is 83-100% [12]. In Accra, gum disease increased with age in children of 4-16 years in the suburban area [3]. In our study, the greater frequency of gingivitis in urban areas is due to the significant predominance of older children in this environment.

Thus, the relationship between the prevalence of oral diseases in rural and disadvantaged housing areas has long

been established [5]. The level of health indicators is inversely proportional to the degree of poverty; which confirms the correlation between poor health and poverty in one hand and between the healthy and development in the other hand [10]. According to WHO, the most important death factor is extreme poverty [6]. It exerts its harmful influence at all stages of human life from conception to death. Unfortunately, most of the world's inhabitants are facing the dual threat of poverty, inequity and double scourge of suffering and disease [11]. Thus in developing countries, people are often sick because they are poor; they are getting poorer because they are sick and have their evil worse due to the increased misery [12].

According Nagarajappa et al there is a strong inverse correlation between incidence of early childhood caries in children and the socioeconomic status of the families of those children. That is, children with early childhood caries tend to come from low-income or lower socioeconomic background [13]. The cost of early childhood caries treatment, particularly in early childhood caries cases in which restoration or extraction is needed, is extremely high for these low-income families, oftentimes these families are unable to make dental care a priority over what is seen as more pertinent day-to-day costs. Thus, children in families with lower socioeconomic status are more likely to have their caries left untreated or are likely to incomplete dental care [14].

In order to improve oral health in children of Diourbel District, three recommendations were made:

- Improving the living conditions of families by strengthening the fight against poverty through the promotion of micro-enterprise and income-generating activities.
- Introduce into the school curriculum and literacy a schedule of prevention of diseases related to poor hygiene and the promotion of oral health.
- Strengthen prevention of oral disease strategies at the community level by training the relay for information, education and communication (IEC) in support of the strategy forward for better monitoring.

## 5. Conclusion

Oral Pathology represents a real public health problem because of its prevalence in children of Diourbel department. It is particularly sensitive to environmental realities socioeconomic conditions more frequent in rural areas. Thus, a multisectoral strategy with a longitudinal follow-up is needed to improve the oral health of children in the sanitary district of Diourbel.

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