

The Oral Health workforce in Cameroon; the past, the present and the future.

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ABSTRACT

Manpower training and development is essential to the improvement of health including oral health. The purpose of this study was to conduct a situation analysis, document trends, and make future projections for the oral health workforce in Cameroon. Data were collected from publications of the Ministry of Higher Education and Scientific Research, National Order of Dental Surgeons of Cameroon, the Cameroon Dental Association and the Association of Cameroon Nurses, Midwives, and Health Technicians. Test for significance was done with Chi-square and Fisher's exact statistics and statistical significance was set at $P < 0.05$. A total of 178 dental surgeons with a mean age of 41 ± 9.1 years were recruited in the study. More than half (53.37 %) of the dental surgeons were females aged 41-50 years, worked in private practice mainly in the Central region (47.19 %). Nearly all the dentists (93.26 %) resided in urban centers. Only 13 respondents had postgraduate studies. More than half (57.69 %) of the dental surgeons participated in continuing dental education program Both dental schools in Cameroon graduated a total of 48 students in 2014 and are projected to graduate 490 dentists by 2019. Prior to 2006, there were 20 dental technicians trained for a period of two years. Between the years 2008 to 2014, 208 registered dental therapists (43 males, 47 females) and 14 dental technologists were trained. Forty percent of them were employed by the government and only 20% of the dental therapists work in rural areas. This study revealed the perennial struggle in Cameroonian oral health workforce training and development which transited from foreign oral health workers, to foreign trained indigenous oral health workers and finally to locally trained indigenous oral health workers.

Keywords: Oral health, workforce, Cameroon, training.

INTRODUCTION

Cameroon is a central African country with an estimated population of 23 million thus ranking as the 53rd largest country in the world. Constitutionally, it is divided into 10 semi-autonomous regions which are headed by a presidentially appointed governor. Cameroon is a diverse and multi-ethnic country known classically as "Africa in miniature" because it

features French and English speaking portions, Muslim and Christian dominated regions, rain forest, desert plains, tall mountains and high plateau terrains. The per capita income of Cameroon is \$2,300 and the literacy rate was estimated to be 71.3 % (male 78.3 % and female 64.8 %) in 2010 (1). A total of 5.1 percent of the national budget is allocated to health annually. The average life expectancy at birth is 58.65 years for females and 56.09 years for males. It is ranked 164 in health system performance with a WHO index of 0.357 out of the 191 member countries of the World Health Organization (2).

Oral health services are rendered by orthodox and complementary health delivery centers in Cameroon. The complementary oral healthcare services are rendered by traditional health practitioners and other alternative medical

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practitioners and such services have persisted even till this modern time. The dental surgeons and dental auxiliaries render orthodox oral healthcare services in clinics and hospitals found mostly in urban centers. The orthodox oral healthcare services is new in Cameroon with earliest records dating the pre-world war era. The National Order of Cameroonian Dentist was separated from the Cameroon Medical Association by the Government, created under the parliamentary Law n°80-09 of 14 July, 1980 to regulate the activities of dentistry in Cameroon. The government trained dental auxiliaries (technician dentaire) between 1987 and 1990 who were directly employed by the government. Other dental auxiliaries are trained on the spot especially in missionary-owned institutions. These dental auxiliaries are recognized and registered with the National Council of Biomedical Technicians, Nurses and Midwives. Two dental schools and 4 schools of allied dental workers started in Cameroon in 2011. The oral health workforce of Cameroon is facing inequalities in terms of its distribution, acute shortage of specialized services and disharmony in training auxiliaries. There is paucity of literature on a situation analysis of the oral health workforce in Cameroon since the times of independence. Hence the objective of this study was to document the trends, situation analysis and future projection of the oral health workforce in Cameroon in the future.

METHODS

This was a descriptive, retrospective study and situation analysis using available data over a 30-year period (1984-2014) to evaluate the oral health workforce in Cameroon. The information for this study was collected by the principal investigator in February 2015 using a data capture sheet that collated information from publications of the Ministry of Higher Education and Scientific Research, the National Order of Dental Surgeons of Cameroon, the Cameroon Dental Association and the Association of Cameroon Nurses, Midwives, and Health Technicians. Information pertaining to registered dental surgeons was obtained from the records of the National Order of Dental Surgeons of Cameroon.

Information collected included age, gender, year of graduation, place of work, area of specialisation and post-graduation training. The information from the Ministry of Higher Education and Scientific Research included the number of dentists and allied dental workers on training in Cameroon. The information on the number of registered dental therapists was obtained from Association of Cameroon Nurses, Midwives, and Health Technicians. The information were entered into Microsoft Excel 2009, which was subsequently exported and analysed using Epi-info version 7. Data were subjected to descriptive statistics in form of frequencies, percentages and cross-tabulations. The association between gender and characteristics of the oral health workers were assessed with Chi square and Fisher's exact statistics and the statistical significance was set at $P < 0.05$. The protocol for this study was reviewed by the Université des Montagnes Institutional Review Board and authorisation to conduct this study was obtained from the Ministry of Higher Education and Scientific Research in Cameroon. All the information obtained concerning the oral health workers were anonymous and kept strictly confidential.

RESULTS

The first dentists that worked in Cameroon were German military oral health workers during the pre-world war era. After the second world war, the dental surgeons operating in Cameroon were visiting dentists from the United States of America, the United Kingdom and France who were missionaries and military personnel. The first indigenous Cameroonian dental surgeons were three dental surgeons trained in France and Russia, who started working in Cameroon in 1969 and were registered then with the Cameroonian Medical Association. The newly formed National Order of Cameroonian Dentists was separated from the Cameroon Medical Association by the Government, created under the parliamentary Law n°80-09 of 14 July 1980 to regulate the activities of Dentistry in Cameroon and it began with seven members in 1980. The number of dental surgeons from Cameroon Dental Association before the indigenous dental school began graduating dentists was 259, however 58 dentists migrated bringing a total of 201 dentists (Table 1). The records of National Order of Cameroonian Dentists have only 178 dental surgeons who were used for this study.

The mean age of the 178 dental surgeons registered in National Order of Cameroonian Dentist was

41±9.1 years. More than half were aged between 31 and 50 years with 31-40 years old constituting 29.7 % and 30.9 % being 41-50 years old. More than half (53.4 %) of the dental surgeons were females in the 31-40 years age group. Almost half (47.2 %) of the dental surgeons worked in the Central region and more than one-third (33.7 %) in the Littoral region. Almost half (47.2 %) of the dental surgeons work in private clinics. More females (53.7 %) compared to male dental surgeons (39.8 %) were found in private rather than public practices. The majority (93.3 %) of the dental surgeons practiced in urban centers (Table 2).

A total of 43.8 % of the dental surgeons had additional training after graduation. Of the dental surgeons that reported receiving continuous dental education in the form of certified short training or courses, more than half (57.7 %), attended at least one short continuous dental education course. Less than one-tenth (7.9 %) of the dental surgeons were specialists, the majority (64.3 %) of whom were male and 35.7 % were specialists in the discipline of community dentistry (Table 3).

Two dental schools, CHUY (Centre Hospitalier Universitaire de Yaounde) and Université des Montagnes, were approved to train dentists in 2011 and both schools graduated 48 students in 2014. With the current admission, these universities are expected to graduate 490 dentists by 2019. Admission into dental school is available only for candidates who have GCE "A" level certificate (English) or its equivalence BACC (in French) and passed the national entrance examination into medical schools (Table 4).

Dental auxiliaries are recognized and registered with the National Council of Biomedical Technicians, Nurses and Midwives. The government initiated a one year training of dental auxiliaries (*technician dentaire*) between 1987 and 1990. A total of 35 dental auxiliaries were trained and were directly employed by the government. Today, Cameroon has an average output of 48 dental students per year and from the 4 schools of allied dental workers (dental auxiliaries) an average output of the 90 dental auxiliaries per year. The academic program of the 2 dental schools were harmonized in 2011. Other dental auxiliaries receive in-service training especially in missionary-owned institutions and private practices. Prior to 2006, there were 20 dental auxiliaries trained for 2 years. Between the years 2008 to 2014, 203 registered dental therapists (72 males, 131 females) and 39 dental technologists (24 males, 15 females) were trained (Table 5). Forty percent of them were employed by the government. Only 20%

of the dental therapists work in rural areas. The majority of the therapists and technologists work in the Central and Littoral regions (Table 6). All therapists ("dental technicians") are registered with the Association of Cameroon Nurses, Midwives, and Health Technicians. Dental surgery assistants are not trained in Cameroon. There is only one female dental assistant who was trained in Canada and works with a University in the West region.

DISCUSSION

National capacities and human, financial and material resources to ensure the availability and accessibility of quality health services are insufficient in many countries and especially in deprived communities more than 20 years after the widespread adoption of the strategy of Health for all through primary health care (3). Health care systems in many countries are facing difficulties achieving their objectives to reduce inequities as a result of poor access to health services, inadequate promotion of universal coverage, and a lack of efficiency of the health system and these shortcomings continue to pose a serious challenge in health care delivery (3). In the present study, 307 dental surgeons were retrieved from records as at 2014. This means that the number of dental surgeons has increased by forty times from the time of institution of National Order of Dental Surgeons of Cameroon in 1980 to 2014. Tracking the increase over the decades revealed that in the first decade (1980-1989) of formation of National Order of Dental Surgeons of Cameroon, the number of registered dental surgeon increased from 7 to 46 which approximately was 6.6 fold. The increase from first decade (1980-1989) to second decade (1990-1999) was from 46 to 129 reflecting a 2.8 increase. The increase from second decade (1990-1999) to the third decade (2000-2009) was from 129 to 222, a 1.7 increase. The increase from the third decade to the first five years of the fourth decade was from 129 to 283 was a 2.2 increase. The increase in the last decade from 193 in 2004 to 307 in 2014 reflected about 1.6 increase.

It was also projected that the number of dentists will triple in 2021. Since the government of Cameroon recruits an average of only 10 dentists in a year, the remainder will practice in the private sector in big cities. This situation has the potential to lead to saturation of the oral health care services in private sector which depends on direct payment and insurance for payment of dental services. In a long

Table 1: Trends of Dentists in Cameroon

Year	New subscription	Total	Expatriation
1984	8	13	0
1985	5	18	0
1986	9	27	3
1987	5	32	2
1988	12	44	1
1989	2	46	1
1991	4	50	1
1992	4	54	0
1993	21	75	0
1994	18	93	2
1995	11	104	0
1996	6	110	2
1997	6	116	1
1998	13	129	1
1999	20	149	3
2000	9	158	1
2001	8	166	2
2002	8	174	1
2003	9	183	1
2004	10	193	0
2005	7	200	4
2006	8	208	3
2007	7	215	5
2008	7	222	5
2009	7	229	7
2010	4	231	3
2011	9	240	2
2012	5	245	5
2013	14	259	2
2014	48	307	2

Table 2: Demographic Characteristics of the Dentists in Cameroon

Characteristics	Female n(%)	Male n(%)	Total n(%)	P-value
Age (years)				0.116
20-30	21(22.1)	9(10.8)	30(16.9)	
31-40	31(32.6)	22(26.5)	53(29.7)	
41-50	28(29.5)	28(38.4)	55(30.9)	
51-60	13(13.7)	21(25.3)	34(19.1)	
61-70	3(1.5)	3(3.6)	6(3.4)	
Location				0.175
Central (CE)	50(53.6)	34(41.0)	84(47.2)	
Litoral(LT)	34(35.8)	26(31.1)	60(33.7)	
North West(NW)	2(2.1)	4(4.8)	6(3.4)	
South West(SW)	3(3.2)	3(3.6)	6(3.4)	
Far North (FN)	2(2.1)	3(3.6)	5(2.8)	
Adamoua (AD)	0(0.00)	4(4.8)	4(2.2)	
South (S)	2(2.11)	2(2.41)	4(2.2)	
West (W)	1(1.05)	3(3.61)	4(2.2)	
Northern (N)	0(0.00)	3(3.61)	3(1.7)	
Eastern (E)	1(1.05)	1(1.20)	2(1.1)	
Residence				0.721
Rural	7(7.4)	5(6.0)	12(6.7)	
Urban	88(92.6)	78(94.0)	166(93.3)	
Type of practice				0.150
Public	32(33.7)	39(47.0)	71(39.9)	
Missionary	12(12.6)	11(13.2)	23(12.9)	
Private	51(53.7)	33(39.8)	84(47.2)	
Total	95(100.0)	83(100.0)	178(100.0)	

Table 3: Continuing Dental Education and Specialization among the Dentists

Characteristics	Female	Male	Total	P-value
	n(%)	n(%)		
Continuing Dental Education (CDE)				0.032
Yes	34(35.8)	44(53.0)	78(43.8)	
No	61(64.2)	39(47.0)	100(56.1)	
Total	95(100.0)	83(100.0)	178(100.0)	
No of CDE				0.439
1	21(61.8)	24(54.5)	45(57.7)	
2	12(35.3)	15(34.1)	27(34.6)	
>2	1(2.9)	5(11.4)	6(7.7)	
Total	34(100.0)	44(100.0)	78(100.0)	
Specialist				0.193
Oral Surgeon	0(0.0)	2(22.2)	2(14.3)	
Orthodontist	2(40.0)	1(11.1)	1(7.1)	
Paedodontist	1(20.0)	1(11.1)	1(7.1)	
Prosthodontist	0(0.0)	1(11.1)	1(7.1)	
Community Dentist	1(20.0)	5(55.5)	5(42.9)	
Restorative Dentist	1(20.0)	0(0.0)	1(7.1)	
Total	5(100.00)	9(100.0)	14(100.0)	

Table 4: The Projection of Dentist graduation from indigenous University

	CHUY			Montagnes			Total
	Male	Female	Total	Male	Female	Total	
2014	9	11	20	9	19	28	48
2015	12	13	25	11	24	35	60
2016	8	15	23	10	22	32	65
2017	14	16	30	19	43	62	72
2018	15	20	35	25	35	60	95
2019	32	43	75	25	45	70	150
Total	90	118	208	99	188	287	490

Table 5: Trends of Dental therapist and technologist in Cameroon

Year	Dental therapist			Dental Technologist		
	Male	Female	Total	Male	Female	Total
2008	15	20	35	4	2	6
2009	15	22	37	4	2	6
2010	10	21	31	5	2	7
2011	9	19	28	4	3	7
2012	8	18	26	3	3	6
2013	7	16	23	4	3	7
2014	8	15	23	0	0	0 (training stopped)
Total	72	131	203	24	15	39

Table 6: Distribution of Dental therapist and technologist in Cameroon

Region	Dental therapist				Dental technologist			
	Male	Female	Total	P-value	Male	Female	Total	P-value
CE	24	29	53	0.277	12	5	17	0.629
LT	21	49	70		12	2	14	
NW	12	15	27		1	1	2	
SW	4	3	7		0	0	0	
FN	4	2	6		1	0	1	
AD	5	2	7		2	0	2	
S	4	5	9		1	1	2	
W	10	7	17		1	0	1	
N	2	3	5		0	0	0	
E	3	4	7		1	1	2	
Total	89	119	208		31	10	41	

run, it may result in a decrease in the cost of dental treatment and eventually the quality of oral health care delivery. Therefore it is suggested that the training of dental surgeons be strictly regulated, not only in the number of dental schools but the intake should be reduced from an average of 65 students per year to 25 students. This will ensure adequate training of other oral health workers and prevent oversupply.

The high concentration of dentists in urban areas means that populations in the rural areas which still constitute 46.2% of the entire population will be neglected(4). Recent studies have shown that this population has a high burden of oral diseases because of poor access to oral health care facilities and sanitation facilities(4,5). It is suggested that the government assign expanded duties dental auxiliaries or dentists to work in districts where most the rural population are concentrated.

A total of 178 registered dental surgeons practice in Cameroon which translates to a dentist: patient ratio of approximately 1:100 000. This shortage of oral health personnel concurs with the situation in many countries in Africa, Asia and Latin-America where oral health care is usually limited to pain relief or emergency care. In Africa, the dentist to population ratio is approximately 1:150 000 compared to 1:2000 in most industrialized countries (3). This ratio is high but falls with range as estimated by World Health Organization. The majority of the dentists were fourth and fifth decades of life, however about a quarter were in the sixth and seventh decade of life indicating an aging dentist population.

In the present study, the dental profession in Cameroon is female dominated and there is a likelihood of the gap widening further as reflected from the indigenous trained dentists. This female dominance in the dental profession had also been reported in Nigeria (6), the USA and Britain (7-10). While, female dental surgeons dominated private practices, there was almost equal gender distribution in missionary and government dental services.

Specialization among dental surgeons in Cameroon was found to be low as less than 10 % were specialized. Female dentists preferred specialising in orthodontics and restorative dentistry, while many males in dental public health. This might be because it involve a lot of field work and less attractive financially. The few specialists in Cameroon work mainly in private practices, yet their knowledge and competence is highly sought after in academic training institutions..

The low numbers of dentists receiving continuing dental education is an indication of the lack of enforcement of the law by regulatory agencies like the National Order Cameroon Dentists. Failure to attend continuing dental education programmes does not bode well for the provision of quality evidence-based oral health care. Enforcement of law by regulatory agencies is recommended for public protection.

In developing countries, unlike in developed countries, oral diseases are more prevalent among high socioeconomic, predominately urban dwellers due to lifestyle changes. This may explain why most dentists practice in urban centers where patients have more oral diseases and can afford to pay for their own treatment. Dental insurance is not fully developed in Cameroon. Public oral health services are offered in regional or central hospitals in urban centers and little, if any, priority is given to preventive or restorative dental care (3). In the present study, more than three-quarters of the dentists worked in the developed Central and Littoral region. This inequitable distribution of dentists may be due to low employment of dentist in government public services and the predominant engagement of Cameroon dentists in private practices thereby limiting the capacity of government to control the distribution. More females (53.6 %) as compared to male practitioners (39.8 %) practitioners were found in private rather than public practices.

Projecting future clinician supply and demand informs stakeholders and policy makers about the health care workforce implications of expected changes in the health care environment, including demographic shifts in the population and changing public policies. In the United States, the National Center for Health Workforce Analysis is charged with estimating supply and demand of the U.S. health care workforce and works to overcome the inherent challenges projecting the future by improving available data, integrating projection systems, and enhancing scenario modeling, including building nurse workforce micro-simulation models that facilitate localization, improve accuracy and factor in other types of clinicians.

Effective training of dental auxiliaries allows for increased productivity of dentists, increased oral healthcare delivery and reductions in rural-urban oral health inequalities. Active training of dental therapists and technologists in Cameroon started in 2008 to

increase the provision of oral health services. The employment of 40 percent of them by the government was to reduce in rural-urban oral health inequalities. However, the population of dentists and dental auxiliaries remains much higher in more developed regions. The ability of therapists to render independent care as expanded duty dental auxiliaries warrants them to update their competence through continuous dental education. Although dental surgery assistants are not trained in Cameroon, dental technicians who perform same function were trained in Cameroon. A total of 20 dental technicians were trained and the programme was terminated. The program was terminated because the term of training contract expired and was not renewed as it was a foreign assistance under the French development alliance to train dental therapists who could serve as dentist in district hospitals. In most non-state owned hospitals, some of these auxiliaries are used as unqualified personnel without any formal training working in dental clinic as an attempt to reduce the running cost of the clinic. The low proportion of the dental auxiliaries that were registered with Association of Cameroon Nurses, Midwives, and Health Technicians indicate non-enforcement of existing regulations in developing countries which favours quackery.

To boost the oral health manpower strength, the government started the training of dental auxiliaries (*technician dentaire*) between 1987 and 1990. At that time, there were only 57 dentists in Cameroon, with 97% of them located in Douala and Yaoundé. The training that lasted for one year was able to train 35 dental auxiliaries, who were directly employed by the government.

CONCLUSION

The present study has highlighted the perennial struggle in Cameroonian oral health workforce training and development which transited from foreign oral health workers, to foreign trained indigenous oral health workers and finally to locally trained indigenous oral health workers. Enforcement of existing regulations are necessary to forestall quackery to effective healthcare delivery. The study projects a 3-fold increase in the number of dentists from 2014-2019. This increase will have both positive and negative impacts on the oral health care delivery in Cameroon, unless policies are formulated to protect and support vulnerable populations. The low

level of oral health workers in the university teaching hospitals is also a concern on the quality of training given to current students in training.

Recommendation

In order to reduce inequalities and increase access to oral health care services, it is recommended that oral health care should be established in all the health districts in Cameroon. Attractive incentives and remuneration should be provided for dentists and dental auxiliaries in underserved areas. It is suggested that the training of dental surgeons be strictly regulated, not only in the numbers of dental schools but the intake of students should be reduced to provide high quality training and to cater for the future needs of the population.

In order to reduce quackery, a standard referral chain should be established and respected in the oral health care system. The government should formulate policies that will regulate the training of oral health specialists in the country and a tertiary institution should be established will be responsible for the training of oral specialists in Cameroon. The Cameroon dental association should reinforce and regulate continuing dental education and it should be a requirement for renewal of practicing licenses.

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