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Predictors of Postgraduate Dental Specialty Training Choice: The Nigerian Experience

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Authors' contributions

Authors GI, MA and OO involved with conceptualization, data collection and reading and editing of the final manuscript. The corresponding author SON was involved in conceptualization, data collection, data analysis as well as and reading and editing of the final manuscript.

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ABSTRACT

Objectives: The objectives of this study are three-fold. First, to highlight areas of shortage in postgraduate dental education in Nigeria, secondly to propose the introduction of dental advisors into our postgraduate dental training and thirdly, to propose a model that could aid such dental advisors in predicting postgraduate dental training choice among Nigerian dental graduates. It is hoped that such a model would have enough predictive powers to aid would-be dental advisors in guiding fresh dental graduates aright in their choice of postgraduate dental training.

Methods: Participants were dentists attending compulsory continuing professional development events at different centres across Nigeria. Graded Likert responses of 16 potential predictors of dental postgraduate training choice were obtained through self-administered questionnaires filled by 112 Nigerian dentists (mean age of 35.21 years \pm 8.21). Data were analyzed after necessary recodes to allow for meaningful statistical analysis. The predictive power of each factor was determined by inter-specialty and intra-specialty comparisons.

Results: A total of 51 males and 61 females participated in the study with predictors rated

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from 2.29 ± 1.23 to 4.09 ± 1.04 .

Diagnostic challenge strongly predicted a choice of Oral and maxillofacial surgery. Affluence and income jointly predicted choices of orthodontics and restorative dentistry while the female gender predicted a choice of pediatric dentistry. ($P < 0.001$). Work-life balance influenced a choice of preventive dentistry-related specialties in combination with other factors. Periodontology had several unique predictors.

Conclusions: Income, work hours, private practice opportunity and affluence were stronger predictors than skills and course content in this study. There's a gradual shift from an oral surgery predilection to restorative dentistry. A female predilection for pediatric dentistry and male predilection for oral surgery persist.

Endangered specialties like periodontics, prosthodontics justify a call office of postgraduate dental advisors in Nigerian postgraduate dental training to avert the looming dental training manpower crisis.

Keywords: Postgraduate dental training; Nigeria; predictors.

1. BACKGROUND

There is a lopsided distribution of specialists in the Nigerian dental education system. Prestige and affluence appear to exert an undue influence in postgraduate dental training. Unfortunately, postgraduate dental training choice predictors are grossly understudied among Nigerian dental graduates. While oral surgery and orthodontics attract many residents, other specialties struggle with meager numbers [1]. Three additional dental schools have recently been accredited in the north and south-east of Nigeria-- helping to ease previous geographic imbalance [2]. But, the lack of commensurate increase in numbers of trainers has further straightened the already staff-staved system [1,2].

The over-dependence of the newly accredited dental schools on visiting lecturers and absence of whole specialties in many dental schools attest to the twain crisis of number and distribution. New dental schools are meaningless without adequate staffing.

With only 3000 dentists, (1: 50,000) and an approved quota of 200 students [2], it is sad that just about 130 specialists [1] have been produced by the national postgraduate medical colleges at year 2010. The major problem though, is not about numbers but uneven distribution of specialists made worse by the silent feminization of dentistry [3]. Declining pass rates in postgraduate dental examination- though not evidence-backed, could jeopardize enrollments for postgraduate dental training-- worsening the problem.

Earlier workers [4] advocated dental counseling as a panacea these concerns but the advice has been neglected for two decades hence the current lopsidedness in specialties.

What influences choice of postgraduate dental training among dental students and graduates? Could an understanding of such predictors aid in "targeted career counseling" and planning? At present, predictors postgraduate dental training choice are non-existent in Nigeria necessitating the present study.

The objectives of the study were to identify shortage areas in postgraduate dental education, to propose the introduction of dental advisors and to propose a model for predicting choices of postgraduate dental training among Nigerian dentists.

2. METHODS

2.1 Study Population, Setting and Instrument

There is an estimated 3000 registered dentists in Nigeria with many working in the south-west of the country in mostly urban centers. This was a cross-sectional of dentists in training centers, private clinics and government dental centers in Nigeria with data collected over 4 months. Questionnaires were distributed at training events involving practitioners from different geo-political zones of Nigeria thus minimizing the effect of geographical location. The north was not well-represented though as only a handful of dentists practice in this part of the country. A literature search was conducted to deduce factors considered important to dentists. The major work which influenced the factors included in the questionnaire was that of Arowojolu and co-workers [4]. Validated with a pretest among ten dentists in the University of Abuja Teaching Hospital. The participants filled self-administered questionnaires developed by the researchers assessing several potential predictors of postgraduate dental training like;

1. Interesting/stressful subject during undergraduate training
2. Gender
3. Relationship (marital status)
4. Skills-related factors
5. Work-challenge related factors
6. Affluence –related factors

2.2 Sampling

The sampling method was purposive involving all consenting participants attending continuing professional development programs and conferences. The inclusion criterion for the study was being a dentist, hence self-administered questionnaires were handed out at different training events and dental specialty conferences. The sampling method was non-random and dentists recruited into the study only filled the questionnaire once.

2.3 Research Questions

1. What affects postgraduate dental training choice among Nigerian dental graduates?
2. Are these factors predictable?
3. What is the current role of counseling in choice of postgraduate dental education

2.4 Consent and Confidentiality

To ensure confidentiality, the questionnaires did not include any personal identifiable data. Implied consent was obtained by accepting to fill the questionnaire.

2.5 Statistical Analysis

PASW (SPSS) statistics[5] was used for data analysis, frequencies and cross-tabulations. The dependent (outcome) variable was postgraduate dental specialty choice while potential predictors of such choices served as independent/explanatory variables.

Potential predictors were rated with 5-level Likert responses recoded into 1-5 (Not important to Extremely important). Total and mean figures of graded response on the Likert scale were recoded for relative strength. Obtainable averages ranged from 1-5 with 1 being the lowest and 5, the strongest prediction strength.

Factor analysis was performed to identify groups of predictors. The purpose of factor analysis was for grouping of similar predictors rather than elimination of any factor. Authors adopted this approach to assess the relative influence of all possible predictors irrespective of seeming insignificance from component analysis. Potential predictors were assigned to the three resultant groups based on their score in the component matrix. The three groups were renamed (based on the potential predictors within each group) into Income, Skills and Work-Hours-related predictors.

Mean values of individual predictors were recoded and compared across specialties. Relative strengths of potential predictors within specialties were also identified. The latter served as an index of potential predictive power of groups of predictors.

Because many resultant figures yielded too many empty cells for valid analysis (> 20%), the responses were further recoded as follows: Not important, Minimally important/Important, and Very important/Extremely. These were then regrouped as 1= Unimportant, 2= Important and 3= Greatly Important.

For meaningful statistical analysis, specialties were grouped as follows; Oral & Maxillofacial surgery/Pathology, Restorative dentistry/pediatric dentistry (comprising conservative, prosthodontics, orthodontics and pediatric dentistry), Preventive dentistry (All other specialties including Periodontics, General Dental Practice, Dental public health).

The grouping of Oral and maxillofacial surgery and Oral pathology stemmed from traditional classifications in Nigerian dental schools. Orthodontics and pediatric dentistry have traditionally been together under child dental health. These were grouped along with restorative dentistry purely arbitrarily for meaningful statistical analysis. Other specialties were grouped under preventive dentistry for the same reason. P values ≤ 0.05 were considered statistically significant.

3. RESULTS

One hundred and twelve dentists participated in the study. The response rate was 85.5% (112 of 131) comprising 51 males and 61 females aged 23 to 55 years. (Mean age= 35.21 years \pm 8.21, modal age= 33 years).

Factor analysis produced 3 prominent groups of potential predictors namely Income-related predictors (accounting for 27.7%), Skills-related predictors (10.8%) and Work Hours-related predictors (9.4%). So, all the factors assessed accounted for 47.9% of potential predictors (Table 1).

Table 1. Principal Component Analysis using 3 Component Extraction

Income-related predictors	Skills-related predictors	Work-Hours-related predictors
Affluence	Skills relevant to specialty	Challenging diagnosis
Income	Intellectual content of specialty	Predictable work hours
Prestige	Career counseling	Private practice opportunity
Patient type		
Residency length		
Few specialist in specialty		
Pre-dental school career plans		
Space availability in specialty		
Pass rate within specialty		
Grants		

Table 1 shows the relationship of the various predictors based on component analysis. The results informed grouping into income-related, skills-related and work-hour related factors.

Respondents rated skills and content highest and affluence least. Average values of predictors rated by respondents ranged from 2.29 ± 1.23 to 4.09 ± 1.04 (Table 2).

Table 2. Average values of predictors as rated by respondents

Strengths of predictors	Affluence rated highest and lowest
Skills	4.09 ± 1.04
Content	4.07 ± 0.93
Private practice	3.77 ± 1.09
Work Hours	3.61 ± 1.31
Challenging	3.51 ± 1.19
Income	3.51 ± 1.19
Prestige	3.31 ± 1.26
Patient type	3.15 ± 1.36
Few specialists	2.95 ± 1.34
Space availability	2.88 ± 1.33
Length	2.74 ± 1.21
Pre-school plans	2.72 ± 1.32
Grants	2.69 ± 1.31
Counseling	2.66 ± 1.29
Pass rate	2.64 ± 1.33
Affluence	2.29 ± 1.23

Table 2 shows the relative strengths of predictors as rated by respondents- skills being rated highest and affluence rated lowest.

Skills and content were generally highly rated by respondents. Some predictors showed both intra specialty and inter specialty high rankings while others showed either (Table 3).

Table 3. Average Likert Ratings of Predictors by Specialty

	Conservative Dentistry	Dental Public Health	General Dental Practice	Oral and Max. Surgery	Oral Medicine	Oral Pathology	Orthodontics	pediatric dentistry	Periodontics
Skills	3.96 ± 0.93	4.17 ± 1.33	4.13 ± 1.13	4.09 ± 1.24	3.86 ± 1.07	4.40 ± 0.89	4.18 ± 1.05	4.30 ± 0.95	4.00 ± 1.00
Content	3.80 ± 1.00	4.50 ± 0.84	4.38 ± 0.52	4.35 ± 1.03	4.00 ± 0.82	4.20 ± 0.44	4.18 ± 0.66	3.50 ± 1.08	4.22 ± 0.44
Challenging	3.48 ± 0.96	3.00 ± 1.54	3.50 ± 1.41	3.83 ± 1.40	3.71 ± 0.95	3.20 ± 1.48	3.44 ± 1.03	3.20 ± 1.32	3.67 ± 1.12
Work Hours	3.56 ± 1.19	4.50 ± 0.55	4.25 ± 0.89	2.61 ± 1.37	3.43 ± 1.27	4.60 ± 0.89	3.81 ± 1.42	3.70 ± 1.06	4.00 ± 1.32
Patient type	2.96 ± 1.17	2.67 ± 1.97	3.37 ± 0.74	2.96 ± 1.49	2.57 ± 1.51	2.80 ± 1.30	3.00 ± 1.55	4.30 ± 0.82	4.00 ± 0.71
Income	3.80 ± 1.08	3.00 ± 1.26	3.38 ± 1.19	3.00 ± 1.31	3.14 ± 1.21	3.20 ± 0.84	4.13 ± 1.15	3.30 ± 0.67	4.00 ± 0.87
Affluence	2.32 ± 1.22	1.67 ± 1.21	2.38 ± 0.92	1.96 ± 1.26	1.71 ± 0.76	2.00 ± 1.22	2.50 ± 1.46	2.80 ± 0.92	2.67 ± 1.22
Length	2.52 ± 1.23	2.00 ± 1.26	3.25 ± 0.89	2.78 ± 1.38	2.43 ± 0.98	2.80 ± 1.30	2.75 ± 1.24	3.00 ± 1.05	3.33 ± 1.11
Private practice	4.20 ± 0.71	3.17 ± 1.47	4.50 ± 0.76	3.21 ± 1.41	3.71 ± 0.95	2.80 ± 0.84	4.13 ± 0.89	3.50 ± 0.71	3.67 ± 1.00
Prestige	3.48 ± 1.19	3.00 ± 1.41	2.75 ± 1.16	3.48 ± 1.31	2.14 ± 0.90	3.00 ± 1.58	3.63 ± 1.02	3.00 ± 1.05	3.89 ± 1.27
Few specialists	2.64 ± 1.08	2.17 ± 1.47	2.87 ± 1.64	2.87 ± 1.39	1.71 ± 0.49	3.40 ± 1.82	3.38 ± 1.20	2.90 ± 1.37	4.00 ± 0.87
Pre-school plans	2.68 ± 1.07	1.83 ± 1.17	2.13 ± 1.64	3.17 ± 1.44	2.43 ± 1.51	3.20 ± 1.48	2.44 ± 1.21	2.70 ± 0.95	3.00 ± 1.32
Counseling	2.64 ± 1.19	2.83 ± 1.83	2.13 ± 1.46	2.52 ± 1.41	2.86 ± 1.46	2.80 ± 0.84	2.44 ± 1.21	2.90 ± 1.10	3.56 ± 1.24
Space availability	2.72 ± 1.21	2.5 ± 1.38	2.25 ± 1.49	2.83 ± 1.47	2.00 ± 1.00	2.40 ± 1.14	3.25 ± 1.24	3.30 ± 0.95	3.67 ± 1.41
Pass rate	2.40 ± 1.19	3.00 ± 1.41	2.13 ± 1.55	2.52 ± 1.41	2.00 ± 1.15	2.80 ± 1.30	2.94 ± 1.29	2.90 ± 1.20	3.44 ± 1.42
Grants	2.44 ± 1.12	3.00 ± 1.90	2.37 ± 1.414	2.52 ± 1.51	2.29 ± 1.11	3.60 ± 0.89	2.75 ± 1.29	2.70 ± 1.06	3.33 ± 1.12

Key: Green=Strongest Inter-specialty rating
 Yellow=Strongest Intra-specialty rating
 Blue=weak Intra-specialty rating
 Green+Yellow= Combined Strongest Inter & Intra specialty rating.
 Other Specialties not included in table due to small numbers
 Prosthodontics 2
 Medical law and ethics 1

Preventive dentistry and Restorative/Child dental health were predominantly female-favored specialties while oral Surgery and Pathology were male dominated ($P < 0.001$) (Table 4).

Table 4. Specialty choice by gender

		Specialty			Total	
		OMFS&Path	Preventive	Resto/Paedo		
Gender	Female	Count	6	21	34	61
		% within Gender	9.8%	34.4%	55.7%	100.0%
	Male	Count	22	10	19	51
		% within Gender	43.1%	19.6%	37.3%	100.0%
Total		Count	28	31	53	112
		% within Gender	25.0%	27.7%	47.3%	100.0%

Table 4. shows a strong male predilection for Oral and Maxillofacial Surgery/Pathology while Restorative Dentistry and pediatric dentistry as well as Preventive Dentistry enjoyed a female predilection. $X^2=16.53$, $df=2$, $P < 0.001$

Eventual specialty choices were positively associated with “Interesting” undergraduate subjects ($P < 0.001$) but not with “stressful” undergraduate subjects ($P = 0.762$) (Table 5).

Table 5. Specialty choice by perceived interest & stress of subject at undergraduate level

		Specialty			Total
		OMFS&Path	Preventive	Resto/Paedo	
Interest	OMFS&Path	19	6	5	30
	Preventive	3	19	5	27
	Resto/Paedo	6	6	43	55
Total		28	31	53	112
Stress	OMFS&Path	8	12	23	43
	Preventive	4	3	5	12
	Resto/Paedo	16	16	25	57
Total		28	31	53	112

Table 5 shows the relative strengths of stress and interest in a subject during undergraduate years in shaping future postgraduate dental career. While interest played a significant role, stress didn't.

Interest: $X^2=69.85$, $df=4$, $P < 0.001$

Stress: $X^2=1.85$, $df=4$, $P=0.762$

4. DISCUSSION

The dearth of research into predictors of postgraduate dental training in Nigeria necessitated the current study. The authors reduced the large number of factors assessed into manageable groups through factor analysis which resulted into three main groups – Income-related, Skills-related and Work-Hours-related predictors. Though the major work which influenced the content of the questionnaire used in this study was by Arowojolu and co-workers, [4] other works [6,7] were also considered amongst others.

Counseling, a part of the routine for postgraduate dental placements abroad [6] is yet to be imbibed in Nigeria hence the current lopsidedness. The current study could become a career counseling tool for would-be counselors in the various Nigerian postgraduate dental training institutions.

Skills and intellectual content were highly by respondents corroborating an earlier Jordanian study among medical students [7]. These factors had predictive value since virtually all respondents rated them very highly.

In an attempt to find predictors of postgraduate specialty among respondents therefore, we analyzed differences both within and across specialties. The predictive power of any factor was thus rated by how they fared within and across specialties. The most predictive factors ranked highest both within and across specialties.

Based on this analysis, private practice opportunity appeared highly predictive of a choice of postgraduate career in General dental practice (GDP). This corroborated an earlier French survey of 1780 students [8] but was at variance with an American report which rated intellectual challenge and demographics higher predictors of GDP choice [9]. It is necessary to replicate this study among larger numbers of dentists to further evaluate the evidence.

Would-be postgraduate dental advisors might be interested in the multiple predictive ability of predictable work hours.

In combination with private practice opportunity, predictable work hours appeared strongly predictive of a choice of postgraduate training GDP. It equally appeared strongly predictive of a postgraduate career choice in Oral pathology in combination with Pre-school plans and Grants for overseas training.

Again, in combination with intellectual content and private practice opportunity, work hours predicted a choice of Dental public health. Work-life balance is a known influencer of postgraduate career choice among doctors [10] but the current study did not establish any gender bias in work-life balance considerations ($P>0.05$).

A love for challenge appeared highly predictive of a choice of Oral and maxillofacial surgery. In the present study, challenge strongly predicted a choice of Oral and maxillofacial surgery among respondents, corroborating an earlier report [11]. This might be connected with the "masculine" perception of Oral and maxillofacial surgery which featured prominently in the current study ($P=<0.001$) corroborating earlier studies [12-14]. It is pertinent for would be postgraduate dental advisors to note that "Challenge" (how challenging a specialty is perceived to be) predicted the choice of several postgraduate dental specialties. It appeared to be multiply predictive among respondents. In combination with private practice opportunity, challenge was highly predictive of a choice of Oral medicine while it was highly predictive of a choice of Oral and maxillofacial surgery in combination with prestige, corroborating an earlier study [13].

Income singularly predicted a choice of orthodontics, but predicted a choice of conservative dentistry only in combination with Private practice opportunity. Again, though income appeared singly predictive of choice of orthodontics, private practice opportunity was also highly important for a choice of orthodontics. There was a striking resemblance between these findings and a survey of American orthodontic residents with about 90% opting for private practice rather than an academic career [15].

Some factors influencing choice of postgraduate dental training in Nigeria appeared to be less predictive because their high inter-specialty ranking did not match intra-specialty rankings. Such factors appeared to exert their predictive powers in a group rather than being individual predictors.

Overall, pediatric dentistry and periodontics appeared to be relatively easy to predict based on our observations. The prediction is however even simpler for pediatric dentistry with two strong predictors- being female and patient type in combination with weaker predictors like skills and affluence. The female predilection for children specialties among doctors is well-documented in literature [12,16,17], has been reported in Nigerian [4] but is not been well researched among Nigerian pediatric dentists.

Gender also appeared to have strong predictive power on other specialties. While more men chose Oral surgery, women preferred preventive dentistry, pediatric dentistry and conservative dentistry ($P < 0.001$).

Interestingly, periodontics appeared special in many respects being the only specialty influenced by the presence of few specialists and the highest number of multiple predictors mostly unimportant to other specialties including counseling, pass rate and space availability. Another striking difference between periodontics and the other specialties was an aversion for private practice. This is an important factor to note by would-be dental postgraduate advisors.

While clinical experiences of “stressful” or “interesting” subjects had a strong influence on their eventual specialty choice, the role of undergraduate experience in specialty choice is equivocal. Some studies report a link between the two [18,19] while other workers believe that post-graduation experiences exert a greater influence on specialty choice [20].

However, though “interesting subjects” during undergraduate years had the predictive power on specialty choice, “stressful subjects” exerted no such influence. This is probably because many respondents went ahead to study subjects perceived as “stressful” during undergraduate training. It is also possible that respondents had resits in subjects considered stressful and further studies required to pass resit examination generated interest in those subjects.

The suggestion for postgraduate dental advisors is in agreement with a study conducted among dental students in the United States which concluded that mentoring and faculty encouragement affected the decision to pursue a postgraduate dental career [21].

The apparent multiple predictive power of “challenge” in postgraduate dental specialty choice seems to be more predictive in deciding to take on postgraduate dental training rather than a predictor of specialty choice as corroborated by a recent study [22].

The authors believe that adopting the predictive model as suggested in the current study would help other countries passing through similar challenges in building their undergraduate and postgraduate dental training manpower.

5. CONCLUSIONS

Skills and content were the most highly-rated factors affecting choice of postgraduate training among Nigerian dental graduates but they were not predictors. The deciding highly-predictive factors appeared to be income, work hours, private practice opportunity and to a lesser extent, affluence. There was a significant female predilection for pediatric dentistry, restorative dentistry and preventive dentistry while oral and maxillofacial surgery enjoyed a male predilection. Periodontology on the other hand seemed to have multiple relatively uncommon predictors.

The gradual shift from an oral surgery predilection to restorative dentistry informs the need to incorporate the office of postgraduate dental advisors into the postgraduate dental curriculum in Nigeria.

CONSENT

Informed consent was obtained from the participants. Participants were dentists and not patients. Acceptance to fill the questionnaires was accepted as consent.

ETHICAL APPROVAL

All authors hereby declare that being a purely questionnaire- based study, approval of the dental education committee of the country's national association was considered adequate. The study was however carried out in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

LIMITATIONS

The number of the respondents limited the practicability of some statistical calculations which necessitated grouping and potential loss of comparisons.

The authors agree that many issues raised in this study might not have been “thoroughly” addressed but this was not part of aim. Our aim was to highlight the current unhealthy trend in specialty choice which is based on popular opinion and at the same time to propose the inclusion on postgraduate dental advisors who can work with the predictive model here proposed.

RECOMMENDATIONS

1. This study should be replicated among a larger number of Nigerian dentists.
2. The Office of a Dental Postgraduate Advisor should be created in all dental postgraduate training institutions in Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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