

# Dental Therapy Student cohorts: Trends in enrolment and progress at a South African University.

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## SUMMARY

**Introduction:** The urgent need to train a great many dental therapists to alleviate the shortage of oral health personnel has long been recognised.

**Aims and objectives:** To describe trends in enrolments, examination pass rates and graduations of cohorts of dental therapy students at Sefako Makgatho Health Science University during the decade 2004 to 2014. The number of students who completed their degree and graduated within the regulation time was also determined.

**Design:** A cross-sectional descriptive study.

**Methods:** Academic records of cohorts of dental therapy students for the period 2004 to 2014 were reviewed. Data related to demographic characteristics, numbers enrolled, numbers who dropped out, and numbers who graduated were acquired and then captured in Microsoft Excel software.

**Results:** The median number of enrolled students in all years was 36. The maximum number of first year enrolment was 21. More female students than male students enrolled and graduated. The aggregate examination pass rate was in the low 80s. The number of graduates was less than a third of the number enrolled. Less than half of all students who had registered initially successfully completed the course in the regulation time.

**Conclusions:** Both student enrolment and graduations are on an upward trajectory.

## INTRODUCTION AND BACKGROUND

The Saskatchewan Dental Therapists Association defines dental therapists as primary oral health care professionals who are trained to perform basic clinical dental treatment and preventive services within a variety of practice

settings.<sup>1</sup> In South Africa, dental therapists were initially trained to undertake their scope of practice under the supervision of a qualified dentist in public dental service as a part of the multi-disciplinary healthcare team.<sup>2</sup> Dental therapists have been allowed to practice independently since October 1992.<sup>3</sup> They focus on the holistic care of patients, which ranges from prevention of oral disease and promotion of oral health to the alleviation of oral abnormalities, pain and disease. They also function in the fields of preventive, promotive and rehabilitative health, on primary, secondary and tertiary levels.<sup>4</sup>

The structural ills of the Health System which necessitated the founding of the dental therapy profession in South Africa have not yet been adequately corrected. The problems include, among other factors, a shortage and an inequitable distribution of oral health personnel,<sup>5-8</sup> a lack of dental services at primary health care level,<sup>9</sup> high attendance rates where services are available and accessible,<sup>10,11</sup> and the limited range of services offered.<sup>12</sup> Dental caries is a common childhood disease in the country despite the fact that National Oral Health surveys indicate a positive trend of decreasing severity.<sup>13-15</sup> The latest survey found that more than 80% of dental caries in children was untreated.<sup>15</sup> New oral health priorities, which include conditions such as periodontal disease, oral manifestations of HIV/AIDS, dental trauma, oral cancer and craniofacial anomalies, are now under consideration, adding to the burden.<sup>16,17</sup>

The urgent need to train a great many dental therapists to alleviate the shortage of oral health personnel has long been recognised.<sup>18</sup> The human resource plan of the National Department of Health envisaged an increased annual output of 600 dental therapists from a baseline of 25.<sup>19</sup> Traditionally, four methods of calculating health personnel requirements have been applied: health-care demands, health-needs approach, personnel to population ratios, and service targets.<sup>20,21</sup> Oral health personnel, including dental assistants, oral hygienists, dental therapists, and dentists, have been estimated to constitute 0.2 per 1000 population.<sup>22</sup> A meagre dental therapist to population ratio of 0.13 per 10,000 has been calculated.<sup>23</sup> At the time of the study, seven hundred and eight dental therapists were registered with the Health Professions Council of South Africa.<sup>24</sup> Dental therapy training is currently offered at the Dental Schools of the Universities of KwaZulu-Natal and Sefako Makgatho

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Health Sciences University. A survey of the application, enrolment and graduation records of the University of KwaZulu-Natal for the period 2001 to 2010 was recently performed. That study found a linear increase in enrolment from 60 to 81 and an upward shift of around a mean of 16 graduates per year.<sup>25</sup>

Training of dental therapists is also offered at Sefako Makgatho Health Science University and in view of the motivation to enhance the numbers of dental therapists in the country, a study of the contribution of that programme is warranted.

## OBJECTIVES OF THE STUDY

- To describe the demographic characteristics and trends in enrolments and graduations of dental therapy student cohorts of Sefako Makgatho Health Sciences University for the period 2004 to 2014.
- To describe trends in the examination pass rates for the first, second and third years of study.
- To determine the median number of students who completed their degrees and graduated within the regulation time.

## MATERIALS AND METHODS

### Study design

This was a cross-sectional descriptive study in which existing academic records were reviewed.

### Target population

The study population consisted of the academic records of cohorts of dental therapy students who were enrolled at Sefako Makgatho Health Sciences University during the period 2004 to 2014.

### Study sample

Every available record was studied, yielding a total of 423 files.

## MEASUREMENTS

### Academic records

Data related to the demographic characteristics of the students, the numbers enrolled, numbers who dropped out, and the numbers who graduated were acquired and then captured in Microsoft Excel software.

### Definition of variables and terms

Age and gender refer to student age and sex as recorded in the academic records.

Population group breakdown of students into African, Indian, Coloured and White was applied according to the Population Registration Act of 1950.<sup>26</sup>

Regulation time is the period of time normally expected for completion of the degree (three years).

Throughput, quite simply, is how many students who started studying completed the course of study. This may also be measured by the number of students who do not "drop out".<sup>27</sup>

### Ethical considerations

Ethical approval for the study was granted by the Ethics Committee of the Sefako Makgatho Health Sciences University (SMREC/D/1820/2017). Permission to conduct

the study was granted by the Chief Executive Officer (CEO) of the Medunsa Oral Health Centre.

## STATISTICAL ANALYSIS/HYPOTHESIS TESTING

Collected data were subjected to univariate and bivariate analysis in Statistical Analysis Software (SAS) software. Frequencies, medians and proportions were calculated.

Chi-squared tests were performed to test the statistical significance of the differences in proportions.

Chi-squared tests for trends were performed to investigate trends in enrolments and examination pass rates.

The chosen significance level of the tests was a p-value less than 0.05.

## RESULTS

Academic records of dental therapy student cohorts for the period 2004 to 2014 were analysed.

### Demographic characteristics

**Table 1: Population Groups represented in the sample.**

Cohorts	Population Groups				Total N (%)
	African N (%)	Indian N (%)	Coloured N (%)	White N (%)	
2004	27 (90)	2 (6.7)	1 (3.3)	0 (0)	30 (100)
2005	30 (90.9)	2 (6.1)	1 (3)	0 (0)	33 (100)
2006	34 (89.4)	2 (5.3)	0 (0)	2 (5.3)	38 (100)
2007	27 (84.4)	5 (15.6)	0 (0)	0 (0)	32 (100)
2008	31 (86.1)	2 (5.6)	3 (8.3)	0 (0)	36 (100)
2009	30 (93.8)	2 (6.2)	0 (0)	0 (0)	32 (100)
2010	38 (97.4)	1 (2.6)	0 (0)	0 (0)	39 (100)
2011	36 (100)	0 (0)	0 (0)	0 (0)	36 (100)
2012	38 (97.4)	1(2.6)	0 (0)	0 (0)	39 (100)
2013	48 (96)	2 (4)	0 (0)	0 (0)	50 (100)
2014	58 (100)	0 (0)	0 (0)	0 (0)	58 (100)
<b>Total</b>	<b>397 (93.9)</b>	<b>19 (4.5)</b>	<b>5 (1.2)</b>	<b>2 (0.4)</b>	<b>423 (100)</b>

The overall median number of enrollees in the first, second, and third years of study between the years 2004 and 2012 was 36 with an interquartile range of 32 to 39. Enrolments have been on an upward trajectory since 2012 when significant growth (28%) was experienced. The overwhelming majority (93.9%) of students were African. White, Coloured, and Indian students together comprised only 6.1% of the enrollees.

**Table 2: Trends in first-year enrolments by gender**

Cohorts	Gender		Total	Chi-squared test for trend
	Female n (%)	Male n (%)		
2004	6 (60)	4 (40)	10 (100)	P = 0.025
2005	12 (85.7)	2 (14.3)	14 (100)	
2006	5 (55.6)	4 (44.4)	9 (100)	
2007	1(14.3)	6 (85.7)	7 (100)	
2008	12 (60)	8 (40)	20 (100)	
2009	8 (57.1)	6 (42.9)	14 (100)	
2010	5 (38.5)	8 (61.5)	13 (100)	
2011	12 (75)	4 (25)	16 (100)	
2012	9 (42.9)	12 (57.1)	21 (100)	
2013	8 (40)	12 (60)	20 (100)	
2014	7 (33.3)	14 (66.7)	21 (100)	
<b>Total</b>	<b>85 (51.5)</b>	<b>80 (48.5)</b>	<b>165 (100)</b>	

The median number of first year enrollees during the decade between 2004 and 2014 was 14 with an interquartile range of 10 to 20. A statistically significant ( $p < 0.05$ ) sharp increase in enrolment was experienced in 2008. A steady increase in enrolment was recorded between the years 2010 and 2012. More female students than male students were enrolled. There was strong evidence of a trend of increased proportion of female student enrolment in the population ( $p < 0.05$ ).

**Table 3:** Trends in the first year examination pass rate

Cohorts	Examination Results		Total	Chi-squared test for trend
	Pass n (%)	Fail n (%)		
2004	10 (100)	0 (0)	10 (100)	P = 0.425
2005	12 (85.7)	2 (14.3)	14 (100)	
2006	9 (100)	0 (0)	9 (100)	
2007	5 (71.4)	2 (28.6)	7 (100)	
2008	18 (90)	2 (10)	20 (100)	
2009	13 (92.9)	1 (7.1)	14 (100)	
2010	10 (76.9)	3 (23.1)	13 (100)	
2011	12 (75)	4 (25)	16 (100)	
2012	17 (81)	4 (19)	21 (100)	
2013	14 (70)	6 (30)	20 (100)	
2014	18 (85.7)	3 (14.3)	21 (100)	
<b>Total</b>	<b>138 (83.6)</b>	<b>27 (16.4)</b>	<b>165 (100)</b>	

The mean pass rate during the decade between 2004 and 2014 was 83.6% (SD 10.6). There was insufficient evidence to reject the null hypothesis of no trend in the proportion of students who passed the examination in the population ( $p > 0.05$ ).

**Table 4:** Trends in second year enrolments by gender

Cohorts	Gender		Total	Chi-squared test for trend
	Female n (%)	Male n (%)		
2004	3 (42.9)	4 (57.1)	7 (100)	P = 0.120
2005	5 (50)	5 (50)	10 (100)	
2006	10 (71.4)	4 (28.6)	14 (100)	
2007	7 (70)	3 (30)	10 (100)	
2008	0 (0)	2 (100)	2 (100)	
2009	11 (68.8)	5 (31.2)	16 (100)	
2010	8 (53.3)	7 (46.7)	15 (100)	
2011	3 (50)	3 (50)	6 (100)	
2012	9 (81.8)	2 (18.2)	11 (100)	
2013	9 (52.9)	8 (47.1)	17 (100)	
2014	5 (27.8)	13 (72.2)	18 (100)	
<b>Total</b>	<b>70 (55.6)</b>	<b>56 (44.4)</b>	<b>126 (100)</b>	

The median number of second year enrollees during the decade between 2004 and 2014 was 11 with an interquartile range of 7 to 16. A statistically significant ( $p < 0.05$ ) sharp decrease in overall enrolment was experienced in 2008. Female students constituted 55.6% of the cohort. There was insufficient evidence to reject the null hypothesis of no trend in the proportion of female student enrolment in the population ( $p > 0.05$ ).

The mean pass rate during the decade between 2004 and 2014 was 80.2% (SD 14.7). There was insufficient evidence to reject the null hypothesis of no trend in the proportion of students who passed the examination in the population ( $p > 0.05$ ).

**Table 5:** Trends in the second year examination pass rate

Cohorts	Examination Results		Total	Chi-squared test for trend
	Pass n (%)	Fail n (%)		
2004	4 (57.1)	3 (42.9)	7 (100)	P = 0.224
2005	7 (70)	3 (30)	10 (100)	
2006	14 (100)	0 (0)	14 (100)	
2007	10 (100)	0 (0)	10 (100)	
2008	2 (100)	0 (0)	2 (100)	
2009	11 (68.8)	5 (31.2)	16 (100)	
2010	12 (80)	3 (20)	15 (100)	
2011	5 (83.3)	1 (16.7)	6 (100)	
2012	8 (72.7)	3 (27.3)	11 (100)	
2013	12 (70.6)	5 (29.4)	17 (100)	
2014	16 (88.9)	2 (11.1)	18 (100)	
<b>Total</b>	<b>101 (80.2)</b>	<b>25 (19.8)</b>	<b>126 (100)</b>	

**Table 6:** Trends in third year enrolments by gender

Cohorts	Gender		Total	Chi-squared test for trend
	Female n (%)	Male n (%)		
2004	7 (53.8)	6 (46.2)	13 (100)	P = 0.458
2005	4 (44.4)	5 (55.6)	9 (100)	
2006	9 (60)	6 (40)	15 (100)	
2007	10 (66.7)	5 (33.3)	15 (100)	
2008	10 (71.4)	4 (28.6)	14 (100)	
2009	0 (0)	2 (100)	2 (100)	
2010	9 (81.8)	2 (18.2)	11 (100)	
2011	7 (50)	7 (50)	14 (100)	
2012	4 (57.1)	3 (42.9)	7 (100)	
2013	10 (76.9)	3 (23.1)	13 (100)	
2014	8 (53.3)	7 (46.7)	15 (100)	
<b>Total</b>	<b>78 (60.9)</b>	<b>50 (39.1)</b>	<b>128 (100)</b>	

The median number of third year enrollees during the decade between 2004 and 2014 was 13 with an interquartile range of 9 to 15. A statistically significant ( $p < 0.05$ ) sharp decrease in overall enrolment was experienced in 2008. Female students constituted 60.9% of the cohort. There was insufficient evidence to reject the null hypothesis of no trend in the proportion of female student enrolment in the population ( $p > 0.05$ ).

**Table 7:** Trends in third year examination pass rate

Cohorts	Examination Results		Total	Chi-squared test for trend
	Pass n (%)	Fail n (%)		
2004	11 (84.6)	2 (15.4)	13 (100)	P = 0.254
2005	7 (77.8)	2 (22.2)	9 (100)	
2006	13 (86.7)	2 (13.3)	15 (100)	
2007	12 (80)	3 (20)	15 (100)	
2008	14 (100)	0 (0)	14 (100)	
2009	2 (100)	0 (0)	2 (100)	
2010	11 (100)	0 (0)	11 (100)	
2011	14 (100)	0 (0)	14 (100)	
2012	7 (100)	0 (0)	7 (100)	
2013	11 (84.6)	2 (15.4)	13 (100)	
2014	15 (100)	0 (0)	15 (100)	
<b>Total</b>	<b>117 (91.4)</b>	<b>11 (8.6)</b>	<b>128 (100)</b>	

The mean pass rate at the third year of study during the decade between 2004 and 2014 was 91.4% (SD 9.3). There

was insufficient evidence to reject the null hypothesis of no trend in the proportion of students who passed the examination in the population ( $p > 0.05$ ).

### Demographic characteristics

The current study observed a progressive rise in the proportion of female student enrolment during the decade between 2004 and 2014 (51.5 % in the first year, 55.6% in the second year, and 60.9% in the third year of study respectively). This study produced results which corroborate the findings of a great deal of work in the field of oral health research.<sup>28-30</sup> The 60:40 female: male ratio in the third year of study is consistent with that reported by Singh and Combrink (2011).<sup>25</sup> A possible explanation for the change in gender distribution might be that more male than female students either repeat or drop out of the course.

The demographics show that the overwhelming majority (94%) of the enrollees were African and that White, Coloured, and Indian students together comprised only 6% of the cohorts. The present findings seem to be consistent with those reported by Singh and Combrink (2011) which found that White and Coloured students are under-represented among dental therapy student registrations.<sup>25</sup> A possible explanation for this might be that the results reflect the historical circumstances under which the dental therapy profession was introduced in South Africa.<sup>31,32</sup> The low number of White, Coloured, and Indian students is an important issue for future research.

### Enrolments

Relevant findings were that during the decade between 2004 and 2014 an average of 36 students (first, second and third year) were enrolled and that the maximum number of first year enrolment was 21. These results differ from those of Singh and Combrink (2011) who reported a substantially higher overall (81) as well as first year (30) enrolment at the Dental School, University of KwaZulu-Natal.<sup>25</sup> In contrast to the declining number of applications for enrolment received at Sefako Makgatho Health Science University, the University of KwaZulu-Natal experienced an exponential increase during the period under review.<sup>25</sup> However, the low combined overall enrolment at both dental schools implies that the proposal of the National Department of Health that the annual output of dental therapists be increased to 600 will remain a pipedream, unless factors that limit or restrict enrolment are addressed. These include, but are not limited to, the availability of preclinical and clinical training facilities and human resources.

An important finding was that enrolments went up 28% in the year 2013. This result, however welcome, is not very encouraging for the reason that in contrast to the increased first year enrolment experienced at the University of KwaZulu-Natal,<sup>25</sup> this growth at Sefako Makgatho is attributable to an increase in enrolments at the second and third years of the course.

### Examination pass rate

The results of this investigation show that the examination pass rate was intermediate in the first year, low in the second year and high in the third year of study. These results have not previously been described. It may be that the low examination pass rate in the second year of study is due to the fact that some of the students who transfer to dental therapy from other programs are underprepared.

**Table 9:** Trends in graduations by gender

Cohorts	Gender		Total	Chi-squared test for trend
	Female n (%)	Male n (%)		
2004	7 (63.6)	4 (36.4)	11 (100)	P = 0.558
2005	3(42.9)	4 (57.1)	7 (100)	
2006	8 (61.5)	5 (38.5)	13 (100)	
2007	8 (66.7)	4 (33.3)	12 (100)	
2008	10 (71.4)	4 (28.6)	14 (100)	
2009	0 (0)	2 (100)	2 (100)	
2010	9 (81.8)	2 (18.2)	11 (100)	
2011	7 (50)	7 (50)	14 (100)	
2012	4 (57.1)	3 (42.9)	7 (100)	
2013	8 (72.7)	3 (27.3)	11 (100)	
2014	8 (53.3)	7 (46.7)	15 (100)	
<b>Total</b>	<b>72 (61.5)</b>	<b>45 (38.5)</b>	<b>117 (100)</b>	

The median number of graduates per year was 11 with an interquartile range of 7 to 14. A statistically significant ( $p < 0.05$ ) steep decline in overall graduations was experienced during the years 2005, 2009 and 2012 respectively. During the decade between 2004 and 2014, with the exception of 2005 and 2009, more females than males earned dental therapy degrees. There was insufficient evidence to reject the null hypothesis of no trend in the proportion of female student graduations in the populations ( $p > 0.05$ ).

**Table 9:** Numbers of students who completed their degree and graduated within the regulation time

Cohorts	Year of study			Number of Graduates	Throughput (%)
	First N	Second N	Third N		
2004	10	9 (1)	7	6	60
2005	14	9 (3)	9	8	57
2006	9	8 (1)	8	8	89
2007	7	3 (3)	2	2	29
2008	20	13 (3)	9	9	45
2009	14	10 (3)	8	8	57
2010	13	5 (5)	4	4	31
2011	16	10 (2)	8	7	44
2012	21	14 (3)	9	9	43
<b>Total</b>	<b>124</b>	<b>81 (24)</b>	<b>64</b>	<b>61</b>	<b>45</b>

( ) number of students who dropped out

Throughput = Percentage graduation success (the number of graduates divided by number of students who had enrolled in the first year of study, expressed as percentage).

The median percentage of students who started the course, completed the degree and graduated within the regulation time during the decade between 2004 and 2014 was 45 with an interquartile range of 37 to 58.5. Nineteen percent (24/124) of students who started the course dropped out. A little less than a third (39/124) of the students took longer to qualify.

## DISCUSSION

Trends in enrolments, examination pass rates and successful graduations of cohorts of dental therapy students at Sefako Makgatho Health Science University during the period 2004 to 2014 were examined.

### Graduations

The study found that on average 12 students graduated each year during the decade between 2004 and 2014. This number of graduates is low compared with that (16) produced at the University of KwaZulu-Natal. However, the ratio of overall enrolment to the number of graduates at Sefako Makgatho Health Sciences University (1:3) compares favourably with that at the University of KwaZulu-Natal (1:5).<sup>25</sup>

The data showed that more female than male students earned dental therapy degrees at SMU. The findings of the current study are consistent with those of Singh and Combrink (2011) who found that 60.5% of graduates at the University of KwaZulu-Natal were female.<sup>25</sup>

### Throughput

The current study found that less than half (45%) of all students who started the course during the decade between 2004 and 2014 finished it in the regulation time. This rather disappointing result has not previously been described. It is difficult to explain this result, but it may be largely related to the low second year examination pass rate and the 19% course dropout rate.

### Limitations of the study

Data on the ages of the students were not available.

## CONCLUSIONS

Both student enrolment and graduations are on an upward trajectory.

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