

# Influence of Parents' Oral Health Knowledge and Attitudes on Oral Health Practices of Children (5–12 Years) in a Rural School in KwaZulu-Natal, South Africa

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ABSTRACT

**Context:** Oral health knowledge, beliefs, and attitudes of parents have a direct influence on their child's oral health maintenance, dietary habits, and oral health behaviors. **Aim:** The aim of this study was to assess the knowledge, and attitude of parents with regard to the oral health practice of their children and its associated factors. **Material and Methods:** A self-administered structured questionnaire was administered to parents or guardians of learners aged 5–12 years at a low socioeconomic rural primary school in the Ugu district, KwaZulu-Natal, South Africa. In addition to demographic variables, knowledge of dental health, use of toothbrush, use of toothpaste, dietary practices, and dental visits; practice with respect to dental care; and attitudes toward oral health were requested. **Results:** One hundred and forty-four completed survey instruments were received with an 80% (118) representation of mothers. Ninety-five percent of the parents (136) had a positive attitude toward oral health with 86% (124) of the children brushed their tongue and 89% (128) of the children brushed their teeth happily. The mean knowledge score was 70%. Children were significantly more likely to brush their tongues (adjusted odds ratio [AOR]: 3.20 95% confidence interval [CI]: 1.06–9.66  $P < 0.001$ ), be happier when brushing their teeth (AOR: 4.65 95% CI: 1.41–15.38  $P < 0.001$ ) when the caregivers were their mothers, had an above-average knowledge score (AOR: 1.86 95% CI: 0.72–4.85) and positive attitudes (AOR: 3.20 95% CI: 0.46–22.00). **Conclusion:** Parents in the rural community have satisfactory knowledge and a positive attitude toward oral health and children display good practices; however, there are a number of gaps noted in overall parental knowledge.

**KEYWORDS:** Attitudes, dental, health education, oral health knowledge, oral health maintenance, oral health practices, oral hygiene, parents education, practice, school going children, self-administered questionnaires, surveys and questionnaires

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## INTRODUCTION

Oral health diseases are the most common noncommunicable disease affecting an estimated half of the world's population. Approximately 2.4 billion people suffering from caries of permanent teeth and 486 million children suffering from caries of primary teeth.<sup>[1]</sup> Untreated cavity caries in deciduous teeth was the 10th most prevalent condition globally in 2010, affecting 621 million children, with a global

population prevalence of 9%.<sup>[2]</sup> Although dental caries is prevalent across all countries, the severity was lower in higher income countries versus lower middle-income countries (LMICs).

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The prevalence of oral diseases continues to increase in most LMICs, due to increasing urbanization, inadequate exposure to fluoride, and poor access to primary oral health care services. Furthermore, behavioral risk factors such as an unhealthy diet high in free sugars, tobacco use, and harmful use of alcohol play a significant role in increasing the risk for oral diseases.<sup>[3]</sup>

In South Africa, there are no reliable epidemiological data at a population level on oral health diseases. The most recent source of oral health data available for children is the National Children's Oral Health Survey (2003).<sup>[4]</sup> The findings from the survey indicated that 45%–60% of children who needed treatment for dental caries ranged from and the mean number of teeth needing care per child ranged between 2 and 3. The needs varied widely from province to province with the greatest need recorded in the Western Cape Province where almost 80% of the children needed care.<sup>[4]</sup> Applying the Unmet Treatment Need Index (UTN) to the recorded caries rates, the results showed that 80% of carious lesions in children go untreated.<sup>[5]</sup>

Dental caries often leads to a poor oral health status of a child and is often associated with a negative impact on the quality of life, and the eventual deterioration of health.<sup>[6]</sup> The consequences of dental caries include pain, decreased appetite, difficulty chewing, difficulty eating some foods, drinking hot or cold beverages, weight loss, difficulty sleeping, changes in behavior, and poor academic performance.<sup>[7]</sup> Children with poor oral hygiene are more likely to miss school when compared to children with good oral hygiene.

Children spend a majority of their time with their parents/guardians<sup>[8]</sup> more specifically with their mothers and therefore parents play a vital role in instilling good habits and values to their children.<sup>[8]</sup> The maintenance and outcome of oral health if a young child is highly influenced by parents.<sup>[9]</sup>

Prevention of oral health diseases is more cost-effective than treatment and rehabilitation. It is imperative that parents have good oral health knowledge, and attitudes which will influence their child's oral health maintenance, dietary habits, and encourage healthy behaviors.<sup>[9]</sup> Currently, there is a paucity of studies that have been conducted in South Africa that have specifically evaluated knowledge, attitude of parents with regard to the oral health practice of their children. The aim of this study was to assess the knowledge, and attitude of parents with regard to the oral health practice of their children and its associated factors at a low socioeconomic rural primary school in the uGu district, KwaZulu-Natal, South Africa.

## RESEARCH QUESTION

What is the knowledge, and attitude of parents with regard to the oral health practice of their children and its associated factors at a low socioeconomic rural primary school in the uGu district, KwaZulu-Natal, South Africa

## SUBJECTS AND METHODS

### STUDY DESIGN

The study was an observational analytical cross-sectional study.

### STUDY PERIOD

The study was conducted between March and September 2018.

### STUDY SETTING

The study was conducted at a public school situated in a rural location in the Ugu district, Port Shepstone, KwaZulu-Natal South Africa [Figure 1]. The primary school is a no-fee school, with 850 learners, caters for children from Grade R to Grade 7. The school provides daily lunch for the children as part of their service. The total number of children from Grade R to Grade 3 was 468.

### STUDY POPULATION

The study population included all parents or guardians of learners aged 5–12 years (Grade R to Grade 3) who were attending Louisiana Primary School in 2018 and who consented to participate in the study.

### SAMPLE SIZE

To calculate the required sample size, we use Epi Info 7 for population-based surveys using a population size of 465, 80% power, 95% confidence interval, and an estimated prevalence of 50%. The total sample required was 120.

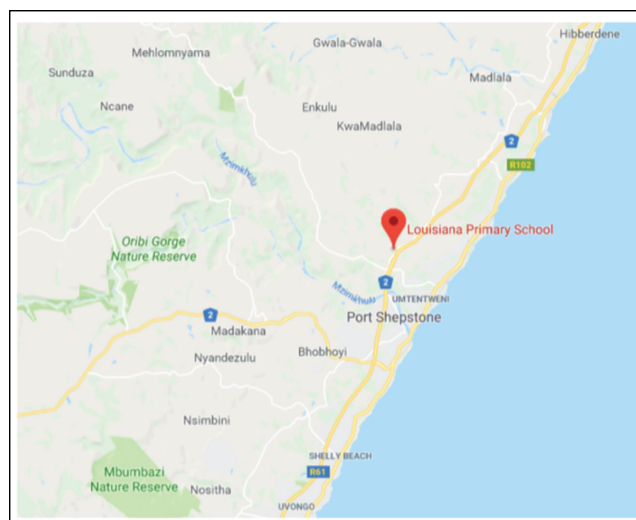


Figure 1: Map highlighting location of Louisiana Primary School in the Ugu district. Source: Google Maps

**DATA COLLECTION***Description of data collection tool*

The questionnaire consisted four sections—Section A: demographic information such as age, marital status, level of education of both the mother and father, and employment status of both parents. Section B: 14 questions assessed overall knowledge of dental health, use of toothbrush, use of toothpaste, dietary practices, and dental visits. The questions consisted of a combination of binary options (yes and no), multiple-choice questions, and rating questions using “agree,” “disagree,” and “don't know” on a modified Likert scale. Section C: three questions tested practice with respect to dental care. Section D: a single question assessed attitudes toward oral health.

*Description—development of research tool*

The questionnaire was designed by the principal investigator. The development of the questionnaire was guided by findings from the literature search and previously validated questionnaires administered.

*Instrument pretesting*

The questionnaires (English and isiZulu version) were piloted on a sample of 10 teachers who had children in a similar age group.

*Instrument reliability and validity, and translation*

The questionnaires were developed in English and translated to IsiZulu by an IsiZulu native speaker who is able to speak both English and IsiZulu. The questionnaire was then translated to English by another bilingual IsiZulu speaker to ensure reliability. The Cronbach  $\alpha$  was 0.83 indicating a very reliable questionnaire. No adjustments to the questionnaire were made, as participants in the pilot study easily understood it.

**VALIDITY***Content and face validity of the questionnaire was assessed by a dentist and teacher*

The questionnaire was administered in the parents' home language either (English or IsiZulu to improve comprehension of questions, which improved the validity of responses and hence reduced misclassification.

To limit social desirability bias, the questionnaire was primarily self-administered and anonymous.

**APPLICATION OF THE DATA COLLECTION TOOL**

We used a self-administered structured questionnaire to collect primary data from participants. The questionnaire and consent forms were designed to be easily read. The questionnaires were sealed in an envelope and sent along with other school notices via

the child's “homework file.” As an incentive, parents were sent a black ballpoint pen. We followed up with a telephone call to ascertain whether the parents had any questions or uncertainties

**SCORING METHODS**

The questions consisted of a combination of binary options (yes and no), and rating questions using “agree,” “disagree,” and “don't know” on a modified Likert scale. The correct option in each category were scored as one and the incorrect options were scored as zero. The knowledge scores were aggregated to a maximum of 14. The total score was calculated for each participant for knowledge followed by a calculation of the mean and median. A score above 70% ( $\geq 11$ ) was considered as good knowledge.

Parents were provided both an English and isiZulu questionnaire to complete in the language of their preference.

**STATISTICAL ANALYSIS**

The data were entered into Microsoft Excel 2013 spreadsheets and exported to Stata Corp. 2013—*Stata Statistical Software: Release 13*. Double entry of data was performed and a process of data verification was conducted to resolve any discrepancies. An initial descriptive analysis of baseline characteristics such as age, education, knowledge, and of oral health practices of participants was performed. Bivariate and multivariate logistic regressions using odds ratios were used to assess the association between parent's sociodemographic factors with their oral health knowledge and practice scores. A  $P < 0.05$  was considered statistically significant.

**ETHICAL APPROVAL**

The Biomedical Research Ethics Committee of the University of KwaZulu-Natal (Reference number BE677/17) provided ethical approval and authorization was obtained from the Department of Education. All parents signed informed consent before completing the questionnaire.

**RESULTS****BASELINE CHARACTERISTICS OF SURVEY PARTICIPANTS**

One hundred and forty-four completed survey instruments were received. Eighty percent (118) of the participants completing the survey were mothers of the children. Seventy-nine percent of the parents (115) were below the age of forty. Eighty-three percent (120) of the parents were single. One hundred and twenty-five (87%) of the parents classified their area of residence as rural. The majority of parents (both mothers (64%) and fathers (65%)) had a high-school education and above. The majority of the mothers (60%) were unemployed [Table 1].

**ATTITUDE OF PARENTS TOWARD DENTAL HEALTH**

Ninety-five percent of the parents (136) had a positive attitude toward oral health by rating oral health as very important or important in relation to other health conditions in general [Table 2].

**CHILDREN'S ORAL HEALTH PRACTICES**

Parents reported that 86% (124) of the children brushed their tongue and 89% (128) of the children brushed their teeth happily [Table 3].

**PARENTAL KNOWLEDGE OF ORAL HEALTH PRACTICES**

The majority of parents correctly answered the knowledge questions. The mean knowledge score was 70% (9.75/14) with a median of 72% (10/14). Less than 70% of the parents correctly answered the following questions: the best time for sweets and cool drinks (40% incorrect); period in which a toothbrush needs to be changed (38% incorrect); best brushing methods for a child (46% incorrect); amount of toothpaste (51% incorrect); first course of action to take place when a child complains of toothache (49% incorrect); long-term breastfeeding (55% incorrect); and transmission

of germs between mother and child if same teaspoon was used (38% incorrect) [Table 4].

**BIVARIATE AND MULTIVARIATE ASSOCIATION BETWEEN SOCIODEMOGRAPHIC FACTORS AND PARENT'S KNOWLEDGE, ATTITUDES, AND CHILDREN'S ORAL HEALTH PRACTICES**

After bivariate analysis mothers (unadjusted odds ratio [UOR]: 1.49 95% CI: 0.58–4.00) and parents between 18 and 29 years of age (UOR: 1.16 95% CI: 0.55–2.45) showed an increased but not significant odds of better oral health knowledge ( $P = 0.08$ ). After multivariate analysis, mothers showed an increased but nonsignificant odds (adjusted odds ratio [AOR]: 1.43 95%CI: 0.58–3.42  $P > 0.12$ ) of better oral health knowledge compared to fathers, grandparents and other caregivers.

Mothers (AOR: 4.17 95% CI: 0.60–26.80); high-school education and above (AOR: 1.36 95%CI: 0.22–8.59); parents from urban areas (AOR: 1.98 95% CI: 0.18–21.47) and parents with above-average knowledge scores (AOR: 4.48 95% CI: 0.50–40.20) had a nonsignificant increased odds of a better attitude toward oral health.

Children were significantly more likely to brush their tongues (AOR: 3.20 95% CI: 1.06–9.66  $P = 0.03$ ) and were more likely to be happier when brushing their teeth (AOR: 4.65 95% CI: 1.41–15.38  $P = 0.02$ ) when the caregivers were their mothers. Furthermore, children were more likely to be happier brushing their teeth when parents had an above-average knowledge score (AOR: 1.86 95% CI: 0.72–4.85) and had positive attitudes (AOR: 3.20 95%CI: 0.46–22.00).

**Table 1: Sociodemographic profile of parents of students**

	N	%
Relationship to child		
Mother	118	82
Father	8	6
Grandmother	13	9
Grandfather	2	1
Other guardian	3	2
Age		
18–29 years	48	33
30–39 years	66	46
40–59 years	28	19
>60 years	2	1
Marital status		
Single	120	83
Married	13	9
Divorced	11	8
Mother's education status		
Primary school and lower	52	36
High school and above	92	64
Father education level		
Primary school and lower	65	45
High school and above	79	65
Mother employment		
Unemployed	86	60
Employed	58	40
Fathers employment		
Unemployed	48	33
Employed	96	66
Residence		
Rural area	125	87
Urban area	19	13

**Table 2: Frequency table of parent's attitude toward oral health**

Variable	Frequency (n)	Percentage (%)
Attitude toward dental health		
Very important	100	69.4
Important	36	25
Neutral	5	3.5
Less important	2	1.4
Not important	1	0.7

**Table 3: Frequency table of children's oral health practices**

Variable	Frequency (n)	Percentage (%)
Children's practice		
Brushing of tongue		
Yes	124	86.1
No	19	13.2
Don't know	1	0.7
Childs mood when brushing teeth		
Happily	128	89
Sad	4	3
Resistant	12	8

**Table 4: Frequency table of parental knowledge of oral health practices**

Parental knowledge		
	N	%
Age in which the child's first tooth grew		
6–10 months	103	71.5
10–16 months	15	10.4
Don't know	26	18.1
Best time to give your child sweets and cool drinks such as Coke		
After meals	88	61.1
In-between meals	20	13.9
At night, before bed	1	0.7
Don't know	35	24.3
Foods that cause teeth to rot in children		
Chocolate	112	77.8
Biscuits	22	15.3
Fruits	9	6.3
Cakes	1	0.7
Period in which a toothbrush should be changed		
Every 3 months	90	62.5
Every 6 months	22	15.3
When the bristles start to splay	22	15.3
Don't know	10	6.9
Frequency of tooth brushing		
Twice a day	113	78.5
Once a day	13	9
After every meal	18	12.5
Best brushing method for a child		
Circular motions	78	54.2
Scrubbing to and fro	53	36.8
Doesn't matter	13	9
The use of fluoride toothpaste prevents holes in teeth (tooth decay)		
Agree	102	70.8
Disagree	13	9
Don't know	29	20.1
First course of action when your child has a toothache		
Give a pain killer	47	32.6
Gargle with salt water	20	13.9
Ask child to eat on the opposite side	1	0.7
Take child to local clinic or dentist	74	51.4
Don't know	2	1.4
Amount of toothpaste placed on a brush		
Small pea-size	70	48.6
Full-length	57	39.6
Doesn't matter	17	11.8
With the growth of the first baby teeth, parents can begin to clean them with a piece of gauze or a clean washcloth		
Agree	96	66.7
Disagree	20	13.9
Don't know	28	19.4
Breast-feeding for a long time causes holes in teeth (decay)		
Agree	56	38.9
Disagree	63	43.8
Don't know	25	17.4

**Table 4: Continued**

Parental knowledge		
Eating too much of food containing sugar can cause holes in teeth (cavities)		
Agree	128	88.9
Disagree	3	2.1
Don't know	13	9
If a baby sleeps with a milk bottle all night this will result in holes in teeth (tooth decay)		
Agree	94	65.3
Disagree	10	6.9
Don't know	40	27.8
Bacteria (germs) from the mother's mouth can be passed to her child if she uses the same spoon when feeding her baby		
Agree	87	60.4
Disagree	27	18.8
Don't know	30	20.8

In addition, children were more likely to brush their tongues (AOR: 2.70 95% CI: 0.40–19.21) when parents had positive attitudes toward oral health ( $P < 0,001$ ) [Table 5].

## DISCUSSION

The demographic profiles of the participants such as less than 40 years of age, majority being single parents, unemployed and a high-school education, and above are generally representative of a lower socioeconomic community in South Africa. The above demographic profiles of participants share similarities with studies conducted in Nepal<sup>[10]</sup> and Belagavi, Karnataka.<sup>[11]</sup>

Despite the wide confidence interval due to a small sample size, the most significant findings of the study was that when the caregivers were their mothers children were significantly more likely to brush their tongues (AOR: 3.20 95% CI: 1.06–9.66  $P < 0.05$ ) and were more likely to be happier when brushing their teeth (AOR: 4.65 95% CI: 1.41–15.38  $P < 0.05$ ). Furthermore when parents had an above-average knowledge score (AOR: 1.86 95% CI: 0.72–4.85) and when parents were positive attitudes toward oral health (AOR: 3.20 95% CI: 0.46–22.00;  $P < 0.001$ ), the children were happier when brushing their teeth.

In our view, this study is among the first that have been conducted among parents of school-going children in a rural area of South Africa.

Mothers are often the main role model to their children and usually have more knowledge compared to fathers regarding their child's oral health.<sup>[12]</sup> A number of previous studies have indicated that the mother's support

**Table 5: Bivariate and multivariate analysis of sociodemographic factors versus knowledge, attitude of parents, and practices of children toward oral health**

	Knowledge			Attitude			Practice—brushing teeth			Practice—state of child				
	UOR	95% CI	AOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI
Relationship to child														
Mother versus other	1.49	0.58–4.00	1.43	0.58–3.42	3.71	0.51–23.32	4.17	0.60–26.80	3.93*	1.19–12.10	3.2*	1.06–9.66	4.46**	1.23–15.22
Age														
18–29 years versus 30 years and above	1.16	0.55–2.45	0.93	0.54–1.60	0.37	0.51–2.28	0.33	0.80–1.35	1.65	0.55–6.12	1.03	0.52–2.04	1.62	0.45–7.30
Marital status														
Married	1.03	0.39–2.77	0.98	0.40–2.39					2.53	0.70–8.14	2.60	0.82–8.21	0.68	0.71–3.35
Education														
High school and above	0.63	0.30–1.32	0.68	0.34–1.37	1.34	0.18–8.29	1.36	0.22–8.59	0.73	0.21–2.19	0.91	0.31–2.72	0.78	0.20–2.64
Employment														
Employed									0.75	(0.35–1.66)				
Residence														
Urban area	0.59	0.19–2.24	0.47	(0.15–1.49)	1.1	0.22–9.23	1.98	0.18–21.47	1.19	0.20–4.84	0.99	0.23–4.34	0.75	(0.35–1.66)
Knowledge scores									1.74	0.60–5.5	0.81	0.44–1.50	2.07	0.62–7.99
Attitude									2.65	0.23–17.56	2.79	0.40–19.21	3.51	0.30–23.77

UOR = unadjusted odds ratio, AOR = adjusted odds ratio, CI = confidence interval

\* $P < 0.05$  and \*\* $P < 0.001$

is significantly associated with the toothbrushing habits of children aged 1–3 years but not with those of children aged 4–5 years.<sup>[15]</sup> For older age children, the child's gender, the mother and father's education, and the caregiver's toothbrushing frequency and oral health knowledge were more likely to influence the tooth brushing habits of older children.<sup>[13]</sup> This is further corroborated by this study that indicates Younger parents between 18 and 29 years of age showed a slightly increased likelihood of better oral health knowledge, with an increased likelihood of the children brushing their gums and having a positive frame of mind toward brushing their teeth. However, there was no significant correlation between mother's age with either dental health knowledge or practices. Similar findings were noted in a survey conducted in district hospitals of Srinagar, Kashmir among women with children below 12 years of age<sup>[14]</sup> and a further study conducted in Nigeria.<sup>[15]</sup> Younger parents generally have better computer, Internet, and smartphone literacy and would therefore have greater access to oral health-related knowledge.<sup>[16]</sup>

The findings of our study indicate areas of strength and weakness in the knowledge of participating parents. The majority of parents were aware of the role in which diet plays on oral health, the role of excessive intake of food containing sugar could cause cavities in teeth,. Similar findings were noted at vaccination centers from six geographic districts in Kuwait.<sup>[16]</sup> Good parental knowledge on dietary factors affecting children's oral health were also shown in a cross-sectional study conducted among mothers of the children aged between 1 and 4 years, attending the pediatric division of government district hospitals in Moradabad, India that showed 73% of mothers had good knowledge of diet and dietary practices.<sup>[9]</sup> The increased knowledge on the role of sugar-containing foods on the child's oral health status could be attributed to the health promotion messages provided about sugar intake.

Parents in our study were knowledgeable on the role of fluoride toothpaste in preventing dental caries, the correct amount of toothpaste, twice-daily brushing of teeth, and the correct brushing technique required. These findings were similar to the previously quoted Indian study.<sup>[17]</sup> A possible reason for the high knowledge among parents in our study is possibly due to the diffusion of the knowledge from the children to the parents. The school in this study is included in the district oral health school team program, which includes an oral hygienist who provides oral health education to children on the correct use of a toothbrush and toothpaste as well as provides toothbrushes and toothpaste to the students.

The majority of parents had knowledge regarding the transmission of bacteria when sharing utensils. These

findings were slightly lower but similar to the study in Rajnandgaon, India;<sup>[17]</sup> however, contradictory findings of lower knowledge on transmissibility by sharing utensils and toys were noted in studies in Nigeria,<sup>[18]</sup> India,<sup>[9]</sup> and Brazil.<sup>[19]</sup>

A population-based cohort study in Brazil indicated that breastfeeding for more than 24 months is associated with an increased risk of dental caries.<sup>[19]</sup> The finding of a high proportion of parents unaware of the risk of prolonged breastfeeding is not unique to our study as similar findings were noted from a study conducted among mothers of 3–6-year-old primary-school children from public primary schools of the city, in Rajnandgaonin, India where 65% of mothers were not aware or did not know that prolonged breastfeeding resulted in tooth decay<sup>[17]</sup> and a study among 200 rural mothers from nearby villages and 200 urban mothers from Udaipur city that showed 47% of mothers were unaware that frequent and prolonged breastfeeding was associated with dental caries.<sup>[20]</sup>

A majority of parents (75.7%) in this study believed that long-term bottle feeding is a causative factor of tooth decay and 63.5%( $n = 93$ ) agreed that leaving the milk bottle at night in the child's mouth increases their risk of tooth decay. The knowledge of prolonged nocturnal bottle feeding in our study is lower than the findings from the previous quoted study in Rajnandgaonin, India that 80% of parents were aware of the harmful effect of prolonged nocturnal bottle feeding.<sup>[17]</sup> This is in contrast to findings from pediatric clinics (well-baby clinics) of Security Forces Hospital in Makkah Al-Mukarrama that showed more than half of the mothers (54.5%) agreed that letting baby sleep with bottle still in the mouth was of no harm to teeth.<sup>[21]</sup> Similar low levels of knowledge on the role of nocturnal bottle feeding was noted in a study in Addis Ababa, Ethiopia that showed only 25% of mothers were aware that nocturnal bottle feeding may increase risk of dental caries.<sup>[22]</sup> The relatively better knowledge in our study participants could be attributed to the promotion of exclusive breastfeeding at clinics during antenatal care, the provision of information on bottle hygiene and the risks associated with prolonged bottle feeding.

#### STUDY LIMITATIONS

Although due diligence was maintained to ensure the integrity of the study, the findings of the study are influenced by the limited sample size. Only parents who signed the consent forms were included in the study sample. Hence, the results, even though they may give insight to the current situation, may not be generalized to the whole Grade R to Grade 3 population of parents and children in the Ugu District of KwaZulu-Natal in 2018.

## CONCLUSION

Parents in the rural community have a positive attitude toward and children display good practices. Overall parents have satisfactory knowledge on oral health, with a number of gaps in knowledge. To reduce the gaps in knowledge, oral health promotion should be integrated into all point of care contact with parents at health facilities, increased community awareness and advertising campaigns as well as a more focused school health oral program that addresses primary prevention, screening, and appropriate referrals to health facilities.

## ACKNOWLEDGEMENT

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## CONFLICTS OF INTEREST

There are no conflicts of interest.

## AUTHORS CONTRIBUTIONS

PN - conducted primary data collection and the first analysis of results. OM - conducted the analysis and developed the manuscript.

## ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

The Biomedical Research Ethics Committee of the University of KwaZulu-Natal (reference number BE677/17) provided ethical approval and authorization was obtained from the Department of Education.

## PATIENT DECLARATION OF CONSENT

All parents signed informed consent before completing the questionnaire.

## DATA AVAILABILITY STATEMENT

data will be available on request from authors.

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