

Assessment of Age of Initiation and Motivation for Oral Hygiene Practice among Children in Ile-Ife, Nigeria: A Preliminary Study

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ABSTRACT

Objective: To assess the age at which parents in Ile-Ife, Nigeria, initiate oral hygiene practices in their children and the social factors that influence the initiation and establishment of these oral hygiene habits

Methods: A cross-sectional study was carried out on 200 mothers who attended Urban Comprehensive Health Center, Obafemi Awolowo University Teaching Hospitals Complex, Eleyele, Ile-Ife, between February and May 2021, using a two-part structured self-administered questionnaire on mothers who had at least a child above six months of age. The data was analysed using SPSS-IBM software (version 27.0), and the level of significance was inferred at $P < 0.05$.

Results: Two hundred mothers participated in the study. The mean age of the participants was 35.17 years. Over half, 115(57.5%) of the participants initiated infant oral hygiene in their children, while all the participants initiated traditional toothbrushing in their children, with the mean age of toothbrushing initiation at 21.77 months. A statistically significant association existed between the age of oral hygiene practice initiation and reasons for habit commencement ($P < 0.005$).

Conclusion: This study showed that the mean age of initiation of oral hygiene practices in the studied population was 21.8 months and sheds light on the factors influencing the commencement of these practices, which include the type of food consumed by the children, presence of new teeth, caries and bad breath

Keywords: Oral hygiene, Infant oral hygiene, Regular tooth brushing, Initiation

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INTRODUCTION

Oral health is an essential component of overall health. Therefore, the oral cavity must be kept clean and healthy.¹ Good oral hygiene practice is essential for maintaining optimal oral health throughout life. In children, good oral hygiene can help prevent both the development and establishment of various diseases affecting the oral cavity, such as early childhood caries (ECC) and periodontal diseases. Children are susceptible to oral diseases, which can be avoided when appropriate oral hygiene practices are inculcated in them at an early age.² Children engage in so many habits that have been linked to an increase in the risk of developing caries, such as prolonged daytime and nocturnal use of feeding bottles with fermentable liquids³ and the consumption of refined carbohydrate-containing snacks between meals.⁴ To prevent these oral diseases, it is essential to initiate appropriate oral hygiene habits in children at the right age.

Some studies have reported a significant decline in the prevalence of dental caries in children since the 1970s; however, it is still the most prevalent chronic disease in childhood.^{5,6} This decline, mostly seen in high-income countries, has been attributed to increased access to oral health care and preventive measures.⁷

The 2022 global report on oral health indicates that approximately 3.5 billion individuals worldwide have been impacted by oral disease, with three-quarters of those affected residing in middle-income countries.⁸ More than 50 million school hours are lost annually as a result of oral health problems, which affect children's performance at school and success in later life.⁹

In developing countries such as Nigeria, children tend to utilize emergency and curative dental services rather than preventive services, which are cheaper and easily accessible.¹⁰ This is an unsatisfactory approach to oral health care – an important component of general health.¹¹ Promoting oral health, especially in children, is most likely to benefit them throughout their lifespan, as healthy environments and behaviours early in life have been shown to reduce the risk of developing oral disease later in life.¹² Tooth brushing habits learned during the early years of life are deeply ingrained in the child's mind and may lead to adopting good oral hygiene habits in later life.¹³

Parents play a vital role in influencing children's behaviour. Mothers are the main socializing agents for children, especially in determining the type of

toothbrush, the quantity of toothpaste used, the pattern of brushing, and even the frequency to be adopted by the children. Furthermore, the earlier the influence, the more likely it is to determine the attitude and behaviour of their children, which may be difficult to change later as they get older.¹³ With the proper techniques, successful oral hygiene habits are developed at the appropriate age. A combination of infant oral hygiene and regular tooth brushing with the correct type of toothbrush and fluoridated toothpaste form the foundation of oral health promotion in children.¹⁴

In Nagoya, Japan, Suzuki et al. 1990 reported that 75.5% of children started tooth brushing before the age of 18 months, and 88.3% had started by age 24 months, with approximately 49% of the parents expressing "eruption of teeth" as their primary motivation for starting to brush their children's teeth while parents who had "caries prevention" as their primary motivator started this process at an earlier age.¹⁵

More recently, it has also been reported that Mexican-American mothers initiate toothbrushing in their children at an average age of 21.6 months, while only 13% of the mothers followed the ADA-recommended oral hygiene guidelines for their children and initiated regular tooth brushing by age 12 months.¹⁶

Numerous microorganisms have been linked to the development and advancement of oral diseases. It has been observed that the levels of *Streptococcus mutans* are significantly lower in children who started brushing their teeth by the age of 12 months.¹⁷ This reveals that proper oral hygiene habits initiated at an early age can positively influence a child's long-term oral health status. Adult help and guidance are essential elements for early-stage behavioural learning to be successful.¹⁸

The American Dental Association recommends that parents teach their children the importance of good oral hygiene at an early age to establish good oral habits and enhance their overall health.¹⁹

A search through the literature showed that there has been no report in the literature on the age at which parents initiate oral hygiene practice in their children in Nigeria and sub-Saharan Africa. However, available studies on the age and reasons for first dental visits among children in Lagos, Nigeria, reported an increase in the age of first dental visits compared to the recommended age.²⁰ While dental visits are essential and contribute to preventing the occurrence of dental caries, the art of developing

self-care in promoting oral health cannot be overemphasized. Hence, this study aimed to assess the age at which parents in Ile-Ife, Nigeria, initiate oral hygiene practice in their children and determine the social factors that influence the initiation and establishment of oral hygiene habits in children.

METHODS

A cross-sectional study was designed to assess the age at which parents in Ile-Ife, Nigeria, initiate oral hygiene practices in their children between February and May 2021. Ethical clearance for the study was obtained from the Health Research Ethic Committee (HREC) of the Institute of Public Health Obafemi Awolowo University, Ile-Ife, Nigeria. Data collection was done using a modified structured self-administered questionnaire used for a similar reported study¹⁶ (Appendix 1). The questionnaire has two sections: section one was on collation of participants socio-demographic characteristics, i.e. age as at last birthday, marital status, ethnicity, occupation, occupation of spouse and educational level; section two was designed to evaluate the age of oral hygiene practice commencement. The study participants included 200 mothers attending the antenatal and paediatric clinics at the Comprehensive Health Center of Obafemi Awolowo University Teaching Complex, Eleyele, Ile-Ife, Osun state, Nigeria, within the age range of 20 to 60 years. Interested participants were screened for eligibility and recruited into the study. Inclusion criteria were as follows: (1) Mothers who had initiated oral hygiene practices in their children (2) Mothers who were willing to participate in the study (3) Mothers with at least a child not less than six months old. Conversely, mothers who were either unable or unwilling to provide informed consent, as well as those who weren't the primary caregivers of their children, were excluded from participation.

Eligible participants who fulfilled the inclusion criteria were given self-administered questionnaires structured to assess the age at which they introduced oral hygiene practices in their children and the motivations behind the habit initiation. Informed consent was obtained from each eligible participant before administering the questionnaires. After completing the questionnaires, each participant received oral health education and counselling, emphasising the significance of maintaining optimum oral hygiene and initiating appropriate oral hygiene practices in their children at an early age. The data from the survey were entered into an IBM computer and analysed using SPSS version 27.0.

Continuous data were presented as means with standard deviation, whereas categorical variables were presented as frequencies and percentages. Chi-square and Fisher's exact tests were utilised to test associations between variables, and the level of significance was set at $P < 0.05$. All data were self-reported; no data from past medical or dental records was included in the final analysis.

RESULTS

A total of 200 mothers with a mean age of 35.17 years (Table 1) participated in the study and completed the self-administered questionnaire with a response rate of 100%. Over half of the participants, 117 (58.5%), fell within the age range of 31-40 (Table 1). The oldest participant was 58 years old, and the youngest was 22. Almost all the study participants, 188 (94%), were married, while 3 (1.5%) were divorced, and 4.5% were never married (Table 1). The distribution of the participant's level of education showed that 3 (1.5%) of the participants had a primary school level of education. In comparison, 25% were secondary school leavers; 36% and 7% had tertiary and postgraduate education, respectively. About one-third, 61 (30.5%), had other educational qualifications (Table 1).

Over half of the participants, 115 (57.5%), carried out infant oral hygiene for their children when they were infants. In contrast, less than one-third, 58 (29%), used water only to rinse their mouths as a form of cleaning, and less than one-fifth, 23 (11.5%), of the participants reported doing anything (Table 2).

Table 1: Socio-demographic characteristics of participants

Age group (years)	n	%	Mean	Std. Dev
21-30	49	24.5	35.17	6.540
31-40	117	58.5		
41-50	28	14.0		
51-60	6	3.0		
Marital Status				
Single	9	4.5		
Married	188	94.0		
Divorced	3	1.5		
Educational Level				
Primary	3	1.5		
Secondary	50	25.0		
Tertiary	72	36.0		
Postgraduate	14	7.0		
Others	61	30.5		

Table 2: Infant Oral Hygiene Practise initiated by participants

Infant Oral Hygiene	n	%
Wiping with cloth or towel after feeding	115	57.5
Rinsing with water	58	29.0
Nothing	23	11.5
Others	4	2.0

All the participants indicated that their children used the toothbrush to clean their teeth. The distribution of the age of initiation of the tooth-brushing habit by the mothers showed that only 17% of the participants commenced the toothbrushing habit at 12 months, while only 0.5% started the habit in their children at six months. Most of the participants (47.5%) reported that the oral hygiene practice was initiated in their children at the age of 24 months (Table 3) (Fig 1), The mean age of initiation of regular tooth brushing was 21.77months ± 7.113 with a wide age range of 6 months to 48 months (Table 5b). Almost all, 192 (96%) of the participants reported that they initiated tooth brushing in their children while in less than one-tenth, 8 (4%) fathers were involved in the initiation of the tooth brushing habit (Table 3).

The reasons for initiation of toothbrushing habit: about one-third of the participants 69 (34.5%) stated the choice of foods consumed by their children as the reason for initiation of toothbrushing. This was followed by the presence of stains/dirt on the teeth in about one-fifth, 40 (20%) and the presence of new teeth 38 (19%). Other reasons include to prevent dental caries in less than one-fifth 14 (7%), bad breath 2 (1%) and advice from health care provider 14 (7%) (Table 3).

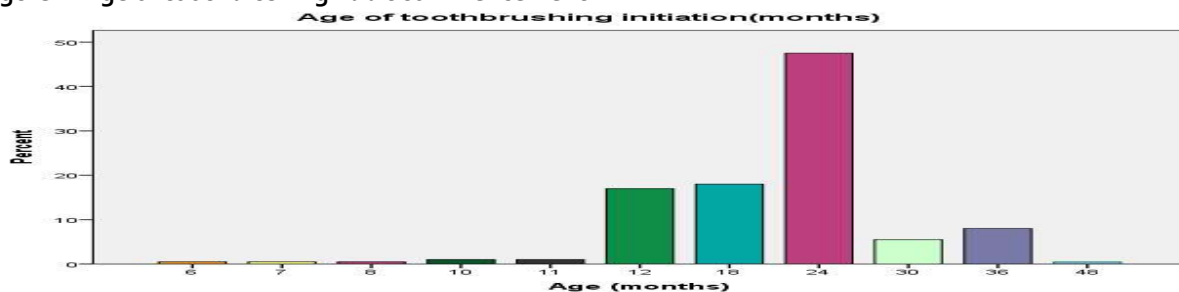
Over three-quarters, 177 (88.5%) of the participants brushed their children’s teeth twice a day and less than one-fifth, 23 (11.5%) did it once a day (Table 3)

Table 3: Distribution of age at initiation of Toothbrushing habit

Age of toothbrushing habit initiation				
Age (months)	n	%	Mean	Std. Dev
6	1	.5	21.77	7.113
7	1	.5		
8	1	.5		
10	2	1.0		
11	2	1.0		
12	34	17.0		

18	36	18.0
24	95	47.5
30	11	5.5
36	16	8.0
48	1	.5
Who initiated the toothbrushing habit?		
Mother	192	96
Father	0	0
Older Siblings	0	0
Both Parents	8	4.0
Frequency of toothbrushing (Daily)		
Once	177	88.5
Twice	23	11.5
After every meal	0	0
Others	0	0
Motivations		
Because there are new teeth in his/her mouth	38	19.0
Because of the food he/she is eating	69	34.5
Child's own interest	8	4.0
It was suggested by a healthcare provider	14	7.0
He/She is big or old enough to brush	14	7.0
He/She has bad breath	2	1.0
His/Her teeth are stained or dirty	40	20.0
To prevent dental caries	14	7.0
Others	1	.5

Figure 1: Age of toothbrushing habit commencement



There was a statistically significant association between the age of oral hygiene practice initiation and reasons for habit commencement ($P < 0.003$) (Table 4). However, the association between the educational levels of the participants and the initiation of infant oral hygiene and toothbrushing habits in their children was not statistically significant ($p > 0.05$) (Table 4).

About a third, 38.9% of participants who initiated toothbrushing in their children at the age of 24 months did it because of the food the children were eating, while 12.5% of those who commenced the practice in their children at the age of 36 months did so because of dental caries (Fig. 2).

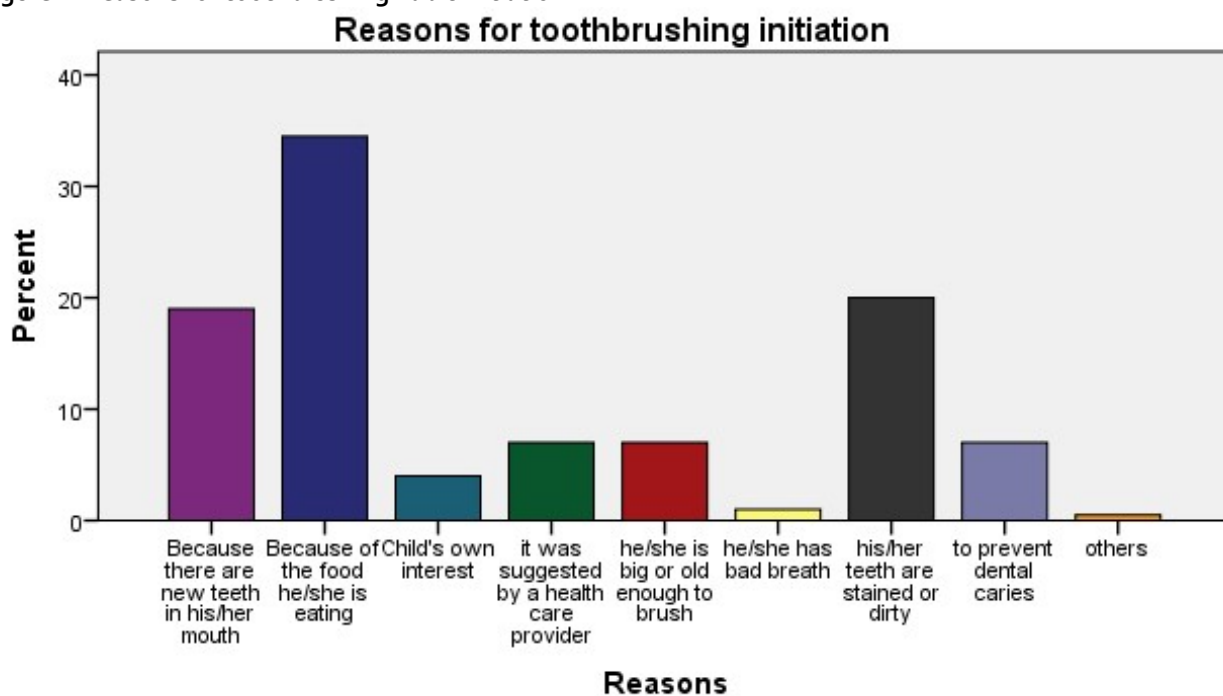
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Table 4: Association between age at toothbrushing habit initiation and reasons for the habit initiation

		Age toothbrushing initiation (months), n(%)										P	
		6	7	8	10	11	12	18	24	30	36		48
Motivations	Because there are new teeth in his/her mouth	1	0	1	1	1	8	6	16	0	4	0	0.03*
	Because of the food he/she is eating	0	0	0	0	0	9	15	37	3	5	0	
	Child's own interest	0	0	0	1	0	1	0	4	1	1	0	
	it was suggested by a health care provider	0	0	0	0	0	3	2	8	1	0	0	
	he/she is big or old enough to brush	0	0	0	0	0	1	3	8	2	0	0	
	he/she has bad breath	0	0	0	0	1	0	0	1	0	0	0	
	his/her teeth are stained or dirty	0	0	0	0	0	8	8	17	3	3	1	
	to prevent dental caries	0	1	0	0	0	4	2	4	1	2	0	
	Others	0	0	0	0	0	0	0	0	0	1	0	
Educational Level	Primary	0	0	0	0	0	0	0	2	1	0	0	0.67
	Secondary	0	0	0	1	0	11	11	21	2	4	0	
	Tertiary	0	0	1	1	1	13	14	34	2	5	1	
	Postgraduate	1	0	0	0	0	4	1	6	1	1	0	
	Others	0	1	0	0	1	6	10	32	5	6	0	

*Statistically significant

Figure 2: Reasons for toothbrushing habit initiation



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DISCUSSION

Infant oral hygiene refers to wiping teeth and gums with a clean gauze pad after each feeding, usually used on children under 18 months of age. The second oral hygiene technique, using a toothbrush, usually targeting children at least one year of age or older, is referred to simply as regular tooth brushing.¹⁶ Currently, the American Dental Association recommends wiping a baby's mouth and gums with a clean gauze pad after each feeding and using a baby toothbrush and water when the first tooth erupts.¹⁴ Despite its importance in preventing dental caries and other oral conditions in children, scientific literature offers limited reports on initiation of oral hygiene practices in infants, toddlers and preschoolers; however, Hoeft et al. reported that only 8% of Mexican-American mothers included infant oral hygiene in their child's oral hygiene routine.¹⁶

Over half of the study participants reported that they did the infant oral hygiene practice of using a clean gauze pad after each feeding, this showed that most of the mothers followed the American Dental Association's recommendation of caregivers wiping their baby's mouth and gums with a clean gauze pad after each feeding even though in this present study, the clean gauze pad has been substituted with clean towel, cloth or foam which is similar to what was reported among Mexican-American mothers who used dampened cloths, towel, little rags (trapito) or a

Reasons

rubber finger toothbrush (dedal) to clean or massage their children's teeth and gums.¹⁶

All the participants used the traditional toothbrush and toothpaste to clean their children's teeth. However, the mean age of initiation of this toothbrushing habit was 21.77 months \pm 7.113, which is similar to what was reported by Pullishery et al. in a study carried out among preschool children of Mangalore, Karnataka (22.4 months \pm 8.4),¹³ regular use of fluoridated toothpaste and toothbrush is the most efficient way to prevent dental caries, including early childhood caries²¹ and this can be achieved through regular tooth brushing which is a habit learnt at an early age of development of a child. Even though all the participants initiated the traditional tooth brushing habit in their children, only 17% initiated this practice in their children at the age of 12 months, while only 0.5% started the habit in their children at the age of 6 months which follows the recommendation of American Dental Association of the use of a baby toothbrush and water beginning when the first tooth erupts in the mouth, babies get their first teeth typically between 6 and 12 months of age.¹⁴ This study showed that most participants did not follow the recommended age of initiation of oral hygiene habits in their children. Adoption of consistent behavioural habits in childhood takes place at home, with the parents, especially the mother, being the primary model for behavior²³ a high proportion of the participants (96%) reported

that they were the only ones involved with the commencement of toothbrushing in their children while only 4% claimed the habit was initiated in conjunction with their fathers as reported in a study by Pullishery et al., which reported that (84%) tooth brushing habits among preschool children in Anganwadi Kindergarten in Mangalore, Karnataka were mainly introduced by their mothers.¹³

The main motive of mothers starting regular tooth brushing in their children was the food the children ate 34.5%, other reasons why they initiated regular tooth brushing habits in their children included stains and dirt on the child's teeth, the presence of new teeth in the baby's mouth, suggestion by a health care provider, prevention of dental caries and bad breath. This was not in agreement with Suzuki et al., reported study that approximately 49% of the parents expressed "eruption of teeth" as their major motive for starting to brush their child's teeth.²² Dental plaque removal is essential for the prevention of both dental caries and gingivitis and should be practised frequently for it to be effective. Tooth brushing is not only a preventive measure; its frequency also provides insight into the overall oral health practices.²³ Brushing more than once a day before the age of 12 has been found to help in establishing a good oral hygiene habit that will last a lifetime.²⁴ Davies et al. studied evidence of the effectiveness of this practice and supported the effectiveness of twice-daily tooth brushing with fluoride-containing toothpaste.²⁵

This study showed that all participants brush their children's teeth every day. However, there are variations in the frequency of brushing; only 11.5% of the participants initiated the recommended practice of brushing at least twice daily for their children, while 88.5% claimed they only brush once daily. Brushing the teeth twice daily in the morning and before going to bed at night is the popular recommendation for maintaining good oral hygiene in Nigeria. Thus, the mothers in the study population need further dental health education to conform to the standard of oral hygiene practice.

Oral hygiene measures should be implemented no later than the time of eruption of the first primary tooth. Tooth brushing should be performed for children by a parent twice daily, using a soft toothbrush of age-appropriate size and the correct amount of fluoridated toothpaste. No more than a smear or rice-sized amount of fluoride toothpaste should be used for children under three, and no more

than a pea-sized amount should be used for children ages three to six.²⁶

Evidence on the time when tooth brushing should be done is limited. However, it is generally recommended to brush the teeth after every meal to prevent the longstanding accumulation of bacterial plaque and food debris, which can encourage the development of dental caries and periodontal diseases. The results suggest targeting mothers and caregivers of younger children to promote their children's oral health, especially about when to start brushing their children's teeth and utilizing oral health care services

The American Academy of Paediatric Dentistry recognizes that infant oral health is one of the foundations upon which preventive education and dental care must be built to enhance the opportunity for a lifetime free from preventable oral disease.²⁷ Since medical health professionals are far more likely to see new mothers and infants than dentists, they must be aware of the initiation of tooth brushing by mothers and the implications of poor oral hygiene especially early childhood caries (ECC). They must be aware of the infectious aetiology and associated risk factors of ECC, make appropriate decisions regarding timely and effective intervention and facilitate the establishment of the dental home.^{28,29,30} Interventions could be designed to be implemented in the paediatrician's office during the well-child visits i.e. mothers' first visit to the paediatrician six weeks after giving birth. It is expected that the knowledge gained from this study will contribute to the oral health promotion field and will help design more effective oral health interventions.

One of the main limitations of this study was that it was a hospital-based study and there could be bias in the selection of participants for the study because mothers in a hospital environment are more likely to have better health behaviour. The study is limited to the group of mothers who attended the clinic in a particular hospital which might not be a representative of the community since other mothers in the community do not attend this particular hospital. The study was based on parent's perceptions and memories of their experiences with their children. Information provided was biased by parent's perspectives, their recall of events of details on the age of initiation of oral hygiene habits in their children was not specific. Another limitation was the small sample size used and therefore the lack of generalizability of the result. Still, it must be

considered that the result will reflect the experiences of this particular group. Despite all these limitations, the knowledge gained by conducting this research and its results will contribute to the development of successful tooth-brushing habits of Nigerian mothers for their babies which was previously unknown in this field.

Future studies should aim to carry out a cross-sectional survey with a larger sample size to have a good representation of Nigerian mothers to address the limitations highlighted in this study while also assessing the relationship between parental socioeconomic status and oral hygiene habits initiation.

CONCLUSION

This study showed that majority of the participants initiated two oral hygiene habits in their children; infant oral hygiene and regular tooth brushing at a mean age of 21.8 months. Most of the mothers carried out the infant's oral hygiene properly, however, there was a late initiation of the regular tooth brushing. Mothers' main reason for initiating regular tooth brushing habits in their children was because of the food the children were eating followed by the presence of stains and dirt on their children's teeth and the presence of new teeth in the babies' mouths respectively. There is need for oral health promotion and dental health education on early initiation of regular tooth brushing in the community and this should start as soon as the first tooth erupts. In addition, it can be concluded that special efforts should be made to educate younger mothers/guardians, as well as first-time mothers about promoting their children's oral health.

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Conflict of interest

None declared

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**APPENDIX 1
QUESTIONNAIRE**

AGE AND MOTIVATIONS FOR ORAL HYGIENE PRACTICE INITIATION AMONG CHILDREN IN ILE-IFE, NIGERIA

SECTION A: RESPONDENT SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Age (at the last birthday) _____ years _____
2. Marital status: Single [] Married [] Divorced [] Others, specify _____
3. Religion: Christianity [] Islam [] Traditional [] Others, specify _____
4. State of Origin _____
5. Occupation _____
6. Educational level: Primary school [] Secondary school [] Tertiary [] Postgraduate [] Others (specify)

7. Number of children _____

SECTION B: ORAL HYGIENE HABIT INITIATION

1. When your children were babies with no teeth in their mouths, what did you do to take care of their mouths?

Wiping his/her mouth and gums with a clean cloth or towel after each feeding ()

Rinsing with water ()

Nothing ()

Others, specify _____

2. Did you use a baby toothbrush for any of your children when he/she was a baby?

Yes ()

No ()

I can't remember ()

3. At what age (in months) did your child start brushing or having his/her teeth brushed?

4. Who started brushing his/her teeth?

Mother ()

Father () _____

Older siblings ()

Both Parents ()

5. Why did you decide to start brushing his/her teeth at that time?

Because there are new teeth in his/her mouth ()

Because of the food he/she is eating ()

Child's own interest ()

It was suggested by a healthcare provider ()

He/she is big or old enough to brush ()

He/she has bad breath ()

His/her teeth are stained or dirty ()

To prevent dental caries ()

Others, specify _____

6. How many times a day do you or does he/she brush?

Once ()

Twice ()

After every meal ()

Others, Specify _____