EARLY CHILDHOOD CARIES EXPERIENCE, ORAL HYGIENE STATUS AND ASSOCIATED ORAL HEALTH HABITS AMONG PRESCHOOL CHILDREN IN TANDALE, DAR ES SALAAM

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Declaration

I, Dr Mercy Namshitu Gideon, do hereby declare that this dissertation is my original work and it has not been submitted for the award of degree in any institution.

Sign .....Date.....

Approval

This dissertation had been submitted for examination with the approval of University appointed supervisors.

Prof. Mary Atieno Masiga BDS (Nbi), MSc (Lond), PDGRM (Nbi), PhD (Nbi)

Department of Paediatric Dentistry and Orthodontics, School of Dental Sciences, University of Nairobi.

Signature _____ Date _____

Dr. Richard Owino BDS (Nbi), MDS (Nbi)

Department of Paediatric Dentistry and Orthodontics, School of Dental Sciences, University of Nairobi.

Signature _____ Date _____

Prof. Febronia Kokulengya Kahabuka DDS (Dar), MSc (Dar), PhD (Nijmegen)

Department of Orthodontics, Paedodontics and Community Dentistry, School of Dentistry, Muhimbili University of Health and Allied Sciences.

Signature _____ Date _____

Dedication

This dissertation is dedicated to my loving parents Dr Gideon Mduma and Dr Benedicta Mduma.

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Acronyms and Abbreviations

ANOVA	Analysis Of Variance
dmf (t)	decayed, missing and filled deciduous teeth
DMFT	Decayed, Missing and Filled permanent teeth
ECC	Early Childhood Caries
KNH-UoN	Kenyatta National Hospital and University of Nairobi
MNH-IRB	Muhimbili National Hospital's Institutional Ethics Review Board
PI	Principal Investigator
OHL	Oral Health Literacy
OHRQoL	Oral Health Related Quality of Life
RCH	Reproductive and Child Health
SES	Socio Economic Status
S-ECC	Severe Early Childhood Caries
SPSS	Statistical Package for Social Sciences
TSh	Tanzanian Shillings
USD	United States Dollar
WHO	World Health Organization

Definition of terms

Caregiver:

An individual who takes care of the needs of the child such as biological parents, aunt, uncle, grandparents or foster parents.

Early Childhood Caries (ECC):

The presence of one or more decayed (non-cavitated/cavitated) lesion, missing (due to caries) or filled tooth surfaces in any primary tooth in a child aged 71 months or younger.

Informal schools:

Preschools serving without any registration by the Ministry of Education of Tanzania. The structures of the informal schools are varied with some having reasonably acceptable buildings and sanitary facilities, while others are very simple in structure.

Oral health habits:

This includes the child's oral hygiene practices (tooth brushing), breastfeeding practices, weaning patterns and consumption of cariogenic snacks and drinks.

Preschool children:

These are children aged 36-72 months attending informal preschools in Tandale, Ward.

Weaning:

The introduction of any other foods (drinking water/porridge) to an infant apart from the mother's breast milk at any time after birth.

Abstract

Background

A high Early Childhood Caries (ECC) experience in the primary dentition can manifest in negative impacts on the child's Oral Health-Related Quality of Life (OHRQoL). It is reported that high prevalence and caries experience among preschool children is frequently precipitated by poor oral health practices particularly among the children from low-income setting.

Study objective: The main objective of this study was to determine the ECC experience, oral hygiene status and associated oral health habits among preschool children attending informal schools in Tandale, Dar es Salaam.

Study settings: Informal preschools in Tandale Ward, Dar es Salaam.

Study Population: A total of 297 preschool children aged between 36-72 months attending informal schools in Tandale Ward.

Study Design: Descriptive cross-sectional study.

Materials and Methods

Stratified random sampling was used to select the informal preschool followed by convenient sampling procedure to select the children in each school. A pretested semi-structured questionnaire was administered to the caregivers to obtain information on their socio-demographic characteristics, children's oral hygiene practices, weaning patterns and dietary habits. Clinical oral examination was subsequently carried out among the children to determine the presence of dental caries and plaque.

Data analysis

Data was analyzed using the Statistical Packages for Social Sciences (SPSS) Version 20 for Windows. Where appropriate, dichotomization of the data was carried out. Bivariate and multivariate statistical tests were used to determine the association among the variables. The results were considered significant when the p value was ≤ 0.05.

Results

The prevalence of ECC was 70% with a dmft of 4.19(±4.52 SD). High caries experience was positively associated with poor oral hygiene (p=0.000), low frequency of tooth brushing (p=0.021) and high frequency of consumption of cariogenic snacks (p=0.029).No significant association was found between caries experience and the caregiver's socio-demographic characteristics (p≥0.05).

Conclusion

The high ECC experience among preschool children in Tandale Ward, Dar es Salaam positively associated with poor oral hygiene status, low frequency of tooth brushing and high frequency of consumption of cariogenic snacks.

Chapter 1

Introduction and literature review

1.0 Introduction

Early Childhood Caries (ECC) is defined as the presence of one or more decayed (non-cavitated or cavitated) lesion, missing (due to caries) or filled tooth surfaces in any primary tooth in a child aged 71 months or younger. ECC is one of the commonest infectious diseases of childhood[1]. Dental caries is an infectious disease because it involves the transmission of main pathogenic microorganisms (*Streptococcus mutants*) to infants through vertical transmission (from the mother's saliva/ breast milk) and horizontal transmission (from siblings/other children) [2]. The *Streptococcus mutants* metabolize sugary food to obtain energy and as a result, they produce acid that demineralises tooth enamel leading to dental caries. High levels of *Streptococcus mutants* have been associated with high prevalence of ECC [3]. Furthermore, *Veillonella* and *Lactobacilli* bacteria species have been implicated in the progression of ECC [4]. Sucrose metabolism produces extracellular polysaccharides that allow pathogenic bacteria to adhere to the tooth surface causing further damage [4]. High prevalences of ECC has been reported among children with the highest frequency of sugar consumption and the type of sugar that is retained on the teeth for longer periods of time [3].

A number of associated risk factors are well reported to contribute to the aetiology and development of ECC especially among children [5]. Oral health practices such as poor dietary habits, oral hygiene practices and utilization of oral health services have been shown to contribute to the development of ECC among preschool children [6]. For example, a hospital base study conducted in a low-income setting in Brazil among preschool children reported that prolonged breastfeeding (beyond 24 months) and children's poor oral hygiene are associated with high prevalence of ECC[5].Several studies have also reported that increased frequency of consumption of cariogenic snacks and drinks (more than three times a day) resulting in high ECC experience [6]. Furthermore, a cross-sectional study done in Nigeria, established positive association of ECC, poor oral hygiene and poor oral health seeking behaviour [7].This was similar to a study among preschool children attending for dental treatment at Muhimbili dental clinic were children with poor oral hygiene had a higher caries experience than those with good oral hygiene [8]. Similar findings have also been reported from a Reproductive Child Health clinic (RCH) in Kampala [9].

The relationship between ECC and socio-economic status is well documented in epidemiological studies and reviews on ECC [4]. High caries prevalence was observed from children coming from low socio- economic families with poor parental education, low family income, and poor dietary habits [4]. Studies have shown that children in low socio-economic setting normally consume more sugary snacks in between meals than the children in higher socio-economic status and this predisposes them to ECC [4].

Early Childhood Caries may have short and long-term effects on children, parents and the population at large [10]. Some of the short-term consequences of ECC include higher risk of new lesions in both primary and permanent dentition [10, 11], emergency room visits and hospitalization[12, 13], increased treatment costs[14] and increased days with restricted activity [15, 16]. The long-term effects of ECC include diminished learning ability [17]and delayed physical growth and development [18, 19]. Children with Severe Early Childhood Caries (S-ECC) have been reported have lower OHRQoL[20]. The negative impact on the primary dentition is reported in the domains of physical, psychological and social development of the child [21].

Early childhood caries is a significant public health problem especially for poor and disadvantaged groups, in both developed and developing countries. It remains relatively unexplored and not well defined in most of the developing countries.

1.1 Literature Review

1.1.1 Global epidemiology of ECC

Early childhood caries is reported to be the commonest oral infection affecting preschool children in both developed and developing countries and with varied disease patterns[22].In the twentieth century, caries epidemiology has changed from a disease of affluence to a disease of deprivation in most of the developed countries where the prevalence of ECC is higher in the lower socioeconomic class[22].

However, in most of the developing countries, the prevalence of ECC is higher in the middle to higher income classes [23].

Studies in Europe reported low ECC prevalence and its strong association with the social background among the preschool children [24]. An overall prevalence of 15.9% among 18-60 months old children was reported in an Island west of Italy. This prevalence increased in older children (48-60 months) as compared to the younger children (18-47 months) [25]. The authors associated low parental education and increased consumption of cariogenic diet during infancy with the increased prevalence of ECC[24]. Similarly, the overall prevalence of ECC of 24.8% was reported among 36-71 months old children who attended paediatric primary health care facility that serves immigrants (disadvantaged minority) in Switzerland [25]. Dental care wasn't covered by the national health insurance in that facility[25].

The authors reported that ECC prevalence in Switzerland was slightly higher than the prevalence reported from the other neighbouring European countries, despite of the overall improvement of dental health. The authors suggested that ECC is a childhood disease from different cultures and health beliefs (considering immigrants) that influence the oral health behaviours [25].

In the United States of America, ECC is most prevalent in children from low socio-economic backgrounds, racial and ethnic minority groups (Native America, African–Americans and Hispanic) as a result of poverty[26]. A three-year prospective study done in Alabama African- American preschool children reported an increased in ECC prevalence and ECC incidence rates.

Authors reported ECC prevalence of 1.1% among 1-year-olds, 12.8% among 2 years old, 39.3% among 3 years old and 65.8% for the 4 years old children respectively[26].The authors concluded that prevalence of ECC increased despite of biannual topical fluoride application that the participating children received. It was suggested that higher ECC prevalence could be a result of increased frequency of the exposure to other caries risk factors[26]. Another study done in Brazil, reported a prevalence of ECC to be 20% among 3-4 years old preschool children from a municipal preschool [28]. This prevalence was related to social factors (low family income) and biological factors (premature birth and childhood obesity) [27].

A systematic review done in China to evaluate the prevalence of ECC in children between 1-6 years old, showed a decline in the ECC prevalence. It was reported that between 1987 and 1994 the overall prevalence of ECC was 77.9% which was reduced to 56.4% in the year 2010-2013 [28]. The prevalence of ECC increased with age with an overall prevalence of 59.1% among boys as compared to 58.9% among girls. The authors suggested that decrease in ECC prevalence shows that the oral health status has improved due to public awareness in children oral diseases from the knowledge obtained in oral health education and promotion programs, improved public health services and attainment of more oral health care providers[28]. High prevalence of ECC has been reported in Asia compared to Europe and America. In a study conducted among children who were below 60 months old from various government aided day care centres and private owned preschools in rural and urban areas of Trivandrum district in Kerala India, a high prevalence of ECC of 54% was reported[29].

Another epidemiological study done in India among children of 24-71 months from 5 governments and 1 private preschools reported an overall medium range prevalence of ECC of 41.9% with boys being more affected than girls [30]. The authors associated the reported prevalence with a cariogenic diet which was provided by mothers [30]. The reported prevalence was low compared to the prevalence reported in review done in China [28]and in an Indian cross section study on ECC [29].

The prevalence of ECC in resource poor countries is thought to have increased due to overall adoption of the western dietary patterns leading to accessibility of refined carbohydrates by the preschool children and the lack of proper ECC prevention care at the community level [30]. A hospital based cross-sectional study done in South Africa found the overall prevalence of ECC to be 51.02% among children below six years in a township (informal settlements with lack of access to basic services) [31]. The author reported increased prevalence with age, such that older children (4-6 years old) had a prevalence of 77% as compared to a prevalence of 16.25% among younger children (0-2 years old)[31]. Similar result, were reported in another study done in Johannesburg South Africa among preschool children with an overall prevalence of ECC of 49.2%[32]. The prevalence was positively correlated with the high cariogenic diet consisted of sweets, chips, sweetened juice, and sodas packed in the children's lunch boxes[32]. A household survey in Nigeria, reported an overall very low prevalence of ECC of 6.6% [33]. This was different compared to what was reported in South African studies. However, this house hold survey showed similar trends with other studies of increased ECC prevalence in with increased age.

The prevalence of 0.0 %, 1.6 %, 2.1 %, 8.2 %, 12.7 %, and 6.6% was reported among 6–11, 12–23, 24–35, 36–47, 48–59, and 60-71months preschool children respectively[33]. The authors postulated that the reported prevalence could be an underestimation of the caries experience in preschool children in that community due to WHO criteria used to detect caries. They suggested that non-cavitated smooth surface lesions could have been missed among 6-18 months old children were these lesions are more prevalent.

In northern eastern part of Africa (Sudan), a school-based cross-sectional study conducted in 7 localities among 3 to 5 year-olds pre-school children, found similar prevalence of ECC of 52.4% to the one that was reported in South Africa by Mothupi *et al*[32] as stated in the preceded paragraphs [34]. However, the caries experience in this study was low (according to WHO), with overall mean dmft of 2.27 which increased with age[34].

In contrast to what was reported by *Elidrissa*[34], a lower ECC prevalence of 17% was found among 3-5 years old children in a cross sectional descriptive community study in Sudan[35]. This could be due to the homogeneity of the study participants. ECC was recorded when the child had a 2/more decayed, missing, filled maxillary incisors. However, the reported dmft of 3.53 was higher compared to the one reported previously in Sudan from the preceding paragraph[35].

1.1.2 Epidemiology of ECC in the East Africa region

Studies done in East Africa have shown a similar pattern of ECC prevalence. Masiga and Holt [36]reported ECC prevalence of 55% among preschool children of 3-5 years old.

The children came from private, government-owned and self help nursery schools in Nairobi that presented children from mixed socio economic backgrounds. The mean dmft was reported to be 3.84 ± 2.96, which was higher according to WHO [36]. High prevalence of ECC of 63.5% was reported in another school-based cross-sectional study by Ngatia *et al* [37]among 3-5 years old preschool children in Nairobi. The reported prevalence was higher compared to the prevalence reported in the previous studies in Nairobi by Masiga and Holt [36] and Kiambaa by Njoroge *et al* [38] respectively. However, the mean dmft of 2.95 was reported to be lower when compared to the dmft reported earlier in Nairobi. The authors found high prevalence among children attending middle-costs schools and associated it with availability and affordability of confectionary which are readily available in the middle socio class when compared to the children from lower and higher socio classes respectively. Furthermore, the prevalence of ECC among 3-5 years old preschool children in a more rural community in Kenya was reported to be 59.5% with mean dmft of 2.46 ±3.21[38]. These results were similar to those reported previously in Nairobi preschools. However, the reported caries experience was lower compared to the ones reported earlier in Nairobi by Masiga and Holt [36.] The reported prevalence of ECC in Kenya from the preceding paragraphs was slightly higher compared to the results found in the Kenyan National Oral Health Survey 2015. Early Childhood Caries prevalence of 46.3% was found among 5 years old children and overall mean dmft of 1.87 among preschool children was reported from this survey[39]. The decay component comprised of a large proportion as compared to missing teeth due to caries and filled teeth among the children of the preschool age[39].

The reported ECC experience was lower as compared to the ones in previous studies in Nairobi and Kiambaa[36-38].

In contrast to the above reported prevalences of ECC, a hospital based cross-sectional study among 3-6 years old preschool children attending a clinic in Nairobi reported a higher prevalence of ECC of 95.5% and overall dmft of 8.53 (± 5.52 SD) [40]. The authors concluded that the high prevalence of ECC was positively correlated to the socio-economic and behavioral factors such as poor oral hygiene and frequently consumption of cariogenic drinks and snacks among the examined children.

In additional, a higher caries experience was observed in a cross-sectional study done in nursery schools in the neighbouring Uganda in an urban and peri-urban setting. Overall ECC prevalence of 56% and 64% were reported from central Kampala and Nakawa respectively [41]. In contrast, a lower prevalence of ECC of 17.6% was reported among 6-36 months children attending RCH clinics for immunization and growth monitoring in Uganda. The authors suggested that risk indicators for ECC among these children were lack of caregivers oral health information from the health workers, high consumption of sugary foods and drinks, poor oral hygiene (from the presence of plaque during clinical examination) and enamel hypoplasia [9].

Studies conducted in Tanzania have shown a lower prevalence of ECC when compared to neighbouring countries of Kenya and Uganda. For example very low prevalence of 3.7% was reported among 3-36 months in a cross section study in a RCH clinic from a high fluoride area in Manyara, Tanzania [9]. The authors highlighted the contribution of poor dietary habits and oral hygiene in the ECC development among the children[9].

In addition, ECC prevalence of 26.4% was reported among children aged 6-36 months attending an urban RCH clinic in Dar es Salaam [42]. Another very low prevalence of ECC of 5.3% was reported in a community based study in Mbeya, Tanzania among 2-4 years old preschool children[43]. The reported prevalence could be an under estimation of the carious disease from the method used to score dental caries. However, the authors associated the occurrence of ECC with consumption of cariogenic snacks at earlier age[43]. Furthermore, a school-based cross-sectional study done among 3-5 years old children from one of the municipalities in Tanzania, reported a prevalence of ECC of 30.1%with overall dmft of 0.95 (± SD1.81) [44]. This prevalence was associated with breastfeeding at night and increased consumption of cariogenic snacks.

However, a higher prevalence of ECC of 50.4% was reported in a school based cross sectional study among 2-6 years old children from a privileged and under-privileged background in Tanzania. The authors concluded that children from the privileged background were more affected by ECC compared to children from underprivileged background[45]. In addition, a higher ECC experience with mean dmft of 6.79±4.68 was reported among 2-5 years old children in a hospital based cross sectional study[8]. The author postulated that poor oral hygiene and single parenthood were associated with higher ECC experiences.

The Tanzania National Oral Health Survey conducted in 2010 reported that every child aged 4-6 years old had at least one carious tooth. This indicates that there is high unreported ECC prevalence and experiences among preschool children in Tanzania [46].

1.1.3 ECC experience and oral hygiene practices

Poor oral hygiene practices have been found to be strongly associated with high prevalence of ECC. This has been demonstrated in several studies. For example, high caries prevalence of 53.6% among 3-5 years old was reported from a cross sectional hospital based study of children attending immunization campaigns in Brazil [5]. The authors reported that out of 593 children who participated in the study 238 had unsatisfactory oral hygiene with the presence of clinically visible plaque had caries compared to 78 children who had satisfactory oral hygiene with caries. The authors concluded by positively associating ECC with poor oral hygiene [5]. A similar association between poor oral hygiene and ECC has been demonstrated in a study among 3-6 years old children in rural and urban Poland [47]. An overall prevalence of ECC was 52.61% was reported with more children from the rural area affected. The authors reported that poor oral hygiene seen among in children from rural areas was due to lack of supervision during brushing and decreased frequency of brushing as compared to the children from urban areas who were supervised while brushing and they brushed for at least 2-3 times a day [47]. Similarly, a hospital based cross-sectional study among 2-5 years old children in Tanzania reported an association of ECC with poor oral hygiene. Majority children 90.1% with poor oral hygiene had caries as compared to their counterparts with good oral hygiene 78.6%[8].

In contrast, studies have reported an association between lower prevalence of ECC with poor oral hygiene. For example, an association of poor oral hygiene with the low prevalence of ECC was found in a cross-sectional study among 6-36 months, children in

Kampala[9]. Lower ECC prevalence of 17.6% was reported among 6-36 years old children with poor oral hygiene. The authors suggested that poor oral hygiene was seen by visible plaque on maxillary anterior region was then correlated with low frequency of tooth brushing. Similar, low ECC prevalence of 9.8% and EEC experience with dmft of 0.37 was found in a school-based cross-sectional study among less than five years old children in Nigeria [7]. These children had poor oral hygiene compared to their counterparts with good oral hygiene who didn't have ECC[7].

Supervision on tooth brushing has been shown to decrease the prevalence of ECC.A combined school based and hospital based cross sectional study done in 8-48 months in India has proven that [48]. A low ECC prevalence of 21.6% was reported among children who were supervised while brushing as compared to a prevalence of 38.6% among the children who brushed on their own without any supervision [48]. A ten year review on the effectiveness of ECC preventive measure reported that supervised tooth brushing with fluoridated toothpaste in preschool children is associated with a reduction in caries prevalence in the various communities where it was reinforced [49].

In contrast, different results were reported in literature that did not find any positive association between ECC experience and supervision in tooth brushing among the preschool children[8, 34].

A decrease in caries experience has been associated with increased frequency of tooth brushing [48]. Caries experience with dmft of 2.21 was reported among preschool children who brushed twice a day when compared to a dmft of 2.35 among preschool children who brushed once a day[34].

Positive association was seen between ECC experience and increased frequency of tooth brushing among preschool children of a special care needs (HIV infected) attending outpatient clinic in Kenyatta National Hospital [50]. The authors reported low caries experience in deciduous dentition with dmft of 1.17 among those children who brushed their teeth at least twice a day when compared to dmft of 1.82 from children who did not brush at least twice a day [50]. Similar results were reported in India, were reduced prevalence of ECC of 10.9% was seen among children who brushed twice daily as compared to a prevalence of 34.7% among those who brushed once a day in a crosses sectional study among 4-48 months preschool children[48].

However, a decreased frequency in tooth brushing has been associated with increased caries experience in preschool children [51]. A study done among 2-5 years old among preschool children reported an association of poor oral hygiene and S-ECC. The authors reported high prevalence of S-ECC among these children to be 84% and they associated it with a low frequency of tooth brushing(less than once daily) and improper brushing techniques[51]. In addition, comparative cross-sectional study in Europe reported an increase prevalence of dental caries among 4-6years old preschool children with irregular tooth brushing habits. Caries prevalence and experience increased from 88.4% to 88.5% and 7.42 to 12.03 respectively from 2000 to 2010.The authors also reported a higher caries experience within girls with irregular tooth brushing habits as compared to boys who were brushing regularly[52].

1.1.4 ECC experience and dietary patterns

The Vipeholm study in Lund Sweden proved the strong association of sugar intake and caries development[53]. The prevalence of ECC seen in preschool children has been associated with the consumption of cariogenic foods that allow bacteria adhesion on the tooth by forming glucan and enabling them to produce copious acid that demineralizes the tooth substance[54].

Dietary habits have been found to be greatly associated with ECC development in preschool children. A detrimental diet rich in refined carbohydrates and sugars is a risk factor for developing dental caries. It is scientific knowledge that sucrose is the main cariogenic sugar substance, this is because it is readily metabolized to produce acid that demineralises tooth substance. High frequency of consumption of cariogenic foods together with poor oral hygiene accelerates the carious process. For example, in the review of data obtained in South Africa National Children Oral Health Survey (1999-2000) among 36-71 months old children found an association between sugar consumption and ECC [55]. The authors reported that sugar consumption in South Africa comprised of a greater percentage of total energy intake [55]. Caregivers with high-income were reported to have a higher mean expenditure of 8.29 South African Rands on sugar as compared to middle-income and unemployed caregivers [55]. However, the authors reported overall higher ECC prevalence of 58.75% with higher dmft scores of 3.10 among children whose caregivers were middle-income earners as compared to the higher income earners [55].

They relate this to better understanding of the disease, access to health promotion and affordability and accessibility to fluoridated toothpaste and dental services among the children whose caregivers had higher income [55]. In addition, another study reported a lower dmft of 0.5 among 3-5 years old preschool children who didn't consume cariogenic snacks as compared to increased dmft of 2.36 among their counterpart who consume cariogenic snacks such as sweets, biscuits, cookies, and chocolates [34].

In between meals snacking of cariogenic foods and drinks is greatly associated with the development of ECC among preschool children. In India, a cross-sectional study among 8 to 48 months old children reported the prevalence of ECC of 29.2% among children who had in between meal snacking habit compared to ECC prevalence of 21.8% among children who didn't have that snacking habit [48]. The authors suggested that was the result of a diet shift from drinking milk as nutritious and protective drink to soft drinks, juices, non-citric beverages and refined carbohydrates among preschool children that contributes to tooth decay [48]. Another study that was conducted among preschool children below 60 months old, reported similar association between high prevalence of ECC and increased frequency of in between meals snacking habit. Children who consumed in between meals snacks once daily had fewer carious lesions with prevalence of 33% compared to those who consume snacks three times a day with prevalence of 80% [30]. The author recommended the importance of emphasizing the limiting of in between meal snacking among preschool children when doing dietary counselling in carious preventive programs [29].

Urbanization and rapid growth of the food industry with television advertisement on confectioneries have also influence mothers and caregivers to give children snacks at earlier ages [54]. This is well stipulated in the study reporting the effect of urbanization and industrialization that made confectionaries easily available and accessible in Kenyan markets, streets and residential area kiosks, on ECC development. The authors postulated that, urbanization and industrialization encourages frequent snacking of cariogenic snacks by preschool children [37]. Although not significant, a higher ECC prevalence was reported from children taking confectionary as compared to their counterparts [37]. Similarly, increased frequency of consumption of cariogenic food was associated with increased ECC prevalence among 4-24 months old rural and urban South African children [56]. A prevalence of 55% and 27% was reported among children from urban when compared to ECC prevalence of 5% from their counterparts in rural areas [56]. The authors associated this high prevalence in urban area with the use of sweetened pacifiers among the urban children as compared to children from rural areas [56].

1.1.5 ECC experience and socio-economic status

Economic and socio-status such as income levels, education, housing, social support networks and the environment can be used to predict oral health status [58]. Socio-economic status has been shown to be a significant factor for the development of ECC and a determinant factor in caries risk assessment studies [57]. It has been reported that children from low socio-economic status cannot afford professional dental health care

and they live in an unhealthy environment which may lead to immune suppression affecting the oral cavity and other body systems [48]. Children coming from low socio-economic status were at 3.9 times higher at a risk of developing caries compared to children in the middle and high Socio-Economic Status (SES). Reported caries prevalence of 77%, 53.3% and 41.5% among the children from low, middle and high SES respectively were found in India [58]. The authors suggested that differences in ECC prevalence between the socio-economic classes in the study was due to the benefit of proper utilization and affordability of oral health services enjoyed by children from high economic class than children from the middle and low economic classes [58]. Similar results were observed in children less than 6 years in India who were from low SES and were reported to be more prone to ECC [59]. Children from families with low SES have financial problems that predispose them to poor nutritional status, ability to identify oral diseases and hence face limited access to early diagnosis and therapeutic care for dental caries [60]. Many epidemiological studies on ECC have well reported SES as a risk factor for developing ECC by mainly considering low parental income and level of education [60]. However, in other ECC epidemiological studies, SES is assessed by considering additional parameters such as caregiver's occupational activities, ethnicity and place of residence [61]. In a systemic review analysis of cross-sectional studies among 2-5 years old preschool children in developing and developed world an inverse relationship was found between dental caries and SES. The author of the review considered the studies that looked at the caregiver's level of education, income level, father's occupation and the cost of tuition fees that the caregivers payed for their children in kindergarten schools to determine individual SES [61].

A study done in India among 8-48 months children, reported that children whose caregivers had higher income had lower caries experience as compared to the ones whose caregivers had lower income [62]. In this study the authors reported that only seven (7) children among 34 children whose parents had high-income had caries as compared to 51children among 121 whose parents had lower income. However, the authors reported overall lower caries experience with a mean dmft of 1.84 and caries prevalence of 44% [62]. Similar results, on positive association between low income and dental caries among preschool children were reported in a population-based case control study among children who were less than 48 months old. The authors reported that children whose caregivers gross low annual income of <USD 40, 000 were four (4) times more likely to have dental caries compared to their counterparts [63]. The authors postulated that low household income without health insurance will make the children more prone to caries as these determine the use of dental services in terms of ECC prevention and treatment [63]. A study done in Brazil was in agreement with that, as it reported a significant association between low household income and ECC. This was among 3-5 years old children with an overall prevalence of ECC of 53.6%[5]. Thirty three 33 (29.2%) of children whose caregivers had high income (≥2 times minimum wage) had caries as compared to 258(59.7%) of children whose caregivers had low income (<2 times minimum wage). The authors concluded that lower household income was ECC risk factor as it is associated with limited access to oral health services [5]. Low socio-economic status has been associated with poor dietary patterns and development of ECC. This was reported in a study done in Brazil among preschool children aged between 18-42 months.

An overall prevalence of ECC of 32% with dmfs of 0.42 was reported [64]. The authors attributed the reported prevalence to high sucrose consumption that was a result of altered dietary patterns in low socio-economic societies [64].

In contrast, high caries experience was associated with high parental income. In a study among 2, 4 and 5 years old children, higher caries experience with a mean dmft of 3.2, 5.7 and 7.5 respectively was reported among children whose caregivers had high income in United Arabs of Emirates [65]. The authors relate this with the caregivers ability to purchase high sugar content foods and drinks readily available in the shops for their children [65].

1.1.6 ECC experience and parental education

Parental knowledge on oral health related issues enables them to provide preventive oral health practices for their preschool children. This knowledge is based on beneficial oral health practices that includes reduced frequency of consumption of cariogenic food substances and practicing good oral hygiene. It has been reported that children whose parents have higher levels of education have better dental practices in terms of good oral hygiene practices and control of sugar consumption [66]. These parents were reported to be interested in good health, which enable them to have positive behaviours related to maintenance of good oral health [66]. For example, in a study done among 3-5 year old children reported that, parents with higher levels of education showed better oral health knowledge including knowledge on ECC compared to the parents who completed primary school level of education [67].

The authors suggested that oral health knowledge generally affected the parent's perception on oral health and utilization of oral health services [67]. Maternal oral health knowledge in particular will greatly influence the prevalence of ECC among their children. A study done in India among 8-48 months preschool children reported that children whose mothers had no formal education 37.9% were more affected with caries as compared to 33.8%, 29.1%, 28.8%, 22.3% and 22.2% of children whose mothers had primary school, higher secondary school, pre-university college, graduate and post-graduate levels of education respectively [48]. The authors suggested that uneducated mothers lack information on the risky oral health practices of their children that may predispose them to caries compared to the educated mothers [48]. Similarly, another study among children who were below 71 months old reported that children from mothers with poor oral health knowledge had a higher ECC prevalence of 51.1% as compared to the prevalence of 48.5% among children from mothers with good oral health knowledge [33]. Mothers who attain secondary education are more aware of ECC compared to their counterparts who attained a maximum of primary school education [42], this was reported in a hospital based study in Tanzania. The authors recommended that efforts to prevent ECC should target oral health preventive programs among children at their last primary school year, or Mothers at RCH clinics in Tanzania [42].

1.2 Statement of the problem

Despite the negative impact of ECC on OHROoL among preschool children, the disease remains relatively unexplored and not well defined in most of the developing countries. Among children in low-income settings, high ECC experience is frequently attributed to woeful living conditions and oral health practices such as poor oral hygiene and frequent consumption of cariogenic snacks and drinks. However, there is inadequate information on the situation of ECC experience and associated oral health habits among preschool children in Dar es Salaam, Tanzania.

1.3 Study objectives

1.3.1 Broad objective

To determine ECC experience, oral hygiene status and associated oral health habits among preschool children attending informal schools in Tandale, Dar es Salaam.

1.3.2 Specific Objectives

1) To determine the prevalence of ECC among preschool children attending informal schools in Tandale, Dar es Salaam.
2) To determine the oral hygiene practices among preschool children attending informal schools in Tandale, Dar es Salaam.
3) To determine the weaning and dietary patterns among preschool children attending informal schools in Tandale, Dar es Salaam.
4) To determine the association of ECC experience and oral hygiene status with oral health habits among children attending informal schools in Tandale, Dar es Salaam.

1.4 Justification of the study

The study will determine the ECC experience, prevalence and oral hygiene status among preschool children in Dar es Salaam particularly those who reside in low income settlements. It will also inform on the associated oral health habits that contribute to high ECC experience. This will help to fill the knowledge gaps in literature on ECC among preschool children in Tanzania and the East Africa region in particular. The findings of this study may also be used to form a basis for polices on preventive oral health among underprivileged children by the national government.

1.5 Study hypotheses

1.5.1 Null hypotheses

There is no association between oral health habits and ECC experience among preschool children attending informal schools in Tandale, Dar es Salaam.

1.5.2. Alternative hypothesis

There is an association between oral health habits and ECC experience among preschool children attending informal schools in Tandale, Dar es Salaam.

1.6 Study variables

Table 1: Study variables

SOCIO-DEMOGRAPHIC VARIABLES	DEPENDENT VARIABLES	INDEPENDENT VARIABLES
Age of child Sex of child Age of caregivers Sex of caregiver Caregiver marital status Caregiver's level of education Caregiver's occupation Family income	ECC	Average plaque Frequency of tooth brushing Supervision of tooth brushing Frequency of supervision in tooth brushing Age at which the child stopped breastfeeding Contents of the feeding bottle Frequency of consumption of cariogenic snacks Frequency of consumption of cariogenic drinks.

1.7 Scope of the study

The data collected for this study included socio-demographic variables among caregivers of the selected children attending informal schools in Tandale, Dar es Salaam. The study also included a clinical oral examination of the children to determine the caries prevalence, experience and oral hygiene status.

While the study may be used to formulate policy it is beyond the scope of the study to implement any interventional measures.

Chapter 2

Materials and Methods

2.1 Study area

Tandale

Tandale is an administrative ward located in Kinondoni in Dar es Salaam Region, Tanzania. Kinondoni is the largest of the 3 municipal councils in Dar es Salaam, others being Ilala and Temeke. The district has the largest number of informal settlements in the region, namely Manzese, Kigogo, Tandale and Mwananyamala Kisiwani [68]. Tandale ward covers about 450 square kilometres and it is subdivided into 6 streets namely, Kwatumbo, Mtogole, Sokoni, Mkunduge, Mhalitani and Pakacha, all characterized by poor settlement planning, low-quality housing, and inadequate social services.

There is an estimated population of 54,781 people living in Tandale in approximately 15,064 households (National Population Census in 2012).The estimated number of children below six years in the entire Kinondoni district was244,767 [68]. Majority of the inhabitants are of a low-income group engaged in petty trading activities and manual labour [69].

There is only one government health centre in Tandale ward, which provides preventive and curative medical services and sometimes offer minor surgical procedures for the entire population [69]. There are a total of 8 private dispensaries that offer maternal and child care and basic outpatient curative services in Tandale ward[69].

However, there are no dental services offered in Tandale health facilities and all patients with oral diseases are referred to an upgraded health center in nearby ward (Magomeni health centre) and to the Ubungo district hospital (Sinza Palestina hospital) [70].

2.2 Study population

The subjects for the study consisted of preschool children attending informal schools in Tandale and their caregivers.

2.3 Study design

This was a descriptive cross-sectional study.

2.4 Study period

The field work (data collection period) was carried out between 26th October2015 and 8thJanuary 2016.

2. 5 Sample size determination

The sample size was estimated using the Fisher's formula for cross-sectional studies[70]. The determined prevalence of ECC of 26% among children in Tanzania aged 6-36 months[43] was used to calculate sample size in this study.

$$n=\frac{Z^2P\ (1-P)}{d^2}$$

Where n= sample size

Z= Z statistics for the level of confidence

P= expected prevalence

d=precision (5% standard error)

For 95% confidence interval Z value was 1.96 and d was 0.05 and P was 0.26

$$n = \frac{(1.96)^2 X 0.26\ (1-0.26)}{(0.05)^2}$$

n=295.64~296

Therefore, the calculated sample size was 296 children.

2.5.1 Sampling procedures

There are a total of 29 informal preschools in the six administrative streets of Tandale. All six streets were included in the sampling procedures of the study. A stratified random sampling technique was used to select the schools in the Ward, following which, the children were conveniently selected and recruited into the study together with their caregivers.

The informal schools which were selected from each street include, PAKACHA(Faraja and Maarifa nursery school), SOKONI (Pili CCM and Mapera nursery school), MHALITANI (Amini and St peter's nursery schools), KWA TUMBO (CCM KwaTumbo and Tandale hope nursery school) MTOGOLE(CCM Mtogole and Praise God nursery school) and MKUNDUGE (Nyota and Shalom nursery school).

To get the total number of children required from each informal school it was calculated as explained below.

This included the ratio of total number of all preschool children enrolled in the informal schools at each street to the total number of preschool children in the informal schools in the whole of Tandale ward during the study period, multiplied by the calculated sample sizes as shown below.

1. PAKACHA STREET

200/1532 X 296 = 39 Children

2. MHALITANI STREET

129/1532 X 296 = 25 Children

3. MTONGOLE STREET

286/1532 X 296 = 55 Children

4. KWATUMBO STREET

326/1532 X 296 = 63 Children

5. MKUNDUGE STREET

174/1532 X 296 = 34 Children

6. SOKONI STREET

417/1532 X 296 = 80 Children

From the selected informal schools children of 36-72 months were selected to meet the total number of children required per street as calculated above to participate in the study.

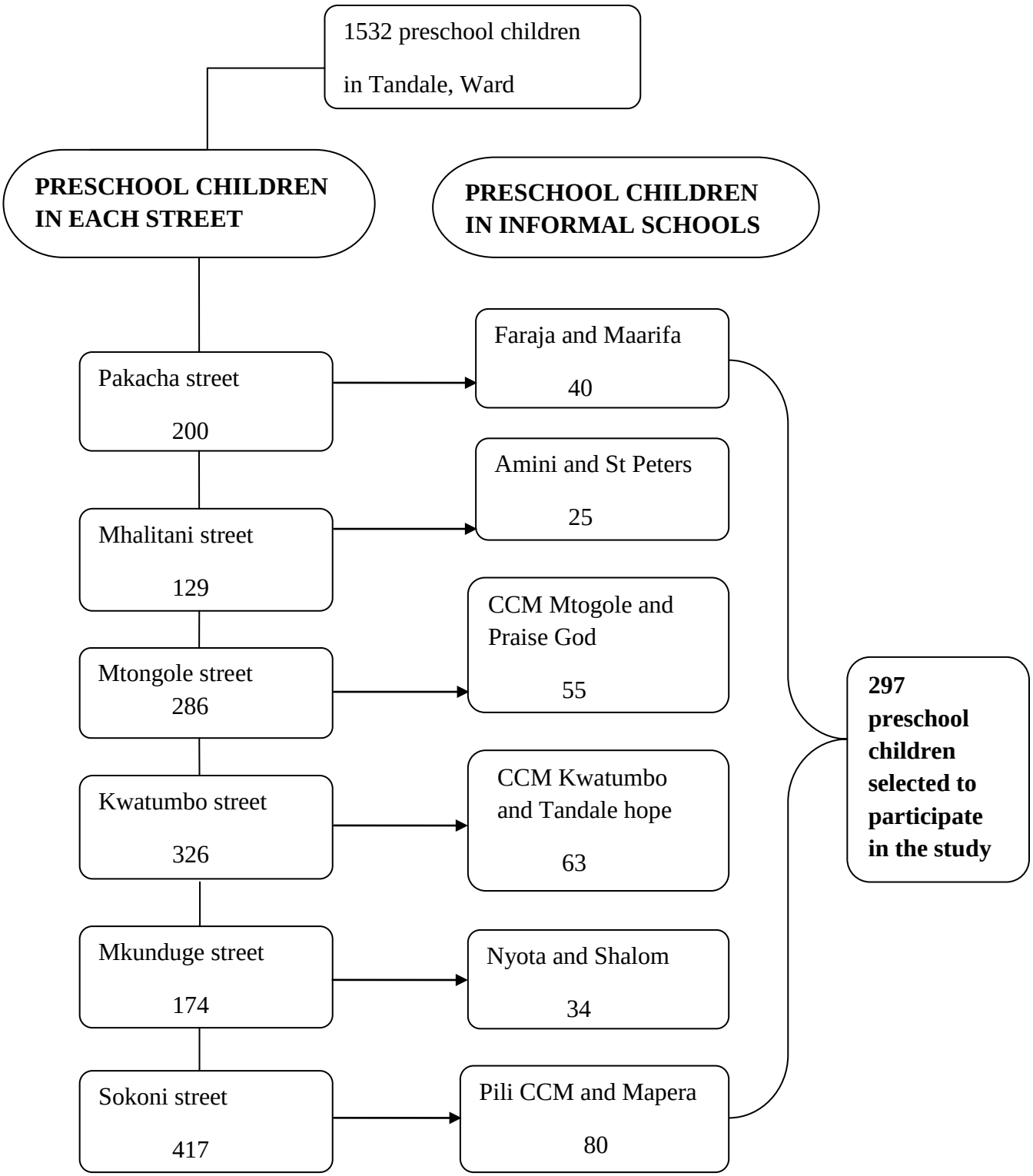

Figure 1: Sampling Frame

The selected children were given consent letters (Appendix I) to take to their parents to allow the child to be examined and also inviting the parents to be present at school on the data collection day to complete the questionnaire. Only children whose caregivers gave consent and were present on the day of data collection and who met the inclusion criteria were recruited to participate in the study.

2.6 Inclusion criteria

1. Children aged 36-72 months attending informal schools in Tandale.
2. Caregivers who gave consent to the study.
3. Children who gave assent to the study.

2.7 Exclusion criteria

1. Children with severe illness or mental disabilities that have an influence on the caries disease pattern.

2.8 Data collection methods

Data were collected through caregivers interview and oral clinical examination of the children. The questionnaire was administered to the caregivers by the research assistants through face to face interviews, followed by clinical oral examination which was carried out by the Principal Investigator (PI) to determine the carious status and oral hygiene status of the children.

2.9 Data collection instruments

2.9.1 Questionnaire

The study utilized a modified questionnaire adopted from the WHO Oral Health Survey Basic Methods [71]. (Appendix II). The questionnaire was translated into Kiswahili by the PI and pretested in a sample of caregivers of children of the same age in one of the preschools that was not included in the study in Tandale. The questionnaire contained both open-ended and closed-ended questions.

Using this questionnaire the following data were collected:

a) Socio-demographic data of the children and caregivers

b) Child's oral hygiene practices

c) Child's breastfeeding and weaning practices

d) Child's snacking habits specific for cariogenic snacks and drinks

2.9.2 Clinical examination

An oral clinical examination was carried out to determine caries status and the presence of plaque among the children. The examination was carried out by the PI in the classrooms setting, with the child lying in a supine position on the school bench and utilizing a natural light source. The findings of the clinical examination were recorded by a trained research assistant on a clinical examination form designed for this study. (Appendix III).

The oral hygiene status was assessed first by examining visible plaque levels on the dentition using dental mirror and explorer.

Plaque disclosing tablets were not used in the study. The plaque index for each individual child was calculated using Plaque Index Scoring criteria of Silnes-Loe (1964). Thereafter the teeth were isolated and dried using sterile gauze, dental caries was diagnosed using a dental explorer and mouth mirror. The research assistant recorded each tooth's caries status as decayed (d), missing (m) or filled (f). Caregivers were asked to confirm if the missing teeth were lost due to caries or other reasons.

2.10 Validity and reliability

The research assistants were trained by an experienced paediatric dentist on how to fill the questionnaire and oral examination record form to ensure uniform understanding and interpretation of the criteria and codes for caries and oral hygiene status.

Standardization and calibration were done prior to data collection. PI who examined all the children was calibrated by the experienced paediatric dentist for plaque score and diagnosis of dental caries. The Cohen's Kappa scores for inter- examiner reliability were 0.87 for dmft and 1.0 for plaque scores. During data collection, every 10^{th} child was re-examined without reference to the initial record to control for intra-examiner reproducibility. The Cohen's Kappa scores for intra-examiner reproducibility were 0.82 for dmft and 1.0 for plaque scores.

2.11 Data analysis

Data was entered in the computer using Excel sheet, cleaned and analyzed using SPSS Version 20 for Windows.Where appropriate dichotomization of data was carried out.

Descriptive statisticswas used and the data was presented in the form of tables and bar charts to provide an overview of the study findings. Inferential statistics (ANOVA, Chi square, Fisher's exact test and Logistic regression) tests were carried out to test the association between caries experience with oral health habits. The results were considered significant when the p value was ≤ 0.05.

2.12 Ethical consideration

1. Ethical approval to carry out the study was obtained from Muhimbili National Hospital's Institutional Ethics Review Board (MNH-IRB) and Kenyatta National Hospital and University of Nairobi Ethical and Research committee (KNH-UoN). Permission to conduct the study was also sought and obtained from the Department of Education from Kinondoni Municipality and from community leaders in each street in Tandale Ward.

2. The study objectives were explained to the caregivers and written informed consent was obtained from the caregivers of the participating children before beginning the study through signing a consent form.

3. Participants were allocated identification numbers written on each page of the questionnaire. No names were included in the questionnaire.

4. Oral health education was given to the caregivers and children on the day of data collection. Children in need of treatment were referred to Muhimbili National Hospital for free treatment.

5. Information obtained will be used only for purposes of the study as outlined.

Chapter 3
Results

3.1 Children's age and sex

There were 297 children who participated in the study. The female to male ratio of the children was 1.1:1.The age range was between 36 to 71 months with mean age of 55.65 months (± 9.81 SD). The children's age distribution is shown in Figure 2

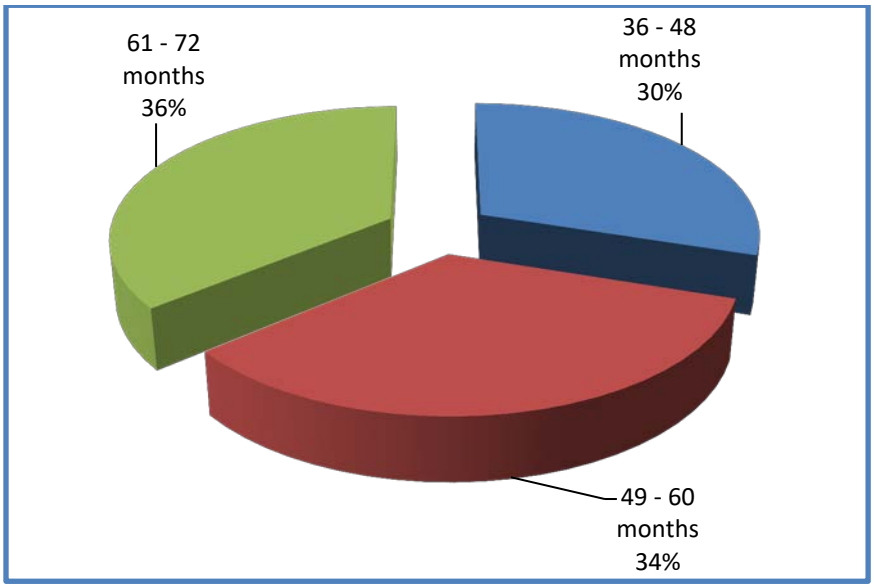

Figure 2: Children's age distribution

3.2 Socio-demographic characteristics of the caregivers

The majority of the caregivers were females (n=276; 92.9%), with 7.1% (n=21) being male. The age range of caregivers was between 20 and 60 years, with mean age of 30.41 years (±6.41SD). A large proportion (n=211; 71%) of the caregivers were married and living with spouse.

The education level attained by 214 (72.1%) of the caregivers was primary level, while 47 (15.8%) had attained secondary education and only a small number of caregivers 4 (1.3%) had attained tertiary level of education. More than half 162 (54.5%) of the caregivers were engaged in informal employment. Their monthly income ranged from TSh 20,000 to TSh 1,000,000(USD 9 to USD 447) per month. Nearly half of caregivers 125 (42.1%) earned minimum wages of Tsh 20,000 to TSh100, 000 (USD9- USD45). The socio-demographic characteristics of the caregivers are summarized in Table 2.

Table 2: Socio-demographic characteristics of the caregivers

VARIABLES	CATEGORY	n	(%)
Age	20-30 years	172	(57.9%)
	31-40 years	102	(34.3%)
	41-50 year	20	(6.7%)
	51-60 years	3	(1%)
Sex	Male	21	(7.1%)
	Female	276	(92.9%)
Marital status	Married	211	(71%)
	Single	25	(8.4%)
	Divorced/Separated	24	(8.1%)
	Widowed	5	(1.7%)
	Cohabitating	31	(10.4%)
	Others	1	(0.3%)
Education	No formal education	32	(10.8%)
	Primary education	214	(72.1%)
	Secondary education	47	(15.8%)
	Tertiary education	4	(1.3%)
Occupation	Unemployed	90	(30.3%)
	Formal employment	45	(15.2%)
	Non-formal employment	162	(54.5%)
Monthly income in TSh	TSh (20,000 to 100,000)	125	(60.7%)
	TSh (100,001 to 200,000)	55	(26.7%)
	TSh (200,001 to 500,000)	16	(7.8%)
	TSh (500,001 to 1M)	7	(3.4%)
	Above 1M TSh	3	(1.5%)

The caregivers further reported ownership of various household items. Mobile phone 289 (97.3%), television 238 (80.1%) and radio 221(74.4%) were the commonest items owned by the caregivers respectively (Figure 3).

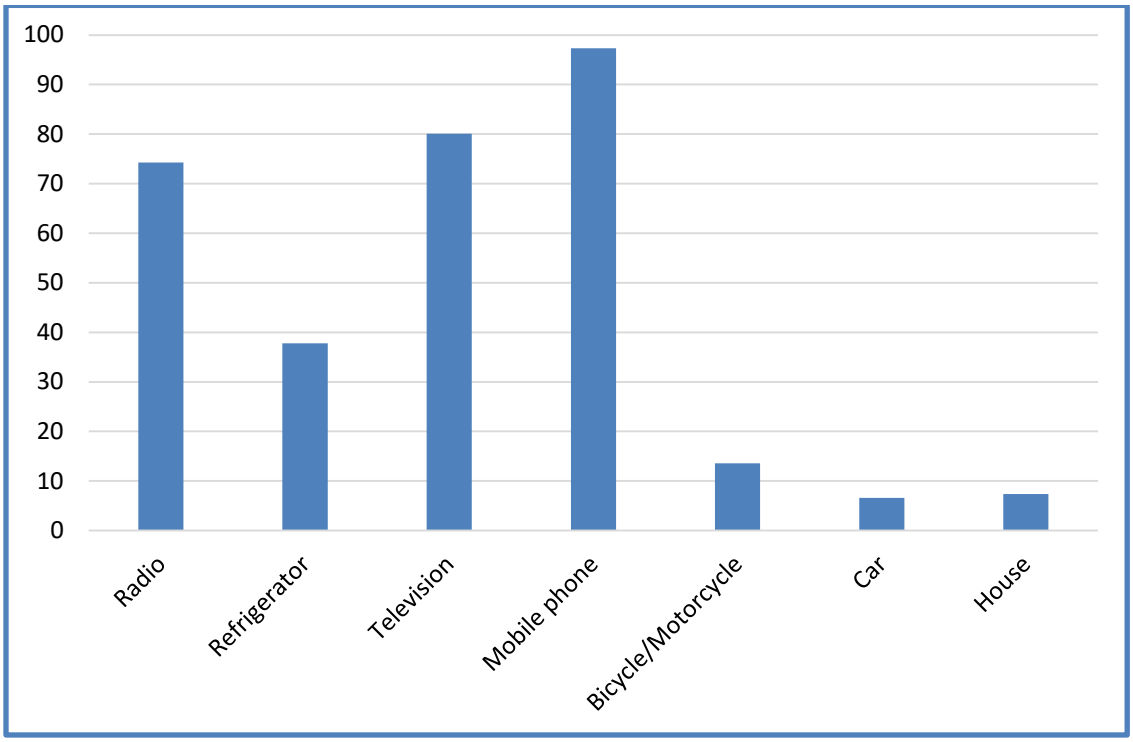

Figure 3: Caregiver's ownership of items

3.3 ECC experience

3.3.1 ECC prevalence and experience

Overall prevalence of ECC among the children was 70%. The mean dmft was 4.19 (±4.52SD).

The teeth that were most affected in the maxilla were the central and lateral incisors, and the first deciduous molars, while in the mandible they were the first and second deciduous molars. (Figure 4).

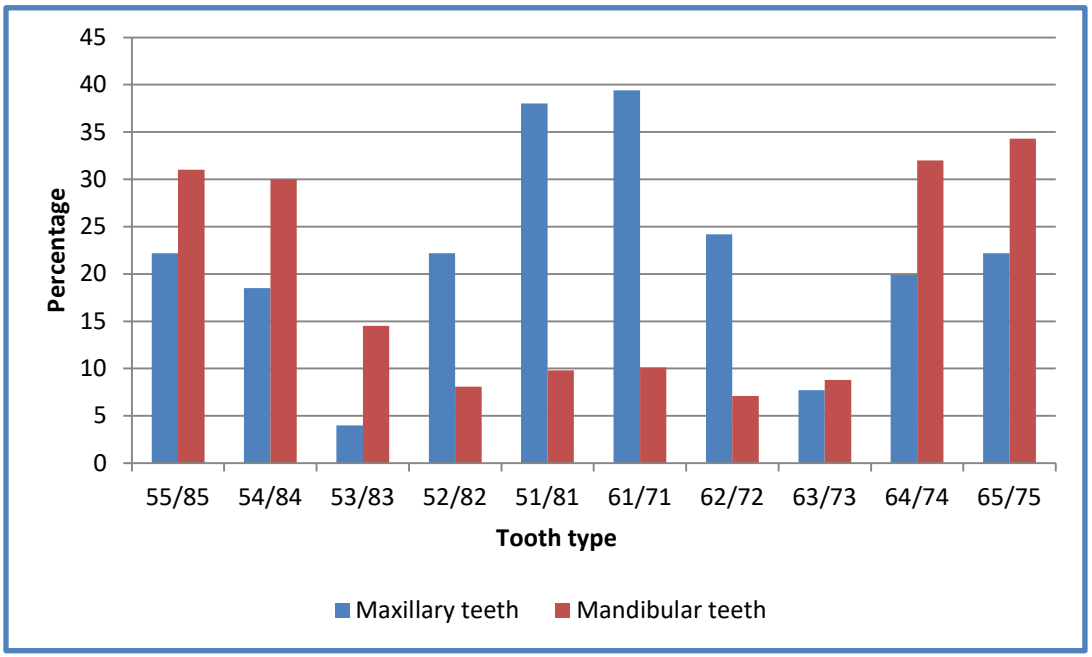

Figure 4: Distribution of ECC in the maxillary and mandibular arch.

The decayed component was the greatest constituent of the dmft caries index compared to the missing and filled teeth (Table 3). None of the children had their teeth filled at the time of the study.

Table 3: The components of the dmft index

dmft component	Frequency	Percentage
Decayed teeth	208	70
Missing teeth	29	9.8
Filled teeth	297	100

3.3.2 ECC experience with children's sex and age

Overall, male children had a higher dmft of 4.38 (±4.23SD) compared to females, whose dmft was 4.01 (±4.78SD).The mean dmft increased with age of the children, those in the older age groups having a higher dmft than the children in the younger age group. These results were not statistically significant (p≥0.05) (Table 4)

Table 4: ECC experience with children age

Age in months	n	Mean	Std. Deviation	F	p
36 - 48 months	89	4.06	4.31	0.067	0.935
49 - 60 months	101	4.30	4.63		
61 - 72 months	107	4.20	4.62		
Total	297	4.19	4.52		

3.3.3 ECC experience with caregivers level of education

The ECC among the children was found to increase with increasing level of education of the caregivers (Table 5). The highest caries experience was found in children whose caregivers had tertiary level of education where the mean dmft was 6.00 (±3.83SD) compared to those children whose caregivers had primary level of education with dmft of 4.29 (±4.62 SD) and those with no formal education with dmft of 4.59 (±4.63 SD). The association of caries experience with caregiver's level of education was not significant (ANOVA, p=0.404).

Table 5: ECC experience with caregiver's level of education

Caregiver's education	n	Mean	Std. Deviation	F	p
No formal education	32	4.59	4.63		
Primary education	214	4.29	4.62		
Secondary education	47	3.28	4.00	0.977	0.404
Tertiary education	4	6.00	3.83		
Total	297	4.19	4.52		

3.3.4 ECC experience with caregivers occupation

ECC experience varied with caregivers occupation. The highest mean dmft of 4.49 (±4.94SD) was found among children whose caregivers were not formally employed, with the lowest dmft of 3.78 (±4.19SD) found among children whose caregivers were formally employed (Table 6). There was no significant association between ECC experience and caregiver's occupation. ANOVA F (2,294) = 0.816, p = 0.443)

Table 6: ECC experience with caregiver's occupation

Caregiver's occupation	n	Mean	Std. Deviation	F	p
Unemployed	90	3.84	3.83		
Formal employment	45	3.78	4.19		
Non-formal employment	162	4.49	4.94	0.816	0.443
Total	297	4.19	4.52		

3.3.5 ECC experience with caregivers household income

ECC experience increased with increased caregivers household income (Table 7). The highest dmft of5.14(± 4.93SD) was found in children whose caregivers had a higher monthly income of TSh 500,001 to TSh1 million(USD 225 to USD 450), followed by those whose caregivers had lowest monthly household income of TSh 20,000 to

TSh100,000 (USD 9 to USD 45) with the dmft of 4.52(±5.01SD) and those children whose caregivers had middle house hold income TSh200,001 to TSh500, 00(USD 90 to USD 225) with the dmft of 3.31(±2.52SD). There was no significant association between ECC experience and caregivers household income (p= ≥0.05).

Table 7: ECC experience with caregiver's household income

Caregiver's income	n	Mean	Std. Deviation	F	p
TSh 20,000 to 100,000	125	4.52	5.01		
TSh 100,00 to 200,00	55	4.27	4.91		
TSh 200,001 to 500,000	16	3.31	2.52	0.278	0.892
TSh 500,001 to 1M	7	5.14	4.95		
Above 1M	3	4.00	1.73		
Total	206	4.37	4.78		

3.4 Children's tooth brushing habits

3.4.1 Frequency of tooth-brushing

All children 297 (100%) who participated in the study were reported to brush their teeth. However, they brushed their teeth with different frequencies. Majority 208 (70%) brushed at least once a day and 73(24.6%) brushed two or more times a day. These data are shown in Figure 5.

A larger proportion of female children 153(51.5%), brushed their teeth more frequently compared to the male counterparts144 (48.5%) The results on tooth brushing with children's sex were however, not significant (p=0.995).

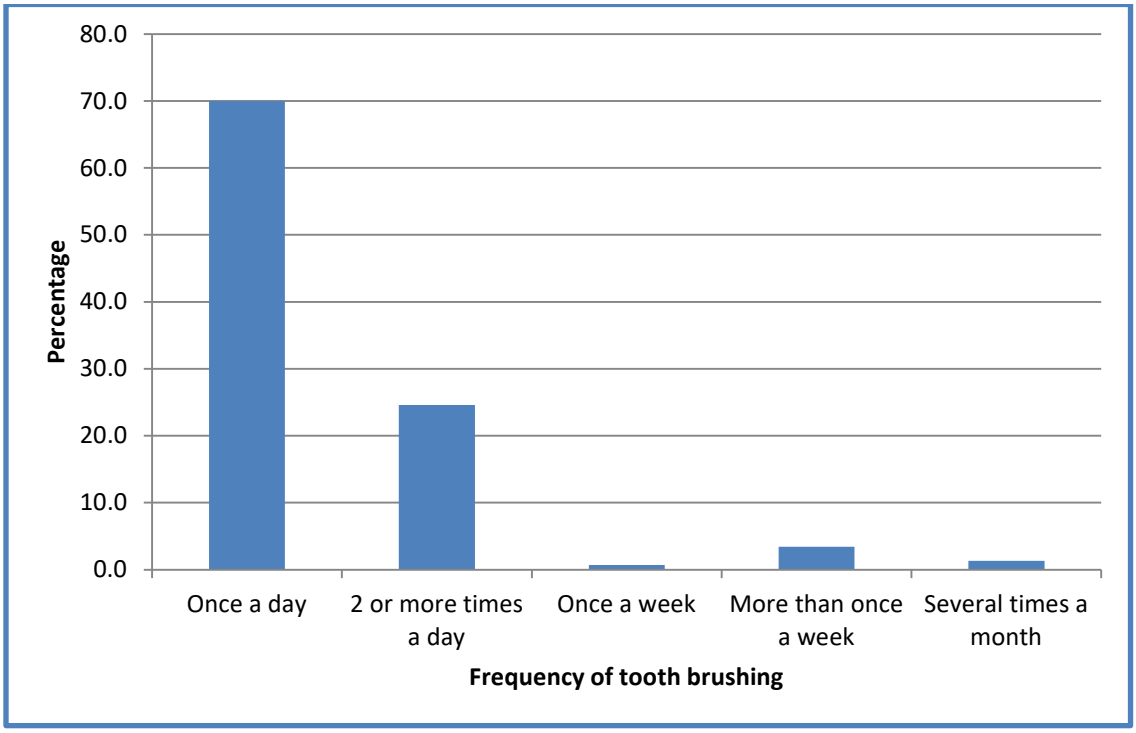

Figure 5: Frequency of tooth brushing by children

The children mostly used commercial toothbrushes, sometimes with additional tooth brushing aids such as wooden toothpicks 25 (8.4%), plastic toothpicks 5 (1.7%) and charcoal 1 (0.3%).The brands of toothpaste used by the children are presented in Figure 6.

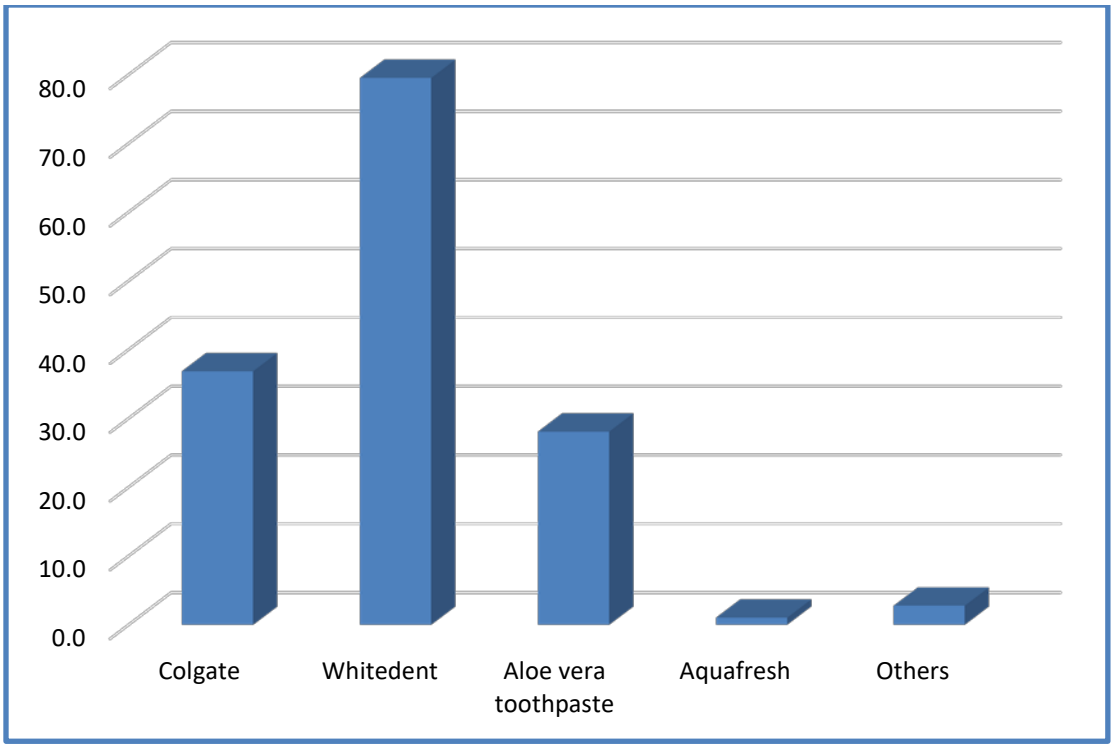

Figure 6: Brands of toothpastes utilized by the children

3.4.2 ECC experience with frequency of tooth-brushing

ECC experience varied with the varying frequencies of tooth-brushing by the children. The children who brushed once daily had the highest ECC experience with dmft of 4.45 (±4.59SD), compared to those who brushed twice or more times a day with dmft of 3.71(± 4.34 SD). The ECC experience of the children with frequency of tooth-brushing is summarized in Table 8.The results, however, were not significant ANOVA (4, 292=0.833, p=0.505).

Table 8: ECC experience with children's frequency of tooth-brushing

Frequency of tooth brushing	n	Mean	Std. Deviation	F	p
Once a day	208	4.45	4.59	0.833	0.505
2 or more times a day	73	3.71	4.34		
Once a week	2	0.50	0.71		
More than once a week	10	3.20	2.94		
Several times a month	4	3.75	7.50		
Total	297	4.19	4.52		

When these results were dichotomized, high dmft(4-20) and low dmft(0-3), high dmft was seen among children who brushed less frequently and the results were statistically significant (χ^2, p=0.021).These results are presented in Table 9. In addition, a logistic regression was performed to ascertain the effects of frequency of tooth- brushing on the likelihood that respondents have caries. Respondents with low frequency of tooth brushing were 0.509 times (OR) more likely to develop dental caries than those with high frequency of tooth-brushing.

Table 9: ECC with relation to frequency of tooth-brushing

Frequency of tooth brushing	Low dmft	High dmft	Total	χ^2	p
Brushing less than twice a day	122 (53.3%)	107(46.7%)	229 (100%)	5.366	0.021
Brushing twice or more than twice a day	47(69.1%)	21 (30.9%)	68 (100%)		

3.4.3 ECC experience with supervision of tooth brushing

Supervision of tooth-brushing was done by the caregivers with different frequencies. Majority 248 (83.5%) of the children were supervised in toothbrushing. A large proportion 180 (72.6%) of the children were supervised every day, with 53 (21.4%) and 15 (6.0%) of the children supervised three times and once a week respectively.

Children who were supervised in tooth brushing had lower caries experience with dmft of 3.99 (±4.26SD) compared to those who were not supervised whose dmft was 5.20 (±5.58SD).These results were not significant (p=0.085).

3.4.4 Children's plaque score

The average plaque score among the children was 0.50 (±0.36 SD).The highest plaque scores were found in the mandibular left posterior segment, followed by the maxillary left posterior segment, the maxillary right posterior segment and the mandibular right posterior segments .The least plaque score was found in the mandibular anterior segment and maxillary anterior segment respectively(Figure 7).

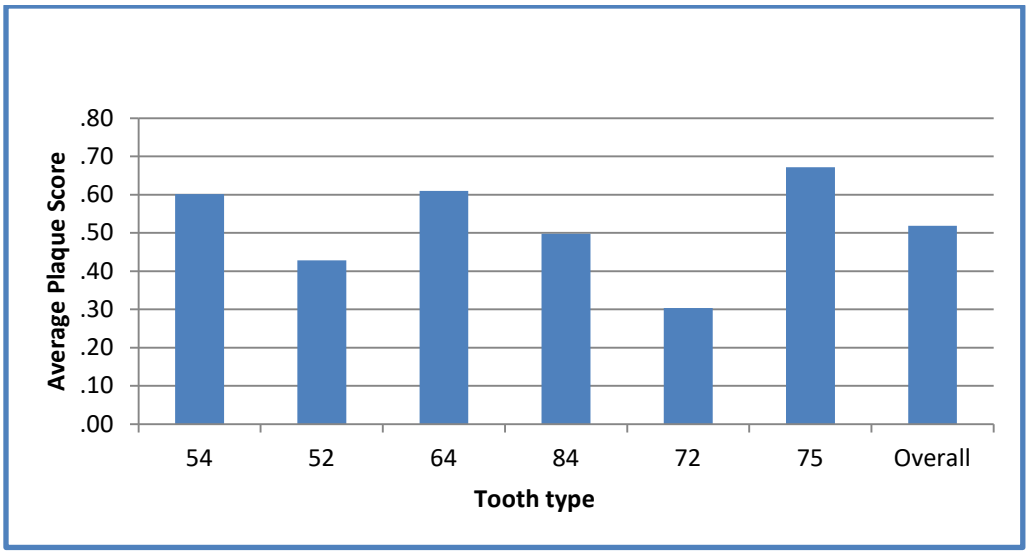

Figure 7: Average plaque scores on the examined teeth

3.4.5 Plaque score with children's sex and age

Male children had a higher average plaque score of 3.24 (± 2.32 SD) when compared to female whose average plaque score was 2.83 (±1.99 SD). The results were not significant (p=0.108). (Table 10).

Table 10: Average plaque scores with child's sex

Child's sex	n	Mean	Std. Deviation	F	p
Male	144	3.24	2.32		
Female	153	2.83	2.00	2.598	0.108
Total	297	3.03	2.17		

When the average plaque scores were further dichotomized to low average plaque scores (0.00-0.99) and high average plaque score (1.00-1.99), male children still showed poor oral hygiene status with high average plaque scores as compared to female, and these results were significant (χ^2, p=0.017).

A decrease in mean plaque score was seen with an increase in ages of the children (Table 11).The association of plaque score with children's age was not, however, significant (p=0.473)

Table 11: Average plaque score with children's age

Age	n	Mean	Std. Deviation	F	p
36 - 48 months	89	3.14	2.30	0.750	0.473
49 - 60 months	101	3.14	2.25		
61 - 72 months	107	2.82	1.97		
Total	297	3.03	2.17		

3.4.6 ECC experience with presence of plaque

The children who had obvious plaque present during clinical examination had two times higher dmfts when compared to their counterpart who didn't have visible plaque present (Table 12).Considering the dichotomized mean dmft and average plaque scores a significant association $p \leq 0.05$ was found between plaque scores and dmft. Higher dmft scores were associated with poor oral hygiene, with results being statistically significant. (χ^2, p=0.000).

Table 12: ECC experience with average plaque scores

Average plaque scores	Low dmft	High dmft	Total	χ^2	p
Low average plaque scores	156 (92.3%)	13 (7.7%)	169 (100%)	12.313	0.000
High average plaque scores	100 (78.1%)	28 (21.9%)	128 (100%)		

3.5 Breastfeeding practices

Almost all children 293 (98.7%) who participated in the study were breastfed as infants with varying durations of breastfeeding as shown in Figure 8.Among the children who were breastfed, 276 (94.2%) included night breastfeeding while 17 (5.8%) were breastfed only during the daytime. A sizeable proportion 89 (30.4%) of children were breastfed at will, with the caregivers report of mothers leaving the nipple in the child's mouth as both the child and the mother sleep.

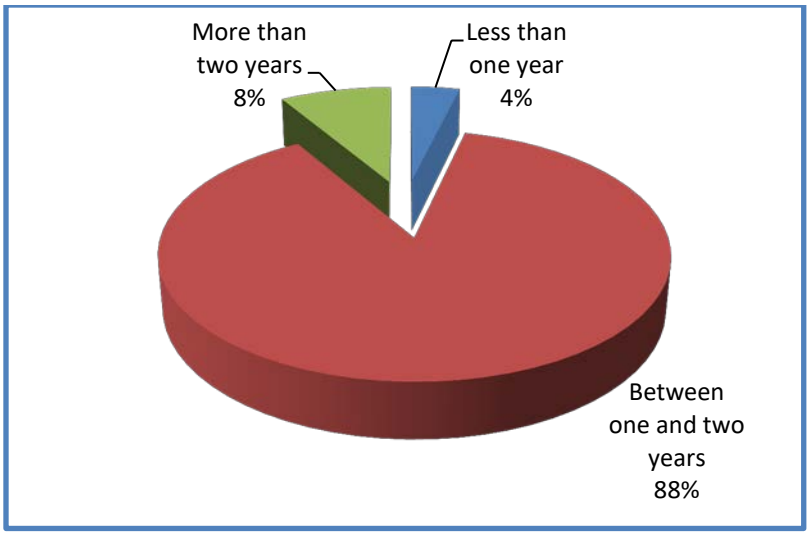

Figure 8: Duration of breastfeeding

3.5.1 ECC experience with duration of breastfeeding

Caries experience increased with increased duration of breastfeeding. Children who were breastfed for a longer period of time (more than 2 years) had the highest caries experience with dmft of 5.00 (±4.60SD), compared to the ones breastfed between one and two years whose dmft was 4.19 (±4.54SD) and ones who breastfed for less than a year whose dmft was 2.55 (±3.67 SD) (Table 13). The difference in ECC experience with duration of breastfeeding was snot significant (ANOVA, p= 0.325).

Table 13: ECC experience with duration of breastfeeding

Duration of breastfeeding	n	Mean	Std. Deviation	F	p
Less than one year	11	2.55	3.67		
Between one and two years	257	4.19	4.54	1.129	0.325
More than two years	25	5.00	4.60		
Total	293	4.19	4.52		

3.5.2 ECC experience with night time breastfeeding

Children who were reported to have been breastfeed at night had a higher caries experience with dmft of 4.29 (±4.57SD) in comparison with the ones who were not breastfeed at night whose dmft was 2.71 (±3.42SD).However, these results were not significant (ANOVA, p=0.162)

3.6 Weaning practices

The caregivers reported different weaning times for their infants. Most children were weaned at below six months of age (Figure 9).The main weaning food was maize, sorghum, millet and cassava porridge. One hundred and sixty one161: (54.2%) children had sugar added to their weaning food while 136 (45.8%) children had no sugar added to their weaning foods.

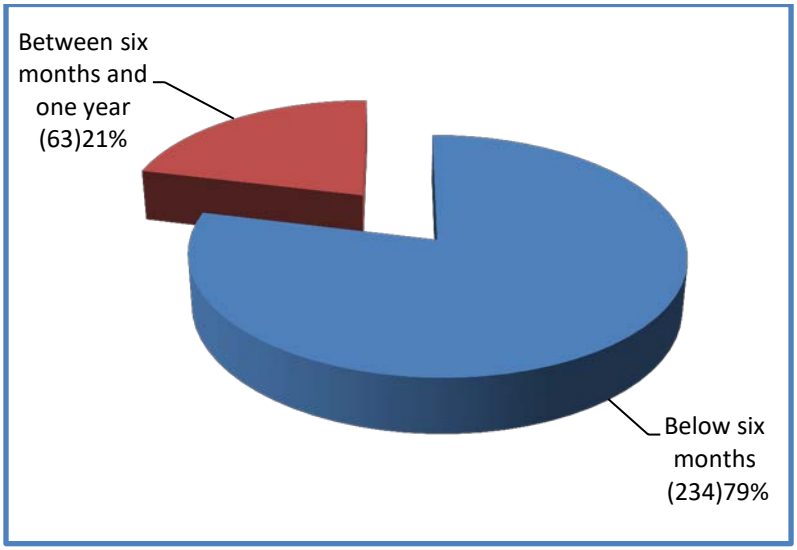

Figure 9: Infant's weaning times

3.6.1 ECC with weaning periods

Caries experience was higher among the children who were weaned at an earlier age of below six months with dmft of 4.36 (±4.61 SD) while children who were weaned at between six months and a year, had a dmft 3.56 (±4.15 SD). The association of ECC with weaning times was not significant (p=0.211).

3.6.2 Use of bottle during weaning

Nearly half of the children 125 (42.1%) were bottle fed during the weaning period. Milk was the most frequently used content in the bottle followed by to juice and water. The bottle content used with the highest frequency 60 (48%) contained milk without sugar, followed by milk with sugar41 (32.8%). (Figure10).

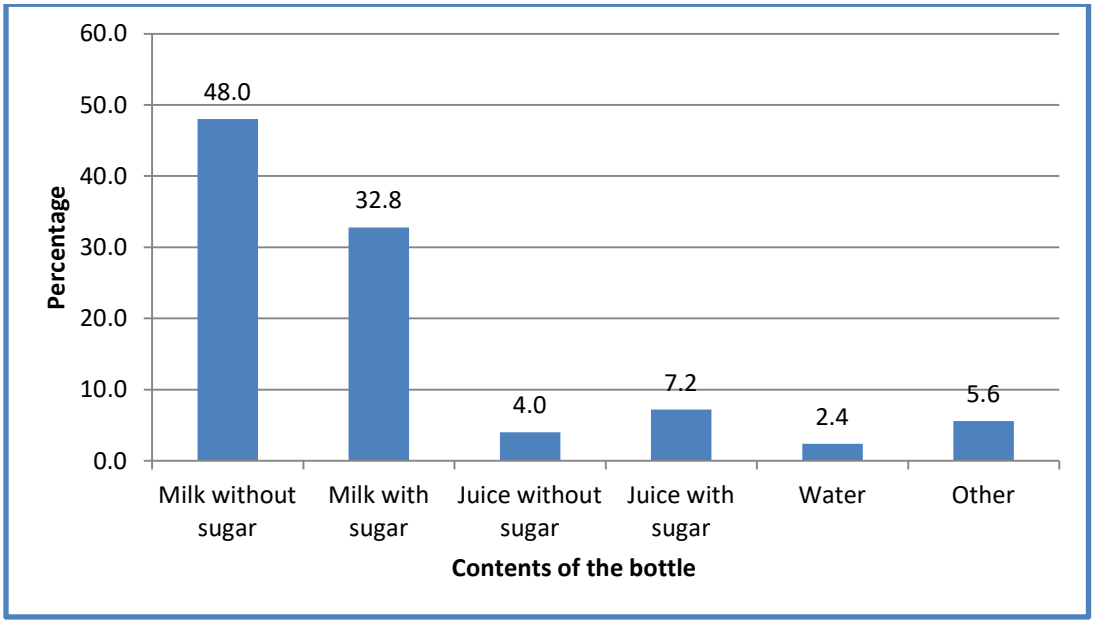

Figure 10: Bottle contents frequently used by infants

3.6.3 ECC experience with bottle feeding

The highest dmft of 4.52 (±4.62 SD) was found among children who were bottle-fed compared to the lower dmft of 3.95 (±4.44 SD) among their counterparts who were not bottle-fed. There was no significant association found between caries experience and bottle feeding practices (p=0.282). However, ECC experience was found to be highest among children who had milk with sugar added in the bottle followed by juice without sugar and milk without sugar respectively (Table 14). Interestingly the association of ECC with the contents of the bottle was not statistically significant. (p = 0.578).

Table 14: ECC experience with contents of the bottle

Contents of the bottle	n	Mean	Std. Deviation	F	p
Milk without sugar	60	4.13	4.57		
Milk with sugar	41	5.49	4.83		
Juice without sugar	5	4.60	4.88		
Juice with sugar	9	3.22	4.99	0.764	0.578
Water	3	2.00	2.65		
Other	7	4.86	3.98		
Total	125	4.52	4.62		

3.7 Dietary patterns

3.7.1 Consumption of cariogenic snacks

Almost all 287 (96.6%) children were reported to consume cariogenic snacks such as biscuits, cakes, and sweets. These snacks were consumed at varying frequencies as shown in Figure 11. Female children 148 (51.6%) appeared to consume cariogenic snacks more frequently than male children 139 (48.4%).However, the results were not significant Fisher's Exact p = 0.914

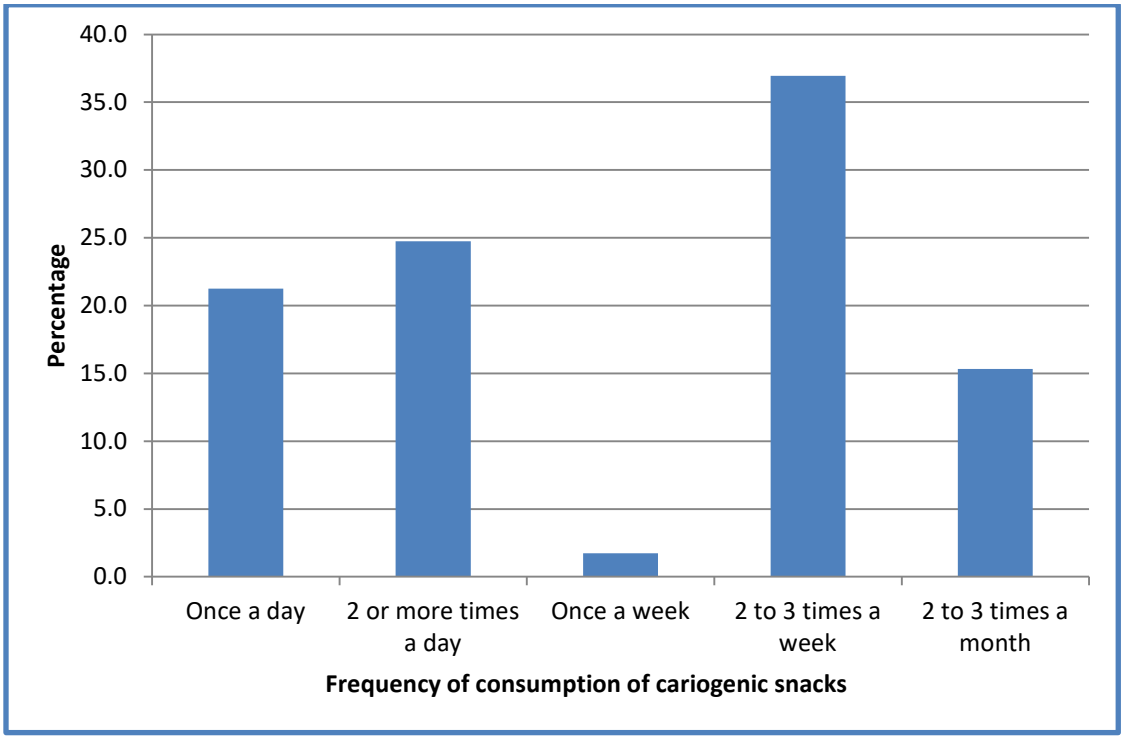

Figure 11: Frequency of consumption of cariogenic snacks

3.7.2 ECC experience with frequency of consumption of cariogenic snacks

ECC experience increased with increase in frequency of consumption of cariogenic snacks (Table 15). Children who consumed cariogenic snacks two or more times a day had the highest ECC experience with dmft of 5.07 (± 4.92 SD) followed by children who consumed cariogenic snacks once daily with dtmf of 3.89 (± 3.98. SD).

When the frequency of consumption of cariogenic snacks was dichotomized into less than twice a day and two or more times a day, it was found that children who consumed cariogenic snacks more frequently had significantly higher dmft compared to their counterparts (χ^2, p=0.029) . Logistic regression to ascertain the effects of frequency of consumption of cariogenic snacks on the likelihood that respondents have caries gave an odds ratio (OR= 1.672) showing high likelihood of developing dental caries with increasing frequency of consumption of cariogenic snacks

Table 15: ECC experience with frequency of consumption of cariogenic snacks

Frequency of consumption of cariogenic snacks	Low dmft	High dmft	Total	χ^2	p
Less than twice a day	102(62.6%)	61(37.4%)	163(100%)	4.743	0.029
Two or more times per day	67(50%)	67(50%)	134(100%)		

3.7.3 Consumption of cariogenic drinks

Two hundred and ninety-one 291(98%) children consumed cariogenic drinks. Juice, soda, and lemonade were reported to be the common types of drinks given to the children. The frequency of consumption of these drinks among the children is presented

in Figure 12. There were more females 151 (51.9%) compared to males 140 (48.1%) who consumed cariogenic drinks. The results, however, were not significant, Fisher's Exact p =0.106

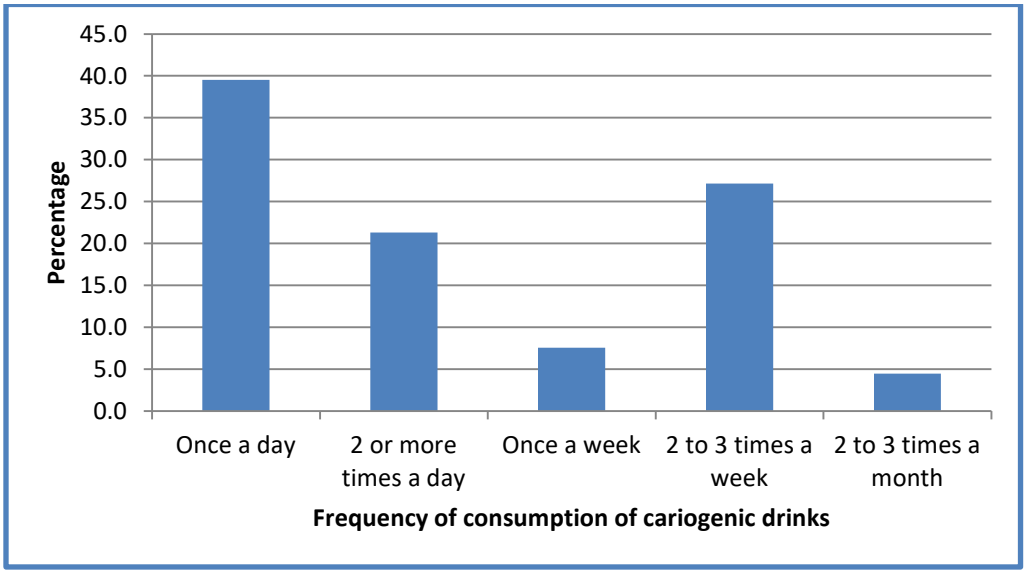

Figure 12: Frequency of consumption of cariogenic drinks

3.7.4 ECC experience with frequency of consumption of cariogenic drinks.

Varying dmft values were recorded among children who consumed cariogenic drinks in different frequencies. When the frequency of consumption of cariogenic drinks was dichotomized, children who consumed cariogenic drinks more frequently had a higher dmft compared to their counterparts, although, the results were not statistically significant (p=0.260).Table 16.

Table 16: ECC experience with frequency of consumption of cariogenic drinks

Frequency of consumption of cariogenic drinks	Low dmft	High dmft	Total	χ^2	p
Less than twice a day	73 (60.8%)	47 (39.2%)	120 (100%)	1.269	0.260
Two or more times per day	96 (54.2%)	81(45.8%)	177(100%)		

Chapter 4

Discussion

This was a crossectional descriptive study conducted among preschool children in Tandale ward, a high density informal settlement in Dar es Salaam. The results of the study are likely to be representative of children from low-income setting in Tanzania.

Overall, the children had a caries prevalence of 70% and a dmft of 4.19(±4.52SD). This study finding indicates that caries prevalence among the children is high and the children have unmet dental care needs as illustrated by the dmft index where decay was the highest component of the caries index. The caries prevalence represented in the current study was higher than that of several school-based studies carried out among children within the same age groups in Moshi and Dar es Salaam in Tanzania, where ECC prevalences of 30.1% and 50.5% respectively were reported [44, 45]. The ECC experience found was higher than what was found in epidemiological studies done in the neighbouring countries of Kenya and Uganda [36, 37, 38, 41].

However, hospital based studies in Dar es Salaam reported lower ECC prevalences of 26% and 16.7%[42, 72]. This could be due to the fact that children with low ECC experience in these studies were of the younger age brackets (6-36 months) hence have short term exposure of the teeth to the cariogenic field. Children in hospital based studies are a selected cohort and they are likely to have higher ECC as reported by Hatib [8] in Dar es Salaam and Chepkowny *et al*[40] in Nairobi.

In the current study, higher ECC experience was found among male children compared to female children, similar to what was reported by Maro and Khabuka [45] among 2-6 years old preschool children. According to Ngatia *et al* [37]and Njoroge *et al*[38] who reported similar findings among preschool children in the Kenyan population, they suggested that male children have poorer oral hygiene practices as compared to female children. Other studies have found a higher ECC prevalence among female children compared to male children[33]. Folayan *et al*[33] found a prevalence of 66.7% among female compared to 33.3%among male in children below 71 months. The authors in this study suggested that there was a need to investigate the possible effect of gender as a risk factor in ECC development.

ECC experience increased with the age of the children who participated in the current study. This trend replicates what has been previously reported by several other studies [33, 34, 37, 38, 48]. This may be attributed long term exposure of the teeth to cariogenic factors.

In the current study, high dmft values were found among children whose caregivers had higher levels of education compared to their counterparts whose caregivers had lower levels of education. Although these results were not significant, the finding is contrary to what is reported in literature where lower ECC experience is commonly reported among children whose caregivers have high levels of education[42, 80]. In India, Prakash *et al* [48] reported that children whose parents have higher levels of education have better dental practices such as good oral hygiene practices and sugar consumption control.

In addition, Sufia *et al* [66] gave a possible explanation that educated parents are more interested in good health, and are therefore likely to instil positive behaviours in their

children in order to maintain good oral health. It is postulated that Oral Health Literacy (OHL) generally affects the caregiver's perception on oral health and utilization of oral health services. However, it should be noted out in this study, there was minimal variability in caregivers level education among the study participants as almost all the caregivers had attained low levels of education and this could have influenced these results.

Another interesting finding, in the current study is that children whose caregivers had relatively high monthly incomes had higher ECC experience than those whose caregivers had lower income. Normal trend is that, increase in ECC experience has been associated with low household income[5, 62, 63].Similar trends as in the current study were observed by Al-Hasani and Rug-Gunn [65]and Olatosi *et al*[81]. The explanation given from these two studies was that there is likely to be a higher purchasing power of cariogenic snacks and drinks for children among those caregivers with higher incomes. On the other hand low income has been associated with less affordability for dental care services. The association between caries experience and these socio-demographic variables in this study should be interpreted with caution as almost all the children were from a homogeneous background of low socio-economic settings.

In the current study, children with poor oral hygiene and obvious plaque present during clinical examinations had a higher dmft when compared to their counterpart with good oral hygiene, without visible plaque. This finding was highly significant. Poor oral hygiene practices are commonly associated with high ECC prevalence and experience

among preschool children. [5, 7, 8]. Despite the report by caregivers that the children brushed their teeth, most (97.3%) of the children had visible plaque during clinical examination. ECC being a chronic infection the presence of high levels of plaque may explain the high ECC experience among children with poor oral hygiene as demonstrated with high average plaque scores.

The additional presence of fluoridated toothpaste may tend to decrease ECC experience among preschool as demonstrated by 10 year systematic review of the effectiveness of fluoride in ECC preventive measure [49]. The findings of this study suggest similar results as the brands of toothpastes reported by the caregivers were fluoridated. Children who brushed only once daily had the highest ECC experience when compared to their counterparts who brushed twice or more times in a day with fluoridated toothpaste who had lower ECC experience. This explains the effect of fluoride in caries prevention among preschool children. It is a common finding that low ECC experience is associated with increased frequency of tooth brushing especially when fluoridated toothpaste is used[34, 48, 50].

Supervision during tooth brushing was associated with the reduction of caries experience among preschool children. Although, this finding was not significant, it concurs with the findings reported in literature on ECC experience in relation to supervision of tooth brushing among children where caregiver supervision in tooth brushing is associated with reduction of ECC [47, 48, 49, 51, 52]. The authors of these studies strongly suggested that preschool children require caregiver assistance for effective plaque removal.

According to the present study, almost all children were reported to have been breastfed, with majority breastfeeding for between one and two years. This was not a surprising finding as it is a cultural norm in Tanzania to breastfeed infant up to 18 months[42].

ECC experience was found to increase with increased duration of breastfeeding. Children who were breastfed for a longer period of time (more than 2 years) had the highest ECC experience, *albeit* the association was not positive. Similar findings between ECC experience and prolonged duration of breast feeding (>12 months) have been well documented [73, 76, 77]. Other studies however, reported no association between ECC experience and duration of breastfeeding[74, 75].Thus the association between ECC experience and breast feeding appears to be equivocal. The differences may be explained by the methodology of the study and term definition of duration of breastfeeding. Furthermore, interpretation of positive association findings between duration of breastfeeding and ECC experience may be confounded by other aetiological factors of ECC such as cariogenic diet and poor oral hygiene.

The effect of the contents of the bottle which stays in constant contact with the tooth during bottle feeding is well accounted as important factor in relating infant bottle feeding with ECC experience [73, 77, 79].In this study, a higher caries experience was observed among children who had milk with sugar in the feeding bottle as compared to those who had milk without sugar; although, the results were not significant. High dmft however, was seen in children who consumed cariogenic snacks and drinks more frequently than their counterparts who consumed these foods with less frequency.

While the association was positive for cariogenic snacks, that for cariogenic drinks was not significant. The fact that frequency of consumption of cariogenic snacks increases the risk of ECC experience in preschool children, has been demonstrated by several studies [8, 29, 37, 44, 50]. It was apparent during the field work that these cariogenic snacks are easily available to the children in this informal settlement which likely translated to the increased in daily consumption.

Conclusion

1. The study demonstrates high ECC experience among the preschool children attending informal schools in Tandale, Ward Dar es Salaam.
2. High ECC experience was positively associated with poor oral hygiene, decreased frequency of tooth brushing and increased consumption of cariogenic snacks.
3. These results are likely to be a representative of the caries status among preschool children of other low income settings in Tanzania.

Recommendation

1. There is a need to enhance oral health education to counteract the detrimental effects of oral health habits such as poor oral hygiene, decreased frequency of tooth brushing and increased consumption of cariogenic snacks which were positively associated with ECC prevalence and experience.

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Appendices

Appendix I: Consent Form

The title of the Study: **Early Childhood Caries experience oral hygiene status and associated oral health habits among preschool children in Tandale, Dar es Salaam.**

PART A (Consent information)

Introduction

Early Childhood Caries (ECC) is a common dental problem affecting preschool children. This has been documented to be a major public health problem in many developing countries, but in Tanzania, there has been scanty documentation on the magnitude of this problem among children in disadvantaged communities including urban slums. This study has been designed to collect more information about the disease among children in Tandale.

You are kindly invited to participate in this study so as to accomplish the mentioned goals and hence improve the oral health care of preschool children in the area. I ask you to read this information careful and ask questions for clarity in areas where you don't understand before signing the form to give consent to participate in the study.

Objectives

The main objective of this study is to **Early Childhood Caries experience oral hygiene status and associated oral health habits among preschool children in Tandale, Dar es Salaam.**

Benefits

If you agree to participate in this study you will benefit in the following ways

1. You will obtain free oral health education for your child on the day of data collection including a demonstration on proper brushing of teeth using fluoridated toothpaste.
2. If your child will be found to be in need of treatment they will be referred to Muhimbili National Hospital for free treatment.

Study procedures & Risks

If you agree to participate in the study, you will answer a semi-structured questionnaire about your socio-economic status and the oral health status of your child.

An intraoral examination will be performed on your child in aseptic conditions to assess the oral hygiene and the decay status of your child's teeth. There is no risk anticipated in the study. In case your child requires treatment he/she will be referred to Muhimbili National hospital for treatment.

Confidentiality

Information obtained from you will be strictly confidential and used for research purposes only. It will be kept under lock and key and your name will not appear on questionnaires or on published reports or any presentations. Codes will be given to identifying you and your child.

Voluntarism

It is your decision to participate or not in this study. If at any time you wish to withdraw from participating in the study, you are free to do so. There shall be no consequences, and neither will this affect any future participation or relations with researcher or institutions involved.

There is no payment required for you to participate in the study and also no payment will be made to you for your participation in the study

Contacts and Questions

The principle researcher conducting this study is Dr. Mercy Namshitu Gideon from the University of Nairobi Kenya. You may ask any question you have now or later and you can contact her through her mobile telephone numbers +255753211473/ +254733702511 or email namshitu21@gmail.com

If you have any questions or concerns and you would like to talk to someone other than the researcher you are encouraged to contact one of the following.

Prof. MA Masiga.	The Secretariat
School of Dental Science	MNH-IRB
University Dental Hospital	Muhimbili National Hospital
P. O. Box 19676	P. O. Box 65000
Nairobi, Kenya.	Dar es Salaam, Tanzania.

The Secretariat

KNH/UoN-ERC

Kenyatta National Hospital

P. O. Box 20723 Code 00202

Nairobi, Kenya

Email: uonknh_erc@uonbi.ac.ke

PART B (Consent Form)

Please read the information sheet (PART A), or have the information read to you before completing and signing the consent form.

Participant Statement

I, (write names)……., hereby give consent to Dr. Mercy. N. Gideon to include me in the proposed study titled **Early Childhood Caries experience oral hygiene status and associated oral health habits among preschool children in Tandale, Dar es Salaam.**

I have read the information concerning this study, and I fully understand the objectives of the study and what will be required of me if I accept to take part in the study. The benefits and risks have been adequately explained to me. Any questions I have concerning the study have been adequately answered and I am satisfied. I understand

that I can withdraw from this study anytime I wish to, without giving any reason and this will not affect my access to normal healthcare management.

I am convinced that no harm or unforeseen dangers will occur in the course of this study, and therefore do hereby freely consent to participate as a respondent.

Name of participant or respondent……

Relation to the index child…… Signature..... Date.....

Name of the researcher..... Signature .....Date.....

Thank you for your cooperation.

FOMU YA RIDHAA YA USAILI

Jina la Utafiti**: Kiwango cha kutoboka kwa meno ya asili ya watoto, hali ya usafi wa kinywa na meno kukihusiana na tabia zinasohusu afya ya kinywa na meno Tandale, Dar es salaam.**

SEHEMU A (Maelezo ya ridhaa)

Utangulizi

Kutoboka kwa meno ya asili ya watoto nii maambukizi ya meno yanayoathiri watoto wa shule za awali. Hili tatizo limeandikwa na kuelezewa kama moja ya tatizo kubwa la kiafya katika jamii na katika nchi zinazoendelea. Tanzania ina nyaraka chache kuhusu ukubwa wa tatizo hilo kati ya watoto kwenye jamii zisizojiweza ikiwa ni pamoja na

makazi duni ya mijini. Utafiti huu umebuniwa kukusanya maelezo ya kutosha kuhusu ugonjwa huu kwa watoto waishio Tandale.

Unaalikwa kushiriki katika utafiti huu ili usaidie kufanikisha malengo ya tafiti hii ili kuboresha afya ya kinywa na meno kwa watoto wa shule za awali katika eneo hili.

Unaombwa kusoma maelezo vizuri na kuuliza maswali sehemu ambazo hujaelewa kabla ya kusaini fomu na kutoa ridhaa ya ushiriki wako katika utafiti huu.

Malengo

Lengo kuu la tafiti hii ni kujua **Kiwango cha kutoboka kwa meno ya asili ya watoto, hali ya usafi wa kinywa na meno kukihusiana na tabia zinasohusu afya ya kinywa na meno Tandale, Dar es salaam.**

Faida

Kama utakubali kushiriki katika utafiti huu utapata faida zifuatazo

1. Utapata elimu ya bure kuhusu afya ya kinywa na meno kwa mtoto wako siku ya usaili, pamoja kuonyeshwa njiia sahihi ya kupiga mswaki na dawa ya meno yenye madini ya Fluoride.
2. Kama mtoto wako atapatikana anahitaji matibabu ya meno atatumwa katika hospitali ya rufaa ya Muhimbili kwa matibabu hayo.

Utaratibu wa ushiriki na madhara

Ukikubali kushiriki kwenye utafiti huu utajibu maswali kwenye fomu ya usaili kuhusu hali yako ya uchumi na hali ya afya na kinywa ya mtoto wako.

Uchunguzi wa kinywa utafanyika kwa mtoto wako katika hali ya usafi ili kuangalia hali ya usafi kinywani na hali ya kutoboka ya meno ya awali ya mtoto .Hakuna madhara yeyote yanayotegemewa kutokea.Kama mtoto wako atagundulika na tatizo la meno linalohitaji matibabu atatumwa kwenda kwenye hospitali ya rufaa ya Muhimbili kwa matibabu.

Usiri

Habari /maelezo yatakayopatikana kutoka kwako yatakuwa ya usiri mkubwa na yatatumika kwa kazi ya utafiti tu. Yataweka sehemu inayofungwa na ufunguo na jina lako halitaonekana kwenye fomu ya usaili au kuchapishwa katika maonyesho au ripoti yeyote. Namba au herufi zitatolewa kumtambulisha mtoto wako.

Uhiari

Ni maamuzi yako kushiriki au kutoshiriki katika utafiti huu.Wakati wowote ukipenda kujitoa kutoka ushiriki uwe huru kufanya hivyo. Hakutakuwa na madhara yeyoyote yatakayoathiri ushiriki wako ako wa baabdae au mahusiano na mtafiti au chuo husika cha elimu ya juu.

Hautahitajika kulipa pesa ili ushirii katika utafiti huu pia hakuna malipo ambayo utapewa kwa kushiriki katika utafiti huu.

Mawasiliano na maswali

Mtafiti mkuu ni Daktari Mercy Namshitu Gideon kutoka chuo kikuu cha Nairobi Kenya. Unaweza muuliza maswali yeyote sasa au baadae. Unaeza wasiliana nae kwa namba

zake za simu yake ya mkononi ambazo ni +255753211473/ +254733702511 au barua pepe namshitu@gmail.com Kama una swali lolote au wasiwasi na ungependa kuongea na mtu mwingine licha ya mtafiti una himiza kuwasiliana na wafuatao.

Profesa. M. Masiga
Shule ya sayansi ya meno
Hospitali ya meno ya chuo
Shule ya meno ya chuo
S. L. P. 19676
Nairobi, Kenya.

Sekretarieti
MNH-IRB
Hospitali ya Taifa ya Muhimbili
S. L. P 65000
Dar es salaam, Tanzania

Sekretarieti ya KNH/UoN-ERC
Hospitali ya Taifa ya Kenyatta
S. L. P. 20723 kodi 00202
Nairobi, Kenya
Barua pepe: uonknh_erc@uonbi.ac.ke

SEHEMU B (Fomu ya usaili)

Tafadhali soma karatasi ya maelezo (SEHEMU A) au usomewe maelezo kabla hujamaliza kusaini hii fomu ya ridhaa ya usaili.

Kaulii ya mshiriiki

Mimi (andika majina)……natoa rihdaa yangu kwa Daktari Mercy Namshitu Gideon kunishirikisha katika utafiti uliopendekezwa wenye

kichwa cha habari: **Kiwango cha kutoboka kwa meno ya asili ya watoto, hali ya usafi wa kinywa na meno kukihusiana na tabia zinasohusu afya ya kinywa na meno Tandale, Dar es salaam.** Nimesoma maelezo kuhusu utafiti na nimeelewa kwa kina malengo ya utfiti huo na ni nini kitatarajiwa kutoka kwangu kama ninakubali kushiriki katika utafiti huo.Faida na madhara yeyoye yameelezewa kwangu.Maswali yote na dukuduku yeyote kuhusu utafiti huu yamejibiwa na nimeridhika.Naelewa kwamba naweza jitoa kutoka katika utafiti huu wakati wowote ninapopenda bila kutoa sababu, na hii haitanizuia kupata huduma za msingi za kiafya.

Nimeridhika kwamba hakuna madhara au hatari yeyote inayotegemewa kutokea katika utafiti huu na hivyo kwa uhuru naridhia kushiriki kama mshiriki atakayejibu maswali.

Jina la mshiriki……

Mahusiano na mtoto mshiriki……

Sahihi……

Jina la mtafiti……

Sahihi……Tarehe……

Asante kwa ushirikiano wako

Appendix II: Caregiver's Questionnaire

Modified from WHO manual for Oral Health Surveys, Basic Methods 5th Edition 2013

The Investigation about **Early Childhood Caries experience oral hygiene status and associated oral health habits among preschool children in Tandale, Dar es Salaam.**

Questionnaire

Child's ID number (Should be registered on top of the questionnaire) ☐

PI will read the following questions about the child's oral health status to the caregiver.

A: SOCIO-DEMOGRAPHIC INFORMATION OF THE CAREGIVER

1. What is the name of the street that you reside? .....
2. What is the Name of your street community leader?……
3. Can I please have your Mobile no.……
4. Care giver's Sex 1= Male ☐ 2= Female ☐
5. How old are you? ☐
6. What is your Marital Status?

   i) Single ☐

   ii) Married ☐

   iii) Divorced /Separated ☐

   iv) Widowed ☐

   v) Cohabitating ☐

vi) Others

7. What is your relationship with the Child?

i) Father

ii) Mother

iii) Aunt

iv) Uncle

v) Grandparent

vi) Brother/Sister

vii) Others

For biological parents only: Answer question 8 and 9

8. How many live children do you have?

i) Mention the number

ix) Not applicable

9. What is this Child's order in the family?

i) Mention the number

ix) Not applicable

10. What is the number of adult households?

i) Mention the number Male Female

ii) Not applicable

11. What are you and your spouse level of education?

	YOU	and	YOUR SPOUSE
i) No formal schooling	☐		☐
ii) Primary school completed	☐		☐
iii) Secondary school completed	☐		☐
iv) High school completed	☐		☐
v) College/university completed	☐		☐
vi) Don't know	☐		☐
ix) Not applicable	☐		☐

12. What is your current employment status?

i)	No employment	☐	☐
ii)	Formal employment	☐	☐
iii)	Self employed	☐	☐
iv)	Businessman/Businesswoman	☐	☐
v)	Housewife	☐	☐
ix)	Not applicable	☐	☐

13. How much do you earn per month?

i)	Between 20,000-100,000 TSh per month	☐	☐
ii)	Between 101,000-200,000 TSh per month	☐	☐
iii)	Between 201,000-500,000 TSh per month	☐	☐
iv)	Between 501,000-1,000,000 TSh per month	☐	☐
v)	More than one million	☐	☐

vi) I don't know

ix) Not applicable

14. Do you/your spouse own one of the following items?

1=YES 2=NO

i) Radio

ii) Refrigerator

iii) Television

iv) Mobile cell phone

v) Bicycle/Motorcycle

vi) Car

vii) House

B: CAREGIVER'S PERCEPTION ON THE CHILD'S ORAL HEALTH STATUS

15. How do you describe the health of your child's teeth and gums?

		Teeth	Gums
i)	Very good		
ii)	Good		
iii)	Average		
iv)	Poor		
v)	Very poor		

16. Has your child experienced toothache/felt discomfort on his/her teeth during the past 12 months?

1=YES 2=NO

If the answer is YES continue with question number 17

17. How often during the past 12 months did your child had toothache/felt discomfort on his/her teeth?

i) Often ☐

ii) Occasionally ☐

iii) Rarely ☐

iv) Don't know ☐

ix) Not applicable ☐

18. Have you taken your child to a dentist during the past 12months?

1=YES ☐ 2=NO ☐

If YES move to question 19 and 20

19. How often have you taken your child to a dentist during the past 12months?

i) Once ☐

ii) Twice ☐

iii) Three times ☐

iv) Four times ☐

v) More than four times ☐

vi) I have never taken him/her to the dentist ☐

vii) I don't know/don't remember ☐

viii) Not applicable ☐

20. What were the reasons for the visit to the dentist?

i) Pain or trouble with the teeth ☐

ii) Pain or trouble with the gums ☐

iii) Pain or trouble within the oral cavity ☐

iv) Routine check-up of teeth/treatment

v) I don't know/don't remember

C: CHILD'S ORAL HYGIENE PRACTICES

21. Does your child brush his/her teeth?

1=YES 2=NO

If NO move to question 27

22. How often does your child clean his/her teeth?

i) Several times a month (2–3 times)

ii) Once a week

iii) Several times a week (2–6 times)

iv) Once a day

v) 2 or more times a day

ix) Not applicable

23. Do you supervise your child when brushing?

1=YES 2=NO 3= Not Applicable

24. If yes, how often do you do that?

i) Every day

ii) Once a week

iii) 3 Times a week

iv) Not applicable

25. What does your child use to clean his/her teeth?

1=YES 2= NO

i) Toothbrush

ii) Wooden toothpicks

iii) Plastic toothpicks

iv) Charcoal

v) Traditional/Wooden Toothbrush

vi) Other

ix) Not Applicable

26. Normally which toothpaste does your child use to clean his/her teeth?

1=YES 2=NO

i) Colgate

ii) Whitedent

iii) Alovera toothpaste

iv) Aquafresh

v) Others

ix) Not Applicable

D: CHILD'S DIETARY HABITS

27. Did your child's breastfeed?

1=YES 2=NO

If YES move to question 28-31

28. When did he/she stop breastfeeding?

i) Below 1 year

ii) Between 1& 2 years

iii) More than 2 years

iv) Not Applicable

29. Did you share a bed at night with your child?

1=YES 2=NO 3= Not Applicable

30. Did the mother wake up at night to breastfeed the child?

1=YES 2=NO 3= Not Applicable

31. Did you breastfeed your child at night in a manner that you will leave the breast in the child's mouth and allow the child to breastfeed without you noticing it?

1=YES 2=NO 3= Not Applicable

32. When did you wean the child?

i) Below 6months

ii) Between 6months and 1 year

33. Which type of foodstuff did you give the child during weaning?

i) Sugar-containing foodstuff

ii) Sugar-free foodstuff

34. Was the child bottle feed?

1=YES 2=NO

If YES move to question 35

35. What were the contents of the bottle?

1=YES 2=NO

i) Milk without sugar

ii) Milk with sugar

iii) Juice without sugar

iv) Juice with sugar

v) Water

vi) Others

ix) Not Applicable

36. Does your child feed on biscuits, cakes, sweets and other sugary snacks?

1=YES 2=NO

37. How often does your child feed on biscuits, cakes, sweets and other sugary snacks?

i) Two or more times a day

ii) Once a day

iii) Two-three times a week

iv) Once a week

v) Two-three times a month

ix) Not Applicable

38. Does your child drink juice, soda, lemonade, and other sugary fluids?

1=YES 2=NO

39. How often does your child drink juice, soda, lemonade, and other sugary fluids?

i) Two or more times a day

ii) Once a day

iii) Two-three times a week

iv) Once a week

v) Two-three times a month

ix) Not Applicable

Kiwango cha kutoboka kwa meno ya asili ya watoto, hali ya usafi wa kinywa na meno kukihusiana na tabia zinasohusu afya ya kinywa na meno Tandale, Dar es salaam

FOMU YA USAILI

Namba ya utambulisho yamtoto (*andika juu ya kila karatasi ya dodoso*) ☐

Mtafiti amsomee mazai/mlezi maswali yafuatayo kuhusu afya ya kinywa ya mtoto wake.

A: TAARIFA BINAFSI ZA MZAZI/MLEZI

1) Unaishi mtaa gani?.....

2) Kiongozi wa mtaa wako anaitwa nani?……

3) Naomba namba yako simu …….

4) Jinsi ya mzazi/mlezi 1= MME 2= MKE ☐

5) Je una umri gani? ☐

6) Una hali gani ya ndoa?

i) Sijaoa/Sijaolewa ☐
ii) Nimeoa/Nimeolewa ☐
iii) Nimeachika/Nimeacha ☐
iv) Mjane ☐
v) Cohabitating ☐
vi) Nyingine

7) Una uhusiano gani na mtoto?

i) Baba mzazi ☐
ii) Mama mzazi ☐
iii) Mjomba/Baba Mdogo ☐
iv) Shangazi/Mama mdogo ☐
v) Babu/Bibi ☐
vi) Kaka/Dada

vii) Mwingineyo

Kama ni mzazi jibu swali la 8 na 9

8)Je una watoto walio hai wangapi?

i) Taja idadi

ii) Si husika

9) Huyu ni mtoto wa ngapi?

i) Taja idadi

ii) Si husika

10) Kwenye kaya yenu kuna watu wazima wangapi? WAUME WAKE

i) Taja idadi

ii) Si husika

11.Una kiwango gani cha elimu? Na mwenza wako je, ana kiwango gani cha elimu?

	WEWE	MWENZA WAKO
i) Sijaenda/Hajaenda shule		
ii) Elimu ya msingi		
iii) Kidato cha nne		
iv) Kidato cha sita		
v) Chuo/Chuo kikuu		
vi) Sijui		
vii) Si husika		

12. Una hali gani ya ajira?

i) Sina ajira		
ii) Nimeajiriwa		
iii) Nimejiajiri		
iv) Mjasiriamali		
v) Baba/Mama wa nyumbani		
vi) Si husika		

13.Kipato chako kwa mwezi ni kiasi gani? WEWE MWENZA WAKO

i) Kati ya shilingi 20,000-100,000 kwa mwezi ☐ ☐

ii) Kati ya shilingi 101,000-200,000 kwa mwezi ☐ ☐

iii) Kati ya shilingi 201,000-500,000 kwa mwezi ☐ ☐

iv) Kati ya shilingi 501,000-1,000,000 kwa mwezi ☐ ☐

v) Zaidi ya milioni moja. ☐ ☐

vi) Sijui ☐ ☐

vii) Si husika ☐ ☐

14. Je Wewe/Mwenza wako mnamiliki nini kati ya hivi?

1=NDIYO ☐ 2=HAPANA ☐

i) Redio ☐

ii) Televisheni ☐

iii) Friji ☐

iv) Simu ya mkononi ☐

v) Baiskeli/Pikipiki ☐

vi) Gari ☐

vii) Nyumba ☐

B: TATHMINI YA MZAZI/MLEZI KUHUSU AFYA YA KINYWA NA MENO YA MTOTO

15.Unaielezeaje afya ya meno na fizi ya mtoto wako?

	MENO	FIZI
i) Nzuri sana	☐	☐
ii) Nzuri	☐	☐
iii) Wastani	☐	☐
iv) Mbaya	☐	☐
v) Mbaya sana	☐	☐

16. Katika kipindi cha miezi 12 iliyopita, mtoto wako amepata matatizo ya meno?

1= NDIO ☐ 2= HAPANA ☐

Kama ndio endelea na swali la 17

17. Mtoto wako amepata matatizo ya meno mara ngapi?

i) Mara nyingi ☐
ii) Mara kwa mara ☐
iii) Mara chache ☐
iv) Sijui ☐
ix) Si husika ☐

18.Katika kipindi cha miezi 12 iliyopita, ulimpeleka mtoto wako kwa tabibu wa meno?

1=NDIO ☐ 2=HAPANA ☐

Kama ndio endelea na swali la 19 na 20

19. Mara ngapi ulimpeleka mtoto wako kwa daktari wa meno?

i) Mara moja ☐
ii) Mara mbili ☐
iii) Mara tatu ☐
iv) Mara nne ☐
v) Zaidi ya mara nne ☐
vi) Sijawahi ☐
vii) Si husika ☐
☐

20.Je ni sababu zipi zilizo sababisha kumpeleka mtoto kwa daktari wa meno?

i) Maumivu au matatizo ya meno ☐
ii) Maumivu au matatizo ya fizi ☐
iii) Maumivu au matatizo mengine ya kinywa ☐
iv) Kutathimini afya ya meno/matibabu ☐
v) Sijui/sikumbuki ☐

vi) Si husika ☐

C: TARATIBU YA MTOTO WAKO KUHUSU UTUNZAJI WA MENO NA KINYWA

21. Je mtoto wako anapiga mswaki?

1=NDIYO ☐ 2=HAPANA ☐

Kama HAPANA nenda swali la 27

22. Je mtoto wako anapiga mswaki mara ngapi?

i) Hapigi mwaki ☐
ii) Mara chache kwa mwezi (mara2–3) ☐
iii) Mara moja kwa wiki ☐
iv) Mara kadhaa kwa wiki (mara2–6) ☐
v) Mara moja kwa siku ☐
vi) Mara mbili au zaidi kwa siku ☐
vii) Si husika ☐

23. Je unamsimamia mtoto wako wakati anapopiga mswaki?

1=NDIYO ☐ 2=HAPANA ☐

24. Kama ndiyo unamsimamia mara ngapi?

i) Kila siku ☐
ii) Mara moja kwa wiki ☐
iii) Mara 3 kwa wiki ☐
iv) Si husika ☐

25. Mtoto wako anatumia nini kusafisha meno yake?

1= NDIYO ☐ 2 = HAPANA ☐

i) Mswaki ☐

ii) Vijiti vya meno vya mbao

iii) Vijiti vya meno vya plastiki

iv) Mkaa

v) Mswaki wa miti

vi) Vinginezo

vii) Si husika

26.Je mtoto wako anatumia dawa zipi za meno kusafishia meno yake?

1=NDIYO 2=HAPANA

i) Colgate

ii) Whitedent

iii) Dawa ya meno ya Alovera

iv) Aquafresh

v) Vinginevyo

vi) Si husika

D. MASWALI YAHUSUYO ULAJI WA MTOTO

27. Je mtoto wako amenyonya maziwa ya mama?

1=NDIYO 2= HAPANA

Kama ndio endelea na swali la 28-31

28. Je aliacha kunyonya akiwa na umri gani?

i) Chini ya mwaka mmoja

ii) Kati ya mwaka 1 na miaka 2

iii) Zaidi ya miaka 2

iv) Si husika

29. Je wakati wa usiku mtoto alikuwa analala kitanda kimoja na mama yake?

1= NDIYO 2=HAPANA

30 Je wakati wa usiku mama aliamka kumnyonyesha mtoto?

1=NDIYO ☐ 2=HAPANA ☐

31. Je wakati wa usiku mama alimwacha mtoto anyonye hata ziwa lake kubaki mdomoni mwa mtoto na kumfanya mtoto anyone bila mama kujua?

1=NDIYO ☐ 2=HAPANA ☐

32. Ulianza kumlikiza mtoto (kumpa vyakula vingine) akiwa na umri gani?

i) Chni ya miezi 6 ☐

ii) Miezi 6-Mwaka 1 ☐

33. Wakati wa kumlikiza alipewa vyakula gani?

1=Vyakula vyenye sukari ☐ 2= Vyakula visivyo na sukari ☐

34. Je umewahi kutumia chupa kumlishia mtoto wako?

1= NDIYO ☐ 2= HAPANA ☐

Kama jibu ni ndiyo nenda swali la 35

35. Ulikuwa unaweka nini ndani ya chupa?

1= NDIYO ☐ 2= HAPANA ☐

i) Maziwa bila sukari ☐

ii) Maziwa yenye sukari ☐

iii) Juisi bila sukari ☐

iv) Juisi yenye sukari ☐

v) Maji ☐

vi) Vinginevyo ☐

vii) Si husika ☐

36.Je mtoto wako anatumia biskuti,keki,pipi na vyakula vingine vya sukari?

1= NDIYO ☐ 2= HAPANA ☐

37. Je ni mara ngapi mtoto anakula biskuti,keki,pipi na vyakula vingine vya sukari?

i) Mara Kadhaa kwa siku ☐
ii) Mara moja kwa siku ☐
iii) Mara kadhaa kwa wiki ☐
iv) Mara moja kwa wiki ☐
v) Mara kadhaa kwa mwezi ☐
vi) Si husika ☐

38.Je mtoto wako anakunywa juisi,soda na vinywaji vingine vya sukari?

1= NDIYO ☐ 2= HAPANA ☐

39. Mara ngapi mtoto wako anakunywa juisi,soda na vinywaji vingine vya sukari?

i) Mara Kadhaa kwa siku ☐
ii) Mara moja kwa siku ☐
iii) Mara kadhaa kwa wiki ☐
iv) Mara moja kwa wiki ☐
v) Mara kadhaa kwa mwezi ☐
vi) Si husika ☐

Appendix III: Oral health assessment form

(Modified from WHO manual for Oral Health Surveys, Basic Methods 5th Edition 2013)

GENERAL INFORMATION

Child's Sex: 1=MALE ☐ 2=FEMALE ☐

Date of Birth ☐☐☐ Age in Years ☐

Name of School…….

ORAL HYGIENE STATUS

54 (M)	**54 (B)**	**54 (D)**	**54 (P)**	**52 (M)**	**52 (B)**	**52 (D)**	**52 (P)**	**64 (M)**	**64 (B)**	**64 (D)**	**64 (P)**
84 (M)	**84 (B)**	**84 (D)**	**84 (L)**	**72 (M)**	**72 (B)**	**72 (D)**	**72 (L)**	**75 (M)**	**75 (B)**	**75 (D)**	**75 (L)**

KEY

0 No plaque is seen

1 A film of plaque adhering to the free gingival margin and adjacent area of the tooth.

2 Moderate accumulations of the soft deposits within the gingival pocket or the tooth and gingival margin which can be seen with naked eye.

3 The abundance of soft matter within the gingival pocket and or on the tooth and gingival margin.

9. Missing tooth due to caries/exfoliation

DENTAL CARIES STATUS

55	**54**	**53**	**52**	**51**	**61**	**62**	**63**	**64**	**65**
85	**84**	**83**	**82**	**81**	**71**	**72**	**73**	**74**	**75**

SCORES	**STATUS**
0	Sound tooth
1	Incipient caries
2	Carious tooth
3	Filled tooth with other carious surfaces
4	Filled tooth
5	Missing tooth due to caries
6	Missing due to other reasons
7	Tooth with a fissure sealing

INTERVENTION URGENCY

0	No Treatment needed/ Preventive	Good oral hygiene with no carious tooth/trauma
1	Routine treatment needed	Satisfactory oral hygiene with carious lesion
2	Prompt /Urgent treatment needed	Periapical abscess/Pulpal involved teeth

Appendix IV: Ethical approval