



doi: <https://doi.org/10.20546/ijcrar.2020.804.006>

Prevalence of Dental Caries among School-Age Children in Ethiopia from 2010 to 2020: A Systematic Review

Addisu Tadesse Sahile^{1*}, Sinetsehay Alemayehu Getahun² and Solomon Muluken Ayehu³

¹Department of Public Health, Unity University, Addis Ababa, Ethiopia

²Department of Public Health, Universal Medical College, Addis Ababa, Ethiopia

³ICOS consulting PLC, Addis Ababa, Ethiopia

*Corresponding author

Abstract

Globally, dental caries affects 60-90% of school children which is one of the common prevalent oral diseases in school-aged children that leads to, eating impairment, tooth loss and pain, discomfort and delayed language development in children. The review was aimed at assessing the prevalence of dental caries in school-age children in Ethiopia from 2010-2020. Published works were searched through the application of MeSH. A search of published studies in PubMed, Google Scholar, Medline, Sage, Academic Journal, and Ethiopian Health development Journal with the keywords; Dental caries, School Age Children, and Ethiopia was conducted. Additionally, referenced articles in the selected articles and pre-prints were searched for. Dental caries prevalence was measured as present or absent, where its severity was assessed through decayed, missing, or filled teeth (DMFT) indices for dental caries. The search identified 14 published articles and 1 pre-printed article, of which 9 of which were related to school-age children from which 8 of them were selected to be appropriate. The prevalence of dental caries among school-age children in Ethiopia was found from 21% to 58%. A total of 14 factors associated with dental caries were investigated. Researches that utilized standard tool for outcome measurements were recommended while concerned bodies could emphasize interventions targeted of caries among school children.

Article Info

Accepted: 04 March 2020

Available Online: 20 April 2020

Keywords

Dental caries; Associated Factors; Systematic Review; Ethiopia

Introduction

Globally, dental caries affects 60-90% of school children(1) which is one of the common prevalent oral disease in school-aged children(2, 3) that leads to, eating impairment, tooth loss and pain, discomfort and delayed language development in children.(4, 5)Dental caries is defined as a localized post eruptive pathological process of external origin proceeding to the formation of cavity.(6)

Dental caries is among the common problem among young aged 6-19 years old (7). Moreover, dental caries affects the growth and functions of the body inflicting financial crises to the families (8, 9). Oral health is of an important part of the general health, whereby dental caries; an infectious disease of multifactorial origin; affecting one's ability socialize, eat or speak.(10)The prevalence of dental caries was more common in developed countries than less developed countries, with

high rate of untreated cases in less developed countries which is an insightful of resource limitation(11)

Dental caries is a major oral disease affecting 35% of the global population by the year 2010.(12) Though by the year 2003, World Health Organization (WHO) and World Dental Federation International (FDI) set global goals for policymakers and planners for the improvements of oral health of the population (13), the emphasis was less in most developing countries including Ethiopia.

Screening and preventive treatment are important to avoid dental caries before its stage of irreversibility. In Africa, the prevalence of dental caries among school age children ranges from 35.1%(14)in Nigeria, to 78% in Eritrea(15).

As determinants of dental caries occupation, parental educational level and income were identified in pieces of literature.(16-18)On the other side, oral hygiene, viscosity, PH, and buffer capacity of the saliva, carbohydrate diet, parental incidence of caries, and social classes were factors favoring the development of dental caries.(19)

In Ethiopia, the attention given for the oral health of primary school-aged children was inadequate. The current review was aimed at assessing the state of evidence regarding dental caries in Ethiopia during the period from 2010 to 2020.

Materials and Methods

Published works were included in the review through the application of MeSH. A search of published studies in PubMed, Google Scholar, Medline, Sage, Academic Journal, and Ethiopian Health development Journal with the keywords; Dental caries, School Age Children, and Ethiopia was conducted. Additionally, referenced articles in the selected articles and pre-prints were searched for.

Articles with a clear description of methodology and findings were reviewed. Dental caries prevalence was measured as present or absent, where its severity was assessed through decayed, missing, or filled teeth (DMFT) indices for dental caries. The selection of articles aimed to include all articles published from 2010 to 2020 with samples of Ethiopian school-age children with the characteristics of cross-sectional studies either institutional-based or community-based studies.

Excluded from the study were those studies undertaken on a different population than school-age children and those didn't report the caries prevalence. The search identified 14 published articles and 1 pre-printed article, of which 9 of which were related to school-age children. And from those directed on children, 8 were considered appropriate. The final review comprised of 8 published articles throughout Ethiopia from 2010-2020 presented in figure 1 and the summary of the identified articles was presented in table 1.

Results and Discussions

The literature search led to 15 studies all of which are a cross-sectional survey. After reading the studies, five articles (20-25) were excluded from the review due to they reported dental caries on different population, and one article (26) was excluded due to outdated information was reported. The final selection included 8 studies, one of which was pre-print and resulted in a total of 8 articles reviewed in the current review where 100% of them reported the prevalence of dental caries. The prevalence of dental caries in school age children of Ethiopia ranged from 21% (27) to 58%(28).

A total of 14 factors associated with dental caries were investigated with a wide variation in the frequency in the samples, details of which was presented in table 1.

In Ethiopia, though prevalence of dental caries was understudied. There were some studies studied in some of regions of the country. The review assessed only those findings from few regions of the Ethiopia, where no studies were available on the non-stated regions of the country.

Results from the review depicted the prevalence of caries in all (27-34) of the studies, whereas the severity of dental caries was assessed only in three of the studies.

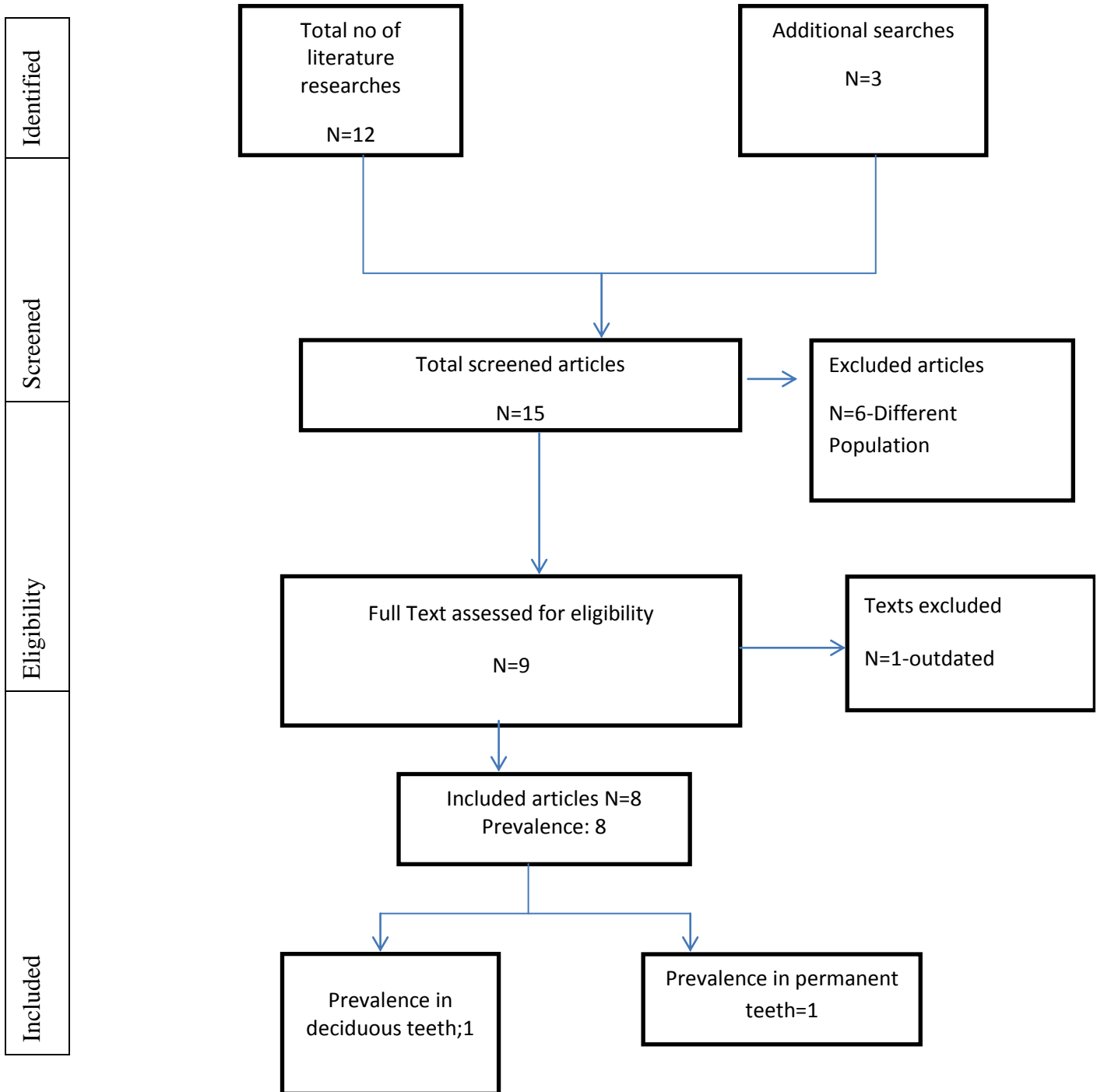
The prevalence of dental caries in school age children of Ethiopia ranged from 21% (27)to 58%(28) which is relatively higher than findings 35.1%(14) to 35.5%(35) in Nigeria, and 37.5% in Kenya (36),and 40% in Uganda(37) and nearly consistent with the finding from Sudan observed at52.4%(38). As observed from the current review the findings were lower than findings in other countries such as 74% in Egypt(39), and 78% Eritrea(15).

Table.1 Summary of prevalence of dental caries in Ethiopia 2010-2020

Author, Year	Place of investigation	population/Sample selection	Age (years/grade)	Sample selection	Caries prevalence	Identified factors for dental caries	Mean DMFT
Mulu <i>et al.</i> , 2014	Bahir Dar city	School based Systematic random sampling	6-15 years Both sex	Urban n=147	Overall:21.8% Deciduous:16.35% Permanent:5.45%	Grade level Poor tooth cleaning habit Dental plaque Toothache	Not stated
Ayele <i>et al.</i> , 2013	Gonder Town	Community based Multi-stage sampling	7-14 years Both sex	Urban n=842	Overall:36.3% Unclassified	Fathers educational status Monthly family income Regular tooth brushing Using of mouth rinsing	Not stated
Tolessa, 2012	Addis Ababa city	Comparative school based study	14 and above years Both sex	Urban n=1013 for both groups	Overall : 39.2%-at private school Overall : 41.8% in government schools Unclassified	Parental Marital status Fathers educational status Poor Oral hygiene Tooth cleaning experience Sex	Not stated
(Pre-prints) Aynalem <i>et al.</i> , 2019	Debre Berhan Town	School based study Simple random sampling	7-19 years	n= 396	Overall : 34.1% Unclassified	Drinking sugared tea Presence of food particle on teeth	Not stated
Pre-prints							

Teshome <i>et al.</i> , 2016	Finote Selam, Amhara region	School based study Simple random sampling method	12-20 years	Urban and rural residents n=291	Overall: 48.5% Unclassified	Lack of tooth brushing habit Frequent consumption of sugared food Residency	1.23
Shedev <i>et al.</i> , 2020	Ayder Hospital, Mekelle Town	Hospital based study Stratified random sampling method	12-20 years Both sex	Urban and rural n=384	Overall: 57.8%	Tooth brushing habit Residency Consumption of sugared diet and drinks	2.50
Zeru, 2019	Aksum Town	School based study Sampling method- not stated	6-15 years Both sex	Urban and rural n=393	Overall: 35.4%	Eating sweet foods	Not stated
Ademe <i>et al.</i> , 2020	Harar Town	School based study Simple random sampling methods	6-15 Both sex	Urban and rural n=407	Overall : 36.9%	Lower academic scores Grade levels Sweet food consumption Absence of daily tooth cleaning habit Absence of tooth paste use Dental ache history Saliva microbial load	0.95±1 .57

Figure.1 Flow chart for review process



The review investigated 14 factors associated with dental caries of which tooth brushing habit was investigated in six of the reviewed articles, toothache was identified in 6 articles, consumption of sugar diet/drinks was stated in five of the reviewed articles, grade level, toothache and fathers educational status were stated in two articles each, presence of dental plaque, sex, lower academic status, and residency were stated in one of the reviewed articles each.

Although, as per the classification by the World Health Organization (WHO) Clinical caries are diagnosed by the DMFT index (D-dentine caries lesion; M-missing due to caries; F-filled; T-tooth) (40), whereas the current review investigated that the severity of dental caries was stated only in three of the reviewed articles, whilst the remaining five articles didn't identify the severity of dental caries among the school age children in Ethiopia. Thus most of the studies throughout the country didn't address the severity of dental caries and hence the studies described only the magnitude of dental caries in Ethiopia, the severity indicator was missed in most of the reviewed articles which might be a barrier for decision making in clinical practice. Overall, the problem of caries in Ethiopia was less emphasized from multiple perspectives.

Future studies

Nationwide studies, with calibrated tool that depict not only the prevalence, but also the severity of dental caries were recommended as most of the reviewed studies lack the severity index illustration.

In conclusion, dental caries in children is a serious public health problem which warrants an immediate attention of the stake holders including dental professionals in Ethiopia. Baseline data on oral health and good understanding of dental caries determinants are important for setting an appropriate strategy. Without having the ability to understand the current situation, it is not possible to have a clear path whether the strategy will result in a betterment of the oral health in school age children. A road map with a clear start point, strategy, and end goal is needed to improve the oral health of school age children in Ethiopia.

Availability of data and materials

The datasets used during the current review are available from the corresponding author on reasonable request.

Conflict of interest

The authors have no conflicts of interest.

Abbreviations

DMFT Dentine caries lesion, Missing; Filled; Tooth
MeSH- Medical Subject Heading
World Health Organization (WHO)

References

1. Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. *Bulletin of the World Health Organization*. 2005; 83:661-9.
2. Escoffié-Ramirez M, Ávila-Burgos L, Baena-Santillan ES, Aguilar-Ayala F, Lara-Carrillo E, Minaya-Sánchez M, *et al.*, Factors associated with dental pain in Mexican schoolchildren aged 6 to 12 years. *BioMed research international*. 2017; 2017.
3. Nomura Y, Maung K, Khine K, Min E, Sint KM, Lin MP, *et al.*, Prevalence of dental caries in 5-and 6-year-old Myanmar children. *International journal of dentistry*. 2019; 2019.
4. Wulaerhan J, Abudureyimu A, Bao X-L, Zhao J. Risk determinants associated with early childhood caries in Uyghur children: a preschool-based cross-sectional study. *BMC oral health*. 2014; 14(1):136.
5. Dawkins E, Michimi A, Ellis-Griffith G, Peterson T, Carter D, English G. Dental caries among children visiting a mobile dental clinic in South Central Kentucky: a pooled cross-sectional study. *BMC oral health*. 2013; 13(1):19.
6. Arunkumar M. Prevalence and determinants of dental caries among primary school children in urban area of Kancheepuram district, Tamil Nadu: a cross sectional study. *International Journal of Community Medicine and Public Health*. 2019; 6(5):2108.
7. Fleming E, Afful J. Prevalence of total and untreated dental caries among youth: United States, 2015–2016. 2018.
8. van der Tas JT, Kragt L, Elfrink ME, Bertens LC, Jaddoe VW, Moll HA, *et al.*, Social inequalities and dental caries in six-year-old children from the Netherlands. *Journal of dentistry*. 2017; 62:18-24.
9. Zhang S, Chau AM, Lo EC, Chu C-H. Dental caries and erosion status of 12-year-old Hong Kong children. *BMC Public Health*. 2014; 14(1):7.
10. Parker E, Jamieson L. Oral health comparisons between children attending an Aboriginal health

- service and a Government school dental service in a regional location. 2007.
11. Abid A, Maatouk F, Berrezouga L, Azodo C, Uti O, El-Shamy H, *et al.*, Prevalence and severity of oral diseases in the Africa and Middle East Region. *Advances in dental research*. 2015; 27(1):10-7.
 12. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, *et al.*, Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The lancet*. 2012; 380(9859):2163-96.
 13. Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. *International dental journal*. 2003; 53(5):285-8.
 14. Olabisi AA, Udo UA, Ehimen UG, Bashiru BO, Gbenga OO, Adeniyi AO. Prevalence of dental caries and oral hygiene status of a screened population in Port Harcourt, Rivers State, Nigeria. *Journal of International Society of Preventive & Community Dentistry*. 2015; 5(1):59.
 15. Andegiorgish AK, Weldemariam BW, Kifle MM, Mebrahtu FG, Zewde HK, Tewelde MG, *et al.*, Prevalence of dental caries and associated factors among 12 years old students in Eritrea. *BMC oral health*. 2017; 17(1):169.
 16. Gautam D, Vikas J, Amrinder T, Rambhika T, Bhanu K. Evaluating dental awareness and periodontal health status in different socioeconomic groups in the population of Sundernagar, Himachal Pradesh, India. *Journal of International Society of Preventive & Community Dentistry*. 2012; 2(2):53.
 17. Dental NIO, Research C. Oral health in America: a report of the Surgeon General: US Public Health Service, Department of Health and Human Services; 2000.
 18. Lasser KE, Himmelstein DU, Woolhandler S. Access to care, health status, and health disparities in the United States and Canada: results of a cross-national population-based survey. *American journal of public health*. 2006; 96(7):1300-7.
 19. Rashkova M, Peneva M, Doychinova L. Study of the risk factors for the development of dental caries and creation of a system for assessment the risk of caries in children in Bulgaria. *Oral Health Dent Manag*. 2008; 7:3-11.
 20. Woldeyohannes D, Getachew D, Lemma S, Gelaye B. Oral Health Related Illness and Associated Factors among Bank Workers and Teachers in Addis Ababa, Ethiopia: Cross-Sectional Study. *Health Sci J*. 2017; 11(6):532.
 21. Kebede B, Kemal T, Abera S. Oral health status of patients with mental disorders in southwest Ethiopia. *PLoS One*. 2012; 7(6).
 22. Shenkute D, Asfaw T. *Streptococcus mutans* Dental Caries among Patients Attending Debre Berhan Referral Hospital, Ethiopia. *J Bacteriol Parasitol*. 2019; 10(350):2.
 23. Meyrema A, Kedir T. Prevalence of oral health care and problems among Rift Valley university health sciences students in Adama, South East, Ethiopia. *African Journal of Oral Health*. 2018; 8(1):16-23.
 24. Darout IA. Knowledge and behavior related to oral health among Jimma University Health Sciences students, Jimma, Ethiopia. *European Journal of General Dentistry*. 2014; 3(3):185.
 25. Workie MS, Belay DB. Bayesian model with application to a study of dental caries. *BMC oral health*. 2019; 19(1):4.
 26. Littleton NW. Dental caries and periodontal diseases among Ethiopian civilians. *Public Health Reports*. 1963; 78(7):631.
 27. Mulu W, Demilie T, Yimer M, Meshesha K, Abera B. Dental caries and associated factors among primary school children in Bahir Dar city: a cross-sectional study. *BMC research notes*. 2014; 7(1):949.
 28. Shedev B, Muruts L, Ganji KK. Prevalence of Tooth Decay and Associated Factors Among Ethiopian Patients. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*. 2020; 20:4835.
 29. Ayele FA, Taye BW, Ayele TA, Gelaye KA. Predictors of dental caries among children 7–14 years old in Northwest Ethiopia: a community based cross-sectional study. *BMC Oral Health*. 2013; 13(1):7.
 30. Tolessa D. Comparative Study of Dental Caries and Oral Hygiene Status among Private and Government High School Students in Nifas Silk Lafto Sub-city, Addis Ababa, Ethiopia. *Harar Bulletin of Health Sciences*. 2012:96.
 31. Aynalem Y, Alamirew G, Mihiret R, Dagne B, Mekonen B, Abebe S. Magnitude of dental caries and its associated factors among governmental primary school children in Debre Berhan town, Ethiopia. 2019.
 32. Teshome A, Yitayeh A, Gizachew M. Prevalence of dental caries and associated factors among Finote Selam primary school students aged 12–20 years, Finote Selam town, Ethiopia. *Age*. 2016; 12(14):15-7.
 33. Zeru T. Prevalence of Dental Caries and Associated Factors among Aksum Primary School Students,

- Aksum Town, Ethiopia 2019: A cross-sectional. of. 2019; 5:2.
34. Ademe D, Admassu D, Balakrishnan S. Analysis of salivary level *Lactobacillus* spp. and associated factors as determinants of dental caries amongst primary school children in Harar town, eastern Ethiopia. *BMC Pediatrics*. 2020; 20(1):1-9.
 35. Okoye L, Ekwueme O. Prevalence of dental caries in a Nigerian rural community: A preliminary local survey. *Annals of medical and health sciences research*. 2011; 1(2):187-96.
 36. Gathecha G, Makokha A, Wanzala P, Omolo J, Smith P. Dental caries and oral health practices among 12 year old children in Nairobi West and Mathira West Districts, Kenya. *Pan African Medical Journal*. 2012; 12(1).
 37. Muwazi LM, Rwenyonyi CM, Tirwomwe FJ, Ssali C, Kasangaki A, Nkamba ME, *et al.*, Prevalence of oral diseases/conditions in Uganda. *African health sciences*. 2005; 5(3):227-33.
 38. Elidrissi SM, Naidoo S. Prevalence of dental caries and tooth brushing habits among preschool children in Khartoum State, Sudan. *International dental journal*. 2016; 66(4):215-20.
 39. Abbass MM, Mahmoud SA, El Moshy S, Rady D, AbuBakr N, Radwan IA, *et al.*, The prevalence of dental caries among Egyptian children and adolescences and its association with age, socioeconomic status, dietary habits and other risk factors. A cross-sectional study. *F1000Research*. 2019; 8.
 40. Organization WH. Oral health surveys: basic methods: World Health Organization; 2013.

How to cite this article:

Addisu Tadesse Sahile, Sinetsehay Alemayehu Getahun and Solomon Muluken Ayehu. 2020. Prevalence of Dental Caries among School-Age Children in Ethiopia from 2010 to 2020: A Systematic Review. *Int.J.Curr.Res.Aca.Rev.* 8(4), 40-47. doi: <https://doi.org/10.20546/ijcrar.2020.804.006>