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Re-Visiting the Decay, Missing, Filled Teeth (DMFT) Index with a Mathematical Modeling Concept

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Abstract Background: The well-established DMFT index has been used for over 75 years as a key for measuring dental caries in dentistry. DMFT is applied to permanent dentition and expressed as the total number of teeth decayed (D), missing (M), or filled (F), tooth (T) in an individual. **Objectives:** The objective of this study is to build a mathematical model for the existing DMFT index and compare its parameters by suggested new mathematical model. **Mathematical Models:** **Fixed Model:** Is a mathematical model for the existing DMFT index and will be considered as fixed model; in which all individuals under screening will have the same probability θ , $0 \leq \theta \leq 1$ of dental caries. In this fixed model the unit of the screening is the individual, and will be evaluated for caries as a dichotomous (0, 1) variable. **Random Model:** The new suggested model is a random model that suggests a mouth of an individual as an environment and the tooth is a unit of research. In this random model, only the teeth in one mouth have the same probability θ , $0 \leq \theta_i \leq 1$ where $i = 1, 2, \dots, k = L$; number of screening individuals. **Expected Outcome:** Mathematically, the fixed model will highlight what the value 1 will hide as information and hence this may explain why the average of DMFT is may be overestimated for any sample studied using fixed model. The random model will yield a cumulative weighed probability on the function of the number of teeth screened per mouth d_i , hence the average DMFT index will be weighed against the number of teeth screened per all subjects. **Conclusion:** The random model yields an average and more realistic expected value for the population studied. Furthermore, in such model, it is easy to estimate the variance and it is obvious that this model yields the smallest variance.

Keywords: Oral Health, Dental Caries, Epidemiology, DMFT Index