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Maternal oral health framework: integration of oral health into perinatal care

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Why is oral health important?

The global oral health epidemic is a multidisciplinary, cross-continental issue and has been amplified since the onset of the COVID-19 pandemic [1, 2]. Before the pandemic, the World Health Organization (WHO) estimated that oral diseases affected about 3.5 billion people a year, with roughly 2 billion cases of dental caries affecting permanent teeth [3]. With urbanization comes increased consumption rates of sugary foods, beverages, and alcohol, and higher rates of tobacco use—all known precursors to oral disease [3, 4]. Oral health, like general health, is a global public health issue because of the impact of its burden and its association with chronic diseases like cardiovascular disease, cancer, diabetes, and respiratory issues [4].

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Why is maternal oral health important?

Maternal oral health plays an important role in dental caries among children. It is, however, an overlooked element among public health interventions. Untreated dental caries in pregnant women can lead to higher risk for dental caries in young children through vertical transmission of cariogenic bacteria [5, 6]. Severe early childhood caries can lead to extensive dental treatment under sedation, impairing everyday functions, such as speech and nutrition [5]. Research has shown a positive association between periodontal disease during pregnancy and adverse birth outcomes, such as low birth weight and preterm birth [7, 8], even though there are mixed results on the association of periodontal treatment and reduced adverse birth outcomes [9]. A mother's oral health knowledge can also influence children's oral health through diet and home oral hygiene care [5, 10–13]. Still, many pregnant women and mothers do not or cannot seek timely dental care due to demographic, socioeconomic, psychological, and behavioral factors [5, 14–18].

What are oral health frameworks for women in childbearing age?

We conducted an integrative review to identify the major maternal and oral health frameworks focused on intervention. We searched Google Scholar and PubMed, along with the gray literature from international government agencies. As keywords we included *Oral Health*, *Oral Health Framework*, *Educational Frameworks for Developing Countries*, *Maternal Health*, *Maternal Health Education*. We included only peer-reviewed articles or reports from academic institutes and governments of national or international organizations published from 2002 to 2022 in English. We included frameworks with descriptions of how users would integrate them into their communities. We assessed 23 articles, seven about maternal health, six about oral health, and one about a general public health framework that met the inclusion and exclusion criteria for the search (Table 1).

We first considered the public health framework that came from the World Federation of Public Health Associations (WFPHA), known as the Global Health Charter for Public Health. This framework highlighted the importance of the intersection of health promotion, prevention, and protection with governance, advocacy, workforce capacity, information collection, and dissemination. The maternal health frameworks came from the University of the Western Cape, Ministry of Health in Timor-Leste, the Gates Foundation, the WHO, the U.S. Agency of International Development (USAID), and the U.S. Department of Health and Human Services (US DHHS). Although these frameworks were tailored to different geographic areas, four fundamental components interlinked them together [20–26]. First, all highlighted the importance of multilevel care continuums that focuses on three levels, the individual, community, and society [20–26]. Some highlighted the importance of the health system that addresses health outcomes and care-seeking behaviors. Others highlighted the importance of categorizing the levels of care according to maternal life stages—pre-, during, and post-pregnancy, or to also include the child's



Table 1 Selected frameworks

Framework title and reference	Institution	Year	Focus
Global Health Charter for the Public's Health [19]	World Federation of Public Health Associations	2016	Public Health
Perinatal health framework [20]	United States Department of Health and Human Services	2003	Maternal Health
A multi-layered explanatory model to illustrate the utilization of maternal health services in Timor-Leste [21]	Ministry of Health in Timor-Leste	2010	Maternal Health
Global Strategy for Women's, Children's & Adolescents' Health for 2016–2030 [22]	World Health Organization	2016	Maternal Health
Person-Centered Care Framework for Reproductive Health Equity [23]	Gates Foundation	2017	Maternal Health
Monitoring Logic Model: Unpacking the Links Between the Strategic Objectives and the Outcomes of the Network [24]	World Health Organization	2019	Maternal Health
Continuum of care framework for maternal and child health in South Africa [25]	University of the Western Cape	2020	Maternal Health
Conceptual Framework to Illustrate the Unique Needs of Vulnerable Urban Populations [26]	United States Agency of International Development	2021	Maternal Health
The risk-factor approach in the promotion of Oral Health [27]	World Health Organization	2003	Oral Health
Social Determinants of Health Model for Oral Health [28]	World Health Organization	2005	Oral Health
Framework of 'global health' education [29]	University Medical Centre Berlin, Germany	2011	Oral Health
Proposed framework to conceptualize and act upon eliminating the sources of oral health disparities [30]	National Institute of Dental Craniofacial Research	2014	Oral Health
Conceptual model in the role of community programs [31]	University of North Carolina	2015	Oral Health
Conceptual Framework for Oral Health in Rural and Remote Communities [32]	Australian Primary Health Care Research Institute	2017	Oral Health



first 5 years [20–22, 25]. These frameworks also emphasized collaboration among local leaders, government officials, and stakeholders as ‘enablers’ [21, 23–26]. Others considered social determinants and their effects on all aspects of the mother’s health and health beliefs [20, 22–26]. The oral health frameworks came from diverse organizations, including the U.S. National Institute of Dental and Craniofacial Research (NIDCR) at the U.S. National Institutes of Health, the WHO, the University of North Carolina, the University Medical Centre Mannheim, and the Australian Primary Health Care Research Institute [27–32]. In addition to focusing on multi-level care continuums, all address the precursors to health and care-seeking behaviors. These include proximal, distal, and contextual determinants [27–32]. Similar to the maternal frameworks, these also address collaboration among disciplines to achieve success with interventions.

Maternal oral health framework

In this analysis, the primary elements highlighted in the maternal, oral, and public health frameworks were considered: contextual factors, intervention levels, and enabling factors. They based the structure of the framework on the USAID model, and integrated key elements from other frameworks into this model (Fig. 1).

Contextual factors

Contextual factors include social determinants of health, including political climate, social and community context, neighborhood and built environment, physical infrastructure, and economic stability. It is important to consider the environment that surrounds the targeted community and how it could play a role in any maternal oral health intervention during implementation of maternal oral health initiatives in low- and middle-income countries or underserved communities in developed countries. Health beliefs and traditions around maternity stages, socio-economic factors, and overall capacity to engage in an intervention are critical contextual factors.

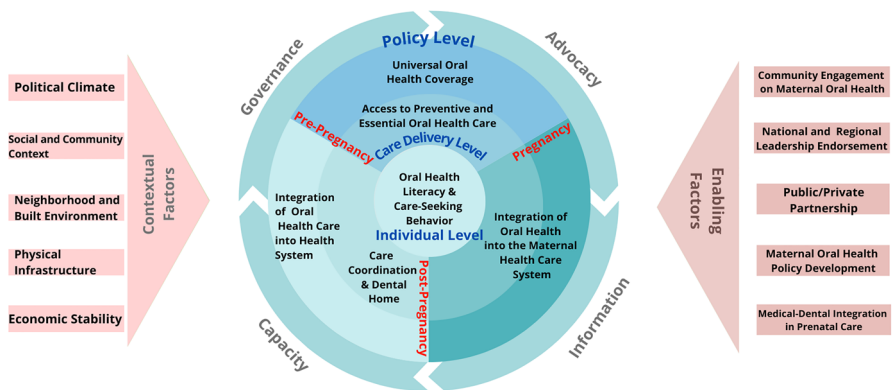


Fig. 1 Proposed maternal oral health framework



Intervention levels

Since oral, maternal, and public health require multilevel approaches, the framework we propose includes three tiers: individual, care delivery, and policy levels. It also covers three life stages of maternity: pre-, during, and post-pregnancy. In the pre-pregnancy stage, universal oral health coverage and access to preventive and essential oral health care are primary, whereas integration of oral health care into maternal health care is key during pregnancy. In the post-pregnancy stage, it is crucial to empower mothers of young children by coordinating of oral health and general health care for themselves and their children and by integrating oral health into primary care health systems, such as well-child visits and post-partum care.

The four external factors displayed above level in Fig. 1 are the necessary functions. Maternal oral health initiatives and programs should be supported by *governance* (legislation that intersects health and policy), *advocacy* (health equity and patient-centered care), *capacity* (health workers and the wider health team), and *information* (that is collected from and disseminated to the public).

Enabling factors

These are factors that are critical to determine whether an intervention will be successful and meaningful. These factors include community engagement on maternal oral health, having buy-in from national and regional leadership before commencing any intervention, and developing partnerships with any public or private entities already working with that community. Enabling factors also include existing and new policies for maternal health and oral health and overall medical and dental integration into perinatal care.

The next step

The maternal oral health framework we propose here emphasizes that a broader societal perspective and integrative approaches are essential for achieving mothers' oral health and the oral health of their young children. Recently, the WHO stated that women are change-agents in families and communities in promoting dialogue, catalyzing societal change, and addressing oral diseases and oral health equity [33]. There is a strong need to discuss how oral health can be integrated into the primary and perinatal health care systems from individual, community, and society levels, highlighting the role of pregnant women and mothers. Policymakers should examine how oral health and oral health care can be systematically integrated into the existing health care system through universal coverage for primary oral health care and interprofessional training and collaboration. We hope that this framework can be used in future maternal oral health dialogues and initiatives to improve women's oral health and overall health across the maternity stages.



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