

# CHAPTER I

## INTRODUCTION

Oral health is widely recognized as an essential component of general health and well-being. It affects fundamental daily activities such as eating, speaking, smiling, expressing emotions, and social interaction. Modern evidence strongly supports that oral health is not an isolated domain but is deeply interconnected with systemic health, psychosocial functioning, and the broader living environment. Global health organizations—including the World Health Organization (WHO), the American Dental Association (ADA), and the FDI World Dental Federation—consistently report that oral diseases such as dental caries, periodontal disease, malocclusion, and tooth loss are among the most prevalent non-communicable diseases worldwide. These conditions contribute significantly to long-term morbidity, disability, and reduced quality of life across different age groups.

Adolescence is a particularly sensitive developmental period during which individuals undergo substantial physical, emotional, cognitive, and social changes. During these years, oral health problems can have greater consequences because appearance, peer acceptance, and social identity play major roles in shaping self-esteem. Research shows that untreated dental caries may lead to difficulties in chewing and gaining adequate nutrition, while periodontal inflammation can worsen systemic health conditions. Oral pain and discomfort frequently result in sleep disturbance, reduced concentration in school, and avoidance of social activities. Adolescents with visible oral problems may experience embarrassment, teasing, or bullying, ultimately leading to social withdrawal, emotional distress, and lower academic engagement. These consequences highlight why Oral Health-Related Quality of Life (OHRQoL) has become a key indicator in both clinical and public health research.

Coastal communities represent a particularly unique context in the study of oral health. Many coastal regions share environmental challenges, economic instability, limited health infrastructure, and cultural habits that directly influence oral health behaviors. Studies conducted in various countries show that coastal families often depend on fishing-based or seasonal income, which may reduce financial ability to prioritize preventive care. Adolescents in these communities may also live far from dental clinics, rely on traditional remedies, have limited access to fluoridated water, or consume high-sugar diets. Additionally, environmental factors such as water salinity,

poor sanitation, and limited clean water access have been associated with variations in oral disease patterns. These structural, cultural, and environmental conditions combine to increase susceptibility to untreated oral conditions and reduce opportunities for early intervention.

In Indonesia, coastal regions play an important cultural and economic role, yet many remain underserved in health facilities, including dental services. Adolescents living in these communities often face challenges such as low parental education, limited access to preventive programs, insufficient school-based oral health interventions, and inadequate knowledge about proper oral hygiene practices. Social determinants of health (SDH) such as income, occupation, housing stability, and environmental exposure further contribute to disparities in oral health status and quality of life. These determinants influence dietary patterns, oral hygiene behaviors, utilization of healthcare services, and overall vulnerability to disease.

Understanding the oral health of adolescents in coastal regions requires a holistic approach that combines clinical indicators, behavioral factors, social environments, and geographical contexts. For example, adolescents with low oral health literacy may misunderstand early signs of dental disease, engage in irregular brushing habits, or delay treatment until pain becomes severe. Peer influence, cultural norms, family practices, and community resources all play major roles in shaping attitudes and behaviors related to oral hygiene. At the same time, environmental and geographic factors—such as distance to the nearest clinic, availability of dental professionals, quality of local water sources, and neighborhood socioeconomic characteristics—shape patterns of service utilization.

To explore these interconnected dimensions, this study adopts a **literature-based approach** supported by theoretical frameworks such as Social Determinants of Health (SDH) and Oral Health-Related Quality of Life (OHRQoL). Additionally, the study incorporates a **conceptual Geographic Information System (GIS) perspective**. GIS offers a spatial lens for understanding how environmental and geographic conditions shape disparities in oral health, distribution of services, and accessibility barriers. Although the present study does not involve primary GIS data collection, it provides a conceptual basis for how spatial mapping can help identify underserved zones, visualize clustering of oral diseases, and support evidence-based planning for coastal communities.

This chapter establishes a comprehensive foundation for analyzing the complex interactions between clinical, behavioral, environmental, and social factors that collectively influence oral health outcomes and quality of life among adolescents living in coastal regions. By integrating

global and regional literature, theoretical insights, and spatial considerations, the chapter provides a deeper understanding of the challenges faced by this population and the importance of addressing oral health as part of a broader public health framework.

### **1.1 Research Objectives**

1. To identify and analyze the key determinants of oral health among adolescents living in coastal communities.
2. To examine the impact of oral health conditions on adolescents' oral health-related quality of life (OHRQoL).
3. To review literature linking environmental and socioeconomic factors in coastal regions with oral health disparities.
4. To propose a conceptual GIS-based perspective for understanding spatial influences on oral health access and distribution.

### **1.2 Research Questions**

1. What are the most common oral health problems faced by adolescents in coastal areas?
2. How do social determinants such as income, education, and access to dental services affect oral health outcomes in these communities?
3. How do oral health conditions influence the functional, psychological, and social aspects of adolescents' quality of life?
4. How can a conceptual GIS approach support understanding of spatial disparities in oral health among coastal populations?

### **1.3 Scope of the Study**

This study focuses on adolescents aged 13–19 living in coastal regions. It relies exclusively on published research and does not involve primary data, clinical examinations, or field surveys. The study synthesizes literature from global sources, Indonesian coastal studies, environmental health research, oral health promotion frameworks, and quality-of-life models. Emphasis is placed on determinants of oral health, their impact on quality of life, and the potential spatial influences examined through a conceptual GIS perspective.

## 1.4 Operational Definitions

- **Oral Health:** The condition of the mouth, teeth, gums, and related structures, affecting functional ability, comfort, and psychosocial well-being.
- **Quality of Life (QoL):** A broad measure of well-being that includes physical, emotional, social, and environmental dimensions.
- **Oral Health-Related Quality of Life (OHRQoL):** The specific impact of oral health on an individual's functional, psychological, and social well-being.
- **Coastal Areas:** Geographic regions located near coastlines, characterized by unique socioeconomic and environmental conditions.
- **Adolescents:** Individuals aged 13–19 undergoing significant physical, emotional, and social development.
- **Social Determinants of Health (SDH):** The conditions in which people are born, grow, live, work, and age, influencing health risks and outcomes.

## CHAPTER II

### GENERAL THEORY

#### 2.1 General Theory of Oral Health

Oral health is increasingly recognized in contemporary public health as an essential indicator of general well-being and human development. It encompasses not only the absence of dental disease but also functional abilities, comfort, psychological stability, and social participation. In modern epidemiology, oral health is viewed as a multidimensional construct shaped by biological, behavioral, environmental, and socioeconomic determinants. This holistic understanding aligns with global efforts to approach oral diseases through integrated health strategies rather than isolated clinical treatment.

Adolescence, as a developmental stage, presents unique oral health challenges. During these years, individuals experience rapid physical growth, hormonal changes, heightened self-awareness, and increased independence in health-related decision-making. These factors influence oral hygiene practices, dietary choices, and attitudes toward preventive care. Poor oral health during adolescence can disrupt daily functioning, affect nutritional intake, and influence self-esteem, school performance, and overall quality of life. Issues such as dental caries, gingivitis, and malocclusion may carry lifelong consequences if not addressed early.

Coastal adolescents are particularly vulnerable due to the convergence of environmental stressors, socioeconomic instability, cultural patterns, and limited access to dental services. Many coastal communities experience structural barriers that reduce their ability to maintain optimal oral health. These include limited fluoride exposure, poor sanitation, high consumption of sugary foods or beverages, and geographic isolation from healthcare facilities. Consequently, adolescents in these regions often report higher rates of untreated caries, periodontal inflammation, and overall oral health discomfort.

Modern oral health theory emphasizes that effective prevention and intervention require an understanding of the broader determinants of health. This includes community settings, cultural norms, economic resources, and environmental exposures. Therefore, the examination of oral health among coastal adolescents must integrate clinical indicators with social, behavioral, ecological, and spatial perspectives to capture the full scope of risk factors and protective influences. This theoretical foundation serves as the basis for analyzing the literature and interpreting the complex interactions that shape oral health outcomes in coastal regions.

#### 2.2 Global Burden of Oral Diseases

Oral diseases represent a major global health concern, affecting billions of people across all age groups. Dental caries remains the most common chronic disease worldwide, surpassing conditions such as asthma and diabetes in prevalence. According to international health reports,

nearly half of the global population suffers from untreated oral diseases, making oral health disparities a critical public health priority.

The global burden is particularly concentrated among children and adolescents. Several factors contribute to this pattern: increased sugar consumption, inadequate oral hygiene practices, limited access to fluoride, and insufficient preventive health programs. Adolescents are especially susceptible because they gain greater autonomy over their diet and hygiene habits, often adopting behaviors that increase caries risk.

Low- and middle-income countries bear the heaviest burden. In these settings, oral health is often overshadowed by other urgent healthcare needs, leading to underinvestment in dental services and prevention programs. Geographic disparities further widen the inequality, with rural and coastal communities frequently lacking dental professionals, infrastructure, and public health outreach. As a result, adolescents in these areas face higher rates of untreated caries, periodontal disease, and oral pain.

The global burden of oral diseases reflects shared modifiable risk factors—including sugar consumption, tobacco use, alcohol intake, and poor hygiene—highlighting the need for integrated, community-based approaches rather than isolated clinical interventions. Understanding these global patterns provides essential context for interpreting the situation in Indonesia and similar coastal regions.

### **2.3 Oral Health Situation in Indonesia**

Indonesia, with its vast archipelago and diverse coastal populations, faces substantial challenges in ensuring equitable access to oral healthcare. National surveys consistently reveal high rates of dental caries and periodontal disease among children and adolescents. Many young people experience untreated decay, often due to socioeconomic constraints, low health literacy, and limited access to dental facilities.

Several structural factors contribute to the oral health situation in Indonesia:

- **Unequal Access to Dental Services**

Most dental clinics and professionals are concentrated in urban areas, leaving coastal and rural regions with limited or irregular service availability.

- **2. Lack of Preventive Programs**

School-based initiatives, fluoride varnish programs, and community dental outreach are not consistently implemented across regions, especially in geographically isolated areas.

- **Economic Barriers**

Many coastal families rely on fishing, seasonal labor, or informal occupations, resulting in unstable income that reduces healthcare-seeking behavior.

- **Low Oral Health Literacy**

Parental knowledge about oral hygiene, early signs of disease, and preventive practices remains limited, directly influencing adolescents' health behaviors.

- **Environmental Factors**

Many coastal regions lack access to fluoridated water, rely on groundwater with high salinity, and experience sanitation challenges—all of which can contribute to higher caries risk.

These structural and environmental barriers result in adolescents facing disproportionate oral health challenges. The Indonesian context underscores the importance of culturally sensitive, locally adapted interventions that address not only clinical needs but also social and environmental determinants.

## **2.4 Coastal Environment as a Determinant of Oral Health**

The coastal environment shapes oral health outcomes through combined environmental, social, and behavioral determinants.

Coastal environments present unique challenges that influence oral health outcomes. While coastal communities often possess rich cultural traditions and strong social bonds, they frequently face socioeconomic and infrastructural limitations that affect health status.

Environmental Determinants:

- **Low Fluoride Levels:** Many coastal water sources lack adequate fluoride, reducing natural protection against dental caries.
- **Water Salinity:** High salinity can affect enamel integrity over time and reduce the usability of water for hygiene.
- **Poor Sanitation:** Limited waste management and inadequate clean water supply increase disease transmission and affect oral hygiene practices.
- **Humid Climate:** Warm, moist environments promote faster bacterial growth, contributing to caries and periodontal conditions.

Social and Economic Determinants:

- **Seasonal or Unstable Income:** Families may prioritize essential needs over dental care.
- **Lower Educational Levels:** Limited oral health knowledge affects both parental guidance and adolescent behavior.
- **Infrastructure Gaps:** Long travel distances and lack of transportation reduce access to dental clinics.
- **Cultural Practices:** The use of traditional remedies or delaying dental visits until pain occurs is common in many coastal communities.

Together, these determinants create a complex risk environment that increases susceptibility to oral diseases among coastal adolescents. These factors also underscore the need for targeted interventions tailored to coastal contexts.

## 2.5 Oral Health-Related Quality of Life (OHRQoL)

Oral Health-Related Quality of Life (OHRQoL) is a multidimensional concept that measures how oral health affects an individual's functional, emotional, and social well-being. It captures the lived experiences of oral disease—pain, discomfort, difficulty eating, social embarrassment, and reduced self-esteem—which are often invisible in purely clinical measures like DMFT or CPI.

For adolescents, whose sense of identity and social belonging is still forming, OHRQoL is especially important. Poor oral health can affect:

- **Self-confidence:** Adolescents may feel embarrassed to smile or speak.
- **Social Interaction:** Visible oral problems may lead to teasing, bullying, or social withdrawal.
- **School Performance:** Oral pain, discomfort, or fatigue from poor sleep affects concentration and attendance.
- **Daily Activities:** Difficulty chewing can limit food choices and nutritional intake.

OHRQoL therefore provides essential insight into how oral health influences overall well-being, beyond clinical symptoms. This is particularly relevant for coastal adolescents, whose social and environmental conditions may amplify the negative effects of oral health problems.

## 2.6 DMFT Index (Decayed, Missing, Filled Teeth)

The DMFT index is a cornerstone of oral health epidemiology, providing a standardized method to assess dental caries experience. Each component reflects a different aspect of disease progression:

### **D – Decayed**

Indicates active untreated caries, often associated with pain, infection, and functional limitations.

### **M – Missing**

Represents tooth loss due to decay, commonly a consequence of delayed treatment or limited access to restorative services.

### **F – Filled**

Reflects teeth that were treated, highlighting access to dental care.

The DMFT index is widely used in adolescent studies because it is simple, comparable across regions, and highly sensitive to changes in disease patterns. However, it does not measure lesion

severity or distinguish between active and inactive lesions. In coastal communities, higher D and M scores are common due to limited preventive care and fewer restorative services.

## **2.7 Community Periodontal Index (CPI)**

The Community Periodontal Index (CPI) is used to assess periodontal health at the population level. It evaluates:

- Gingival bleeding
- Calculus accumulation
- Pocket depth

Adolescents are particularly prone to gingival inflammation due to hormonal changes, poor oral hygiene, and plaque accumulation. In coastal communities, limited access to scaling services and low hygiene awareness contribute to higher CPI scores.

CPI provides valuable population-level insight but has limitations, including its inability to measure attachment loss precisely. Nonetheless, it remains a crucial tool for evaluating periodontal conditions among adolescents.

## **2.8 OHIP-14 (Oral Health Impact Profile)**

The OHIP-14 is a validated and widely used instrument to measure the psychosocial impact of oral health problems. It captures seven domains:

1. Functional limitation
2. Physical pain
3. Psychological discomfort
4. Physical disability
5. Psychological disability
6. Social disability
7. Handicap

Higher scores indicate poorer OHRQoL. Because adolescents are highly sensitive to appearance, social belonging, and self-esteem, OHIP-14 is particularly relevant in assessing the impact of oral diseases on their daily lives.

## **2.9 Social Determinants of Health (SDH)**

SDH provide a powerful framework for understanding why certain populations experience disproportionate oral health burdens.

Key SDH influencing coastal adolescents include:

- Household income and economic stability
- Parental education and health literacy
- Housing conditions and sanitation
- Access to clean water and fluoride
- Distance to dental clinics
- Availability of school-based and community health programs
- Cultural beliefs and family health traditions

SDH demonstrate that oral health disparities are rooted in broader structural inequities, not individual behaviors alone.

### 2.10 Health Belief Model (HBM)

The Health Belief Model explains preventive behaviors based on individual perceptions.

HBM Components:

- Perceived susceptibility
- Perceived severity
- Perceived benefits
- Perceived barriers
- Cues to action
- Self-efficacy

Coastal adolescents may underestimate their risk due to limited exposure to health education, few role models demonstrating proper care, or cultural norms that delay dental visits until pain occurs.

### 2.11 Ecological Model of Health Behavior

The Ecological Model highlights how health behaviors are shaped by multiple levels:

- **Individual:** knowledge, attitudes, skills
- **Interpersonal:** family, peers
- **Community:** schools, clinics, cultural norms
- **Organizational:** programs, local institutions
- **Policy:** regulations, subsidies, government support

In many coastal regions, community and policy factors remain weak, limiting adolescents' opportunities for preventive care and guidance.

### **2.12 Conceptual GIS Framework in Oral Health**

While this study does not involve the use of primary GIS data, incorporating a conceptual GIS model enhances understanding of spatial disparities in health services and disease patterns. GIS can integrate layers such as:

- Distribution of dental clinics
- School locations
- Socioeconomic status maps
- Population density
- Transportation networks
- Water source characteristics
- Coastal environmental risk zones

GIS helps visualize underserved areas, identify spatial clustering of oral diseases, and guide more equitable planning for health interventions.

### **2.13 Integration of Frameworks**

By integrating clinical concepts (DMFT, CPI), psychosocial measures (OHRQoL, OHIP-14), behavioral theories (HBM, Ecological Model), SDH perspectives, and a conceptual GIS lens, this chapter builds a multi-layered understanding of oral health among coastal adolescents. Oral diseases are shaped by biological susceptibility, social environment, economic stability, cultural practices, and geographic accessibility. Quality of life outcomes reflect how adolescents interpret and experience these challenges. This integrated theoretical foundation strengthens the interpretation of findings in subsequent chapters and supports the study's overall objective of examining oral health in coastal communities through a comprehensive, literature-driven approach.