Logical Model for Android-Based Application of Obesity Prevention and Management

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Abstract: Obesity is preventable, but the prevalence of obesity in Indonesia continues to increase. Currently, digital health has been developed, and the Indonesian government has the Nusantara Movement to Reduce Obesity Rates (GENTAS) program to prevent and manage obesity. This paper will show a logic model for Android-based applications on obesity prevention and management. This logical model design was carried out using the Systems Development Life Cycle (SDLC) method. The android-based application's logical model and interface for obesity prevention and management can be accessed by the whole community and health officers (nutritionists and sports experts, the Public Health Center [PHC], and the Ministry of Health [MOH]). There is a health profile feature on the community's role to view users' health status, consultations, recommendations, health articles, videos, and BMI calculator. And dashboard access, answering the consultations, and creating health articles in the health officer's roles. This logical model allows the community and health officers to prevent and manage obesity in Indonesia.

Key Words: Logical Model, Application, Android, Preventive, Management, Obesity, Indonesia

I. INTRODUCTION

Infectious Diseases tend to decrease but Non-Communicable Diseases (NCDs) continue to increase and cause an epidemiological transition (1). NCD kill 41 million people each year, equivalent to 74% of all deaths globally. Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.3 million), chronic respiratory diseases (4.1 million), and diabetes (2.0 million including kidney disease deaths caused by diabetes). These four groups of diseases account for over 80% of all premature NCD deaths (2).

Most cardiovascular diseases can be prevented by addressing behavioural risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol. (WHO, 2022). The high cases of cardiovascular disease are closely related to uncontrolled obesity. Worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese. Most of the world's population live in countries where overweight and obesity kills more people than underweight (3).

The 2018 Basic Health Research (Riskesdas) stated that the proportion of adults aged over 18 years who were obese (BMI \geq 27) had increased by almost 50% than the proportion in 2013 from 14.8% to 21.8% (4). The main causes of overweight and obesity are increased intake of foods high in calories, fat, and sugar; and decreased physical activity due to a sedentary lifestyle. Overweight and obese are caused by genetic factors, environmental factors (diet and physical activity), and drug use or hormonal factors. Some factors are difficult to change and factors can be changed (5). Obesity can be prevented by changing a person's diet and physical activity patterns (3,5).

The Government of Indonesia through the Sub Directorate of Diabetes Mellitus and Metabolic Disorders, the Directorate of Prevention and Control of NCD of the MOH of the Republic of Indonesia has created GENTAS guidebook to reduce the prevalence rate of obesity (6). Many studies show that health information technology improves preventive care outcomes and disease awareness and self-management (7,8)

Senecal, et al (2020) conducted an obesity intervention study that used an application that combined wireless home scales and meal replacements for three months as the nutrition program. This intervention resulted in dramatic weight loss among subjects who were active users when evaluated through a retrospective observational analysis. Even though not all samples reached the final stage (9). Dunn, et al in 2019 stated that self-reporting of diet through both the calorie counter application (FatSecret) and food photos (MealLogger) was statistically significant and strongly correlated with body weight changes in all participants (10). A systematic research review by Patel et al in 2021 shows various kinds of digital health-based interventions that used websites, applications, instant messages, wireless scales, and manuals. It turns out that the level of involvement is higher in individuals who self-monitor through digital methods than in paper-based (11).

Digital health is the use of digital, mobile, and wireless technologies to support the achievement of health goals. Digital health describes the general use of Information and Communication Technology for health and includes mHealth and eHealth (12). The MOH of the Republic of Indonesia developed a mobile application called SehatPedia (13). The features include measuring physical activity or sports, Live Chat, Covid-19, health service reservations, and health articles. However, there is no weight evaluation feature or eating suggestion yet. The aim of this research is creating a logical model for an android-based application to prevent and manage obesity by providing diet and physical activity recommendations that are appropriate to Indonesian users and Indonesian culture. Hopefully in the future, this logical model will be a medium for health promotion in obesity prevention and management in Indonesia. **II. METHOD**

SDLC is a systems approach in developing information system solutions, a conceptual framework used in project management to describe the stages carried out in an information system development project, as well as a framework that describes the processes for understanding, planning, building, testing, and implementing information systems (14). This methodology identifies a framework

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for planning and controlling the creation of an information system, namely the software development process. The logical model design of obesity prevention and management application was carried out using the SDLC method, that consist of context diagrams design, Entity Relational Diagrams (ERD), and interfaces. And Figma is used to build the interfaces.

III. RESULTS AND DISCUSSIONS

Context Diagram of Android-Based Application System of Obesity Prevention and Management

The context diagram in Figure 1 shows the source entity, the system being built, and the destination entity. There are two source entities and two destination entities. Source entities consist of application users or the public and nutrition and sports consultants. The destination entity consists of PHC and the MOH. The user entities register to the applications, fill in personal data, and can submit consultations. This entity is connected to an android-based prevention and management application system prototype. This entity will receive the user's health status, diet, and physical activity/exercise recommendations, according to their health status, then obtain the results of the consultation if they submit a consultation. Nutrition and sports consultant entities will receive consultations submitted by the user and will provide the consultation answers through the system. The user's health status data will be displayed in the dashboard for the PHC entity and the MOH, in particular the Diabetes Mellitus Sub-Directorate, the Directorate of Prevention and Management of NCD, and the Directorate General of Disease Prevention and Control.



Figure 1. Context Diagram on Android-Based Application System of Obesity Prevention and Management Information:

1. Nutrition and Sports Consultant (Manager of NCD and Nutrition and Health Promotion at PHC)

2. Sub Directorate of Diabetes Mellitus, Directorate of Prevention and Control of Non-Communicable Diseases, Directorate General of Disease Prevention and Control

Entity Relational Diagram of Android-Based Application System of Obesity Prevention and Management

Then the context diagram in Figure 1 is developed by creating an Entity Relational Diagram (ERD) which can be seen in Figure 2 below. This ERD describes the relationships between existing entities and explains the attributes of each entity.



Figure 2 Entity Relational Diagram of Android-Based Application System of Obesity Prevention and Management Interface

This application can be accessed through the Google Play Store, after downloading and installing the application, there will be 2 users/roles. The first is the public user. The second user/role is admin, this role can be accessed by Nutrition and Sports Consultants, PHC, and the MOH. In the user's initial view there is access to register, log in for the public, and log in as admin. Users can choose according to their preferences to register manually or register directly using a Google account.

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Figure 3. Welcome Page and Register Page After registering the user will be directed to fill out the profile to continue access to the main application page

Nama	
Jenis Kelamin	
empat Lahir	Tanggal Lahir
olongan darah	
inggi badan (cm)	Berat badan (kg)
Iomisili	
ekerjaan	
liwayat Penyakit Prib	adi
wayat Penyakit Kelu	larga

Figure 4. Profile Fill in Form Page

There is also a user profile page that contains the BMI and weight progress, and disease history.

		5		
тв	170 cm		i i IB	72 kg
Inde	ks Massa Ti	ubuh (IM	T)	
24.9			Kamu	sehat!
15	18.5	25	30	40
Tren I	MT			Normal
Tren I	зв		-	
Riway Amai Riway Pik I	vat Penyaki ndel vat Penyaki Hipertensi	t Pribad t Keluar , Diabe	li ga tes Meli	tus

Figure 5. Health Status Page

The application's menu consists of recommendations, health articles, videos, BMI calculators, and contact us.

Halo Bangga , bagaimana kabarmu hari ini? Jangan lupa makan gizi seimbang dan aktifitas fisik ya! Profil sehat ku						
Konsultasi	Rekomendasi					
Artikel Kesehatan	Video					
Kalkulator BMI	Hubungi Kami					

Figure 6. User Main Page

The difference between admin is they have special access and menus. The admin will log in by entering the e-mail/username along with the password that was created by the developer.

e-mail/username	e
Password	
c4pTCh4	Re-type capthca
	Masuk
	6

Figure 7. Admin Log-in Page

There are 4 main menus in the admin role; the dashboard, answer consultations, create articles, and contact us.

666
Dashboard
Jawab Konsultasi
Buat artikel
😧 Hubungi Kami

Figure 8. Health Officers Main Page

IV. CONCLUSION

This logical model allows the public and health officers to be able to prevent and manage obesity in Indonesia. Hopefully, the development of this logical model will help the Indonesian government to optimize the GENTAS program. And the features developed are expected to help health offices in the process of recording, intervening, and reporting obesity. And the community can independently and actively prevent and control obesity. **REFERENCES**

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