# DIETDUCATE : INTELLIGENT EDUCATION APPLICATION OF NUTRITION TO ACHIEVE AN IDEAL WEIGHT BASED ON EVIDENCE

**M Iqbal [1],\*, M R Permadi[1], H Oktafa[1]**

[1] Department of Clinical Nutrition, Politeknik Negeri Jember, Indonesia

\*E-mail: iqbalbasagili@polije.ac.id

**Abstract.** Obesity and malnutrition is one of the most crucial health problems in Indonesia. Worldwide the prevalence of obesity increased 3-fold between 1980 - 2016. While around 1.7 billion people suffer from malnutrition, some of them are in developing countries like Indonesia. the impact of obesity and malnutrition is the risk of non-communicable diseases and increasing mortality. Nutrition solutions should follow technological developments, where the development of knowledge and technology in the world is undergoing a change in the industrial revolution 4.0. the purpose of this research is to create an application that can help the ideal body weight. This research design is Waterfall model. The dietducate application can be developed with the android platform. and 8 main menus, namely the login page, homepage, output page, Nutritional facts search engine, nutritional calculator, weight report, nutrition consultation & article about nutrition, social network.

## 1. INTRODUCTION

Obesity and malnutrition is one of the most crucial health problems in Indonesia. Worldwide the prevalence of obesity increased 3-fold between 1980-2016. in 2016 more than 1.9 billion adults from over 18 years were overweight [1]. While around 1.7 billion people suffer from malnutrition, most of them are in developing countries [2]. Based on Riskesdas data, the prevalence of obesity in 2018 has increased by 21.8% from 14.8% since 2013. Then the prevalence of malnutrition status of 11.1% is experienced mostly by teenagers.

Both of these nutritional problems -obesity and malnutrition- are commonly referred to as multiple nutrition problems. The impact of obesity and malnutrition is the risk of non-communicable diseases and increasing mortality [3]. Multiple nutritional problems that often occur in adolescence are caused by incorrect lifestyle factors and dissatisfaction with the desired body image [4]. This results in adolescents doing unhealthy eating patterns to achieve the desired body shape.

Many adolescents restrict diet because of fear of fat, besides that there are some adolescents who lack health awareness so that excessive eating patterns and causes obesity [5]. This behavior has a negative impact on health, especially nutrition in adolescents due to unbalanced nutritional intake after the recommended adequacy [6].

The problems mentioned above need proper dietary advice in accordance with the advice of a nutritionist to overcome these nutritional problems. Nutrition problem solutions should follow technological developments, where the development of knowledge and technology in the world when undergoing changes in the industrial revolution 4.0 [7]. There is now a nutritional consultation website that can be used. In addition, there is also a food database to help with diet planning and evaluation.

The existence of online nutrition consultation helps in nutrition services so that they can play an active role in efforts to prevent disease and support healthy lifestyle [8]. The nutritional consultation process is also carried out the process of regulating dietary patterns through the selection of food ingredients that can be included in the Indonesian food composition table online in the form of the Nilaigizicom website.

The use of online media is now the main access for young people in addition to being easier and more efficient in its use. The problem that occurs now is the use of two websites at the same time less efficient for the people themselves. the use of an android smartphone can be used as a medium to access information easily and quickly. Multiple nutritional problems that often occur among adolescents are very appropriate to the lifestyle habits of adolescents who are inseparable from the use of smartphones as entertainment, needs and trends alone [5].

The importance of combining two websites in the form of an android application to be more efficient and effective, independent in its users, the form of an application that is simple and very practical to be accessed anywhere and anytime because it is connected directly to the internet. This effort is expected to be an application in the future in helping to overcome nutrition problems in Indonesia, especially for dual nutrition problems that occur now. The aim of this research is to develop intelligent applications of nutrition education and help achieve evidence based ideal body weight in people with malnutrition (overweight and underweight).

## 2. METHOD AND MATERIAL

The ***Waterfall Model*** was the first Process Model to be introduced. It is very simple to understand and use. In a *Waterfall* model, each phase must be completed before the next phase can begin and there is no overlapping in the phases. *Waterfall* model is the earliest ***SDLC*** approach that was used for software development [9]



**Figure 1.** Waterfall Methods [9]

## 3. RESULT & DISCUSSION
*3.1 Android Arcitecture*



◉ Login
- Homepage
  - Gender
  - Age
  - Level of Activity
  - Height
  - Weight
- Output homepage information
  - Energy Requirement
  - Nutritional Status
  - Ideal Weight
- Search Nutritional facts
  - search food
  - barcode scan
  - add food
  - compare food
  - advance search
- Nutrition Calculator
  - Body Mass Index
  - Energy Requirements
  - Ideal Body Weight
  - Weight Estimation
- Weight Report
  - Progress of weight
    - Graphic
    - Bar chart
  - reminder
- Articles
◉ Nutrition Consultation
- Social Network

**Figure 2.** Concept Menu of Dietducate App

To create an application requires a comprehensive syntactic design and framework which includes functions and menus. Menus are made based on the needs needed for the purpose of ideal body weight.

*3.2. Login Page*

Users who use this application do not need to register, just log in using Google. as is known that Google is a platform that almost everyone has. This is done for users who usually lazy having to register manually with a username and password.
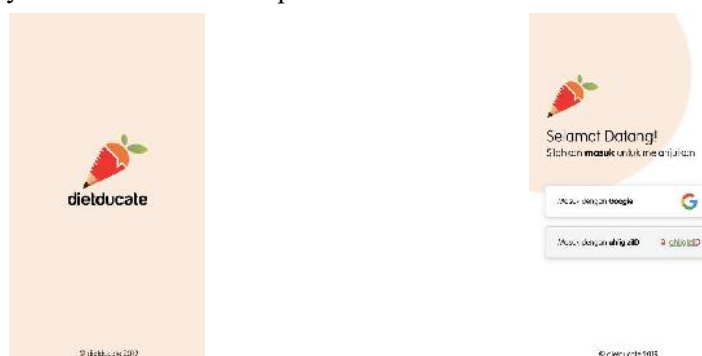


**Figure 3.** Homepage and login page

*3.3. Homepage*

The initial time when a user logs in using this application, data will be asked to identify the initial nutritional status of the user. The requested data includes gender, age, type of activity, height and weight. These data will be entered into the Harris-Bennedict formula to get the daily calorie requirements or more commonly referred to as the Basal Metabolic Rate (BMR) [10].

**BMR calculation for men (metric)**
BMR = 66.47 + ( 13.75 x weight in kg ) + ( 5.003 x height in cm ) - ( 6.755 x age in years )

**BMR calculation for women (metric)**
BMR = 655.1 + ( 9.563 x weight in kg ) + ( 1.850 x height in cm ) - ( 4.676 x age in years )

Basal metabolic rate (BMR) is the amount of energy required to maintain the body's normal metabolic activity, such as respiration, maintenance of body temperature (thermogenesis), and digestion. Specifically, it is the amount of energy required at rest with no additional activity. The energy consumed is sufficient only for the functioning of the vital organs such as the heart, lungs, nervous system, kidneys, liver, intestine, sex organs, muscles, and skin.



**Figure 4.** Personal data form

*3.4. Output page*



**Figure 5.** Result of Personal data shows nutritional status and energy requirement

The results of the data entered on the homepage and then analyzed and issued the results on the output page. The results page consists of a Body mass index to show nutritional status with WHO, Indonesia and Asian standards. In addition to nutritional status by measuring BMI, there are also results of calculations of energy requirements per day.

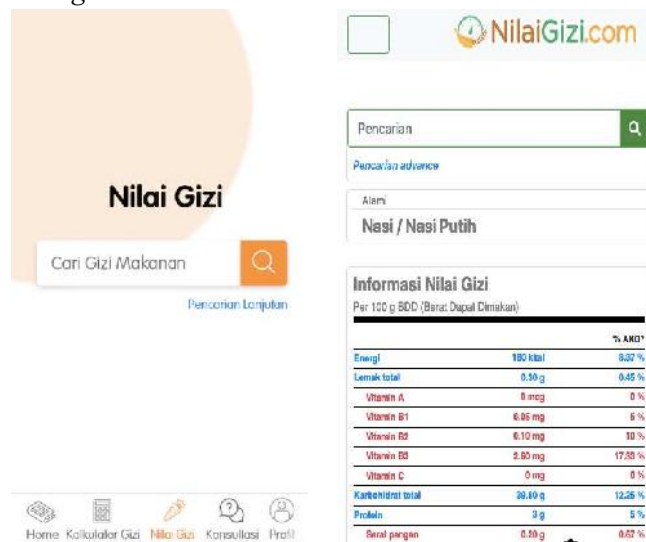*3.5. Nutritional facts search engine*



**Figure 6.** Nutrition Facts Search Engine

During this time the nutritional content, both nutritionists and the community, still relies on the Indonesian Food Composition Table (TKPI) to obtain information about the nutritional content of a food in a valid manner. Internet search results cannot guarantee the validity of nutritional information data for a food. To improve this application, we need a tool to facilitate the search for nutritional value of food digitally. therefore dietducate integrates with the nilaigizi.com platform.

Nilaigizi.com was created to facilitate nutritionists and netizens in finding the nutritional value of food and foodstuffs. The database of raw materials on this website comes from the 2018 Indonesian Food Composition Table [3], while processed foods come from visitor contributions. The Nutrition Adequacy Rate refers to the Regulation of the Head of the Republic of Indonesia Drug and Food Supervisory Agency Number 9 of 2016 concerning Nutrition Label Reference (2150 kcal) [11].

It is shown by the average score of usefulness, satisfaction, and ease of use aspects of over 80 percent. Nilaigizi.com can be made as a reference to obtain foods and processed foods' nutritional value information based on people's needs [12].

*3.6. Nutritional Calculator*

This application also provides calculations to support weight loss such as weight determination if it cannot be known directly. Weight estimation is important for calculations on certain people that are difficult to weigh, such as the condition of the patient unconscious in hospital, elderly or severe illness.

## 3.7. Weight report
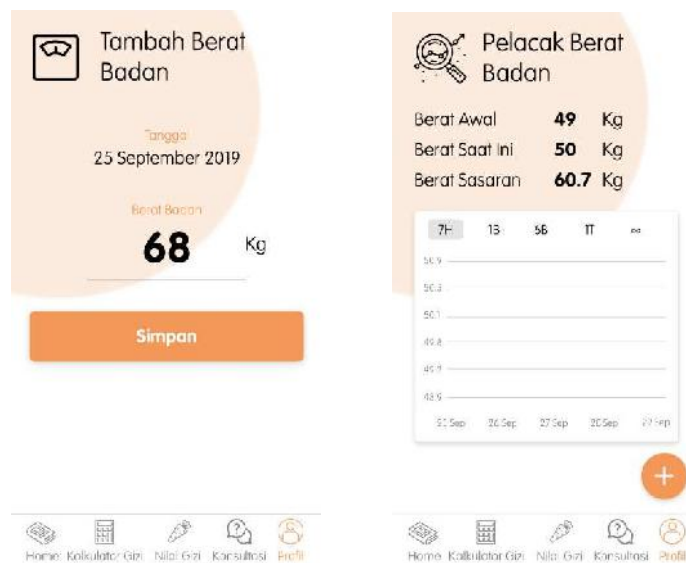


**Picture 7.** Weight Progress Tracker

Users can record weight regularly. After that, the weight data recorded at any time will form a graph so that it can be monitored from time to time and can also be compared to the specified target.

## 3.8. Nutrition Consultation & article about nutrition

Although the application has provided interpretation in each calculation, but in order to guarantee the information received by the user is correct, it needs to be validated by a nutritionist. therefore, special features are needed to consult with nutritionists. Dietducate integrates applications developed with AhliGiziID's online nutrition consultation platform. in this application there is also a menu of nutritional articles that support the process of nutrition education for users in accordance with the needs of the disease
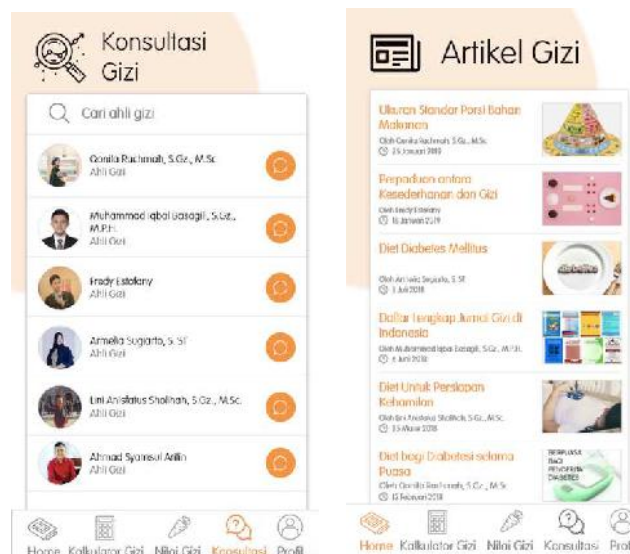


**Picture 8.** Menu of Nutrition Consultation and nutrition article integrated with AhliGiziID

*3.9. Social Network*

This menu is created as a development of the menu intended to receive suggestions and criticisms from users to developers. Damage often occurs in an application but is not known by the developer so this menu can overcome these things. Contacts provided on this application platform include Facebook, WhatsApp and Instagram

## 4. CONCLUSION

The dietducate application can be developed with the android platform. and 8 main menus, namely the login page, homepage, output page, nutritional facts search engine, nutritional calculator, weight report, nutrition consultation & article about nutrition, Social network. these features are developed and adapted to the needs of users to achieve ideal weight. Dietducate can also be used as a reference to get information on achieving an ideal weight.

## Acknowledgements

## REFERENCES

[1]   World Health Organization (WHO). 2019. *Obesity and Overweight*. WHO. Jeneva. https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight

[2]   Food and Agriculture Organization,  2015. *International Hunger Targets: Taking Stock of Uneven Progress*. Rome: Food and Agriculture Organization.

[3]   Kementerian Kesehatan RI. 2010. *Standar Antropometri Penilaian Status Gizi Anak*. Kementerian Kesehatan RI. Jakarta.

[4]   Syahrir, N. Thaha, A. R., Jafar, N. 2013.  *Pengetahuan Gizi, Body Image, dan Status Gizi Remaja di SMA Islam Athirah Kota Makassar*. Semanticscholar

[5]   Arisman. 2010. *Buku ajar ilmu gizi dalam daur kehidupan*. EGC Penerbit Buku Kedokteran

[6]   Nurhaedar, J. 2012. *Perilaku Gizi Seimbang Pada Remaja*. Skripsi. Makassar: Universitas Hasanuddin

[7]   Ristekdikti. 2018. *Kreatif dan Inovatif di Era Revolusi Industri 4.0*. Kementrian Teknologi Pendidikan Tinggi.Volume 8 No 1 [Online] pada : https://ristekdikti.go.id/wp-content/uploads/2018/05/Layout-Majalah-Ristekdikti-I-2018-Update-Page-20180426.pdf

[8]   Iqbal dan Husin, 2017. *Analisis Perbandingan Kualitas Dan Fasilitas Web Konsultasi kesehatan Dengan Pendekatan Pieces Framework*.  Jurusan Kesehatan. Politeknik Negeri Jember.

[9]   Lakshay Sharma. 2016. *WaterFall Model in Software Developement Life Cycle* https://www.toolsqa.com/software-testing/waterfall-model/

[10]  Harris JA, Benedict FG. *A biometric study of human basal metabolism*. Proc Natl Acad Sci USA 1918;4(12):370-3.

[11]  AhliGiziID. 2018. https://nilaigizi.com/info/f/37693cfc748049e45d87b8c7d8b9aacd

[12]  Iqbal, M and Permadi,M.R. 2018. *Going Digital : A New Concept Of Indonesian Food Composition Databases*. IOP. IOP Conference Series: Earth and Environmental Science, Volume 207, conference