Online Tracking Nutrition and Health of High School Students

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Abstract: Nutrition and proper diet plays critic role on development of the high school students. During school age disorders due to diet of student may cause problems and open door to the some other diseases. Early detecting and tracking disorders may play important role on the youth health. We find Body Mass Index (BMI) would be relevant in our work in order to diagnose and keep track of disorders. We built computer program called Tracking Nutrition and Health (TNH) especially for high school students and kept track of height, weight, age of students to measure disorders. BMI values outside of the certain range are considered as a sign of disorder. In order to overcome disorders some tips and suggestions are given such as diet plans, exercises and etc. Activities and suggestions are being kept on the system and progress is analyzed over time to make decisions and observe progress that has been made. In this paper limitations, advantages and disadvantages of the proposed method is going to be discussed. Furthermore we will address experience, knowledge and skills we gained through implementations and research.

***Keywords*:** Online Information Collection, Body Mass Index (BMI), Nutrition Disorders, Computer Programs for Monitoring.

Introduction

Nutrition and proper diet plays critic role on development of the high school students. During school age disorders due to diet of student may cause problems and open door to the some other diseases. Early detecting and tracking disorders may play important role on the youth health. In our work we built computer program called TNH especially for high school students and kept track of height, weight, age of students to measure disorders. BMI values outside of the certain limits are considered as a sign of disorder. The project is about building up a web-based health tracking system for youth especially high school students. The desired Web oriented system would keep track of its members' health conditions and provide health suggestions to the members according to the personal information they subscribed. Our main concern on this project was to complete the user interfaces and built computer program for calculation, submission of data and displaying results and so on. The system we would like to implement is going to answer the needs of specific group of people. Instead of various and complex medical issues we will focus on more common problems such as height, weight problems Targeted users are teenagers from eleven to eighteen years old. By choosing specific user group, we did get more chance to focus on users' specific problems. We also realize making assumptions about individual especially for young people is challenging task. For privacy concerns we embed user authentication in our project. We wanted to prevent user information from unauthorized access and modification.

Method

Body Mass Index is used to calculate individual body fat based on his or her body weight and height. The formula is very simple and universally used. BMI also can be calculated using BMI chart on (Body Mass Index Table). BMI formula can be calculated dividing body mass to individual`s square of height.

$$BMI = mass(kg)/height(m)^2$$

While calculation of BMI goes back to 19th century BMI gained popularity via published paper in 1972 which found BMI to be good approximation body fat percentage (JeremySinger-Vine, 2009)(Keys, Ancel. and friends, 1972). BMI is originally intended to use for population studies but because it`s simplicity it is used also for individual diagnosis in

spite of its inappropriateness. It provides how a person is thin or thick and allow professional to make decisions based on numeric value of BMI. For individuals we take value of BMI of 18.5 to 25 to indicate optimal weight; BMI lower than 18.5 suggests that the person is underweight while the number above 25 indicates that the person is overweight; BMI number above 30 indicates that the person is obese (over 40 is morbidly obese). We use certain ranges of numbers to indicate students have malnutrition or disorders. World Health Organization (WHO) considers BMI less than 18.5 as underweight and a sign for eating disorder. BMI greater than 25 is diagnosed as overweight and above 30 is considered as obese (BMI Classification). Table 1 below shows ranges and their interpretations according to number defined by WHO.

Table 1 Ranges of BMI values

Category	BMI range – kg/m^2	BMI Prime
Very severely underweight	less than 15.0	less than 0.60
Severely underweight	from 15.0 to 16.0	from 0.60 to 0.64
Underweight	from 16.0 to 18.5	from 0.64 to 0.74
Normal (healthy weight)	from 18.5 to 25	from 0.74 to 1.0
Overweight	from 25 to 30	from 1.0 to 1.2
Obese Class I (Moderately obese)	from 30 to 35	from 1.2 to 1.4
Obese Class II (Severely obese)	from 35 to 40	from 1.4 to 1.6
Obese Class III (Very severely obese)	over 40	over 1.6

BMI values above are used for adults and BMI for young's and children is used differently. Although calculation is as same as adult evaluations of BMI are done by comparing to typical values for other children of the same age. Instead of set threshold for malnutrition, the BMI percentile allows comparison with the children of the same gender and age (BMI for Children and Teens). BMI falls under 5th percentile is considered underweight, and above 95th percentile is considered to be overweight. We are giving special and careful attention to the people are categorized as underweight and overweight since that group of people are considered to have disorders according to BMI calculations. A reference BMI table for boys' age between 2 to 20 can be seen in Figure 1.

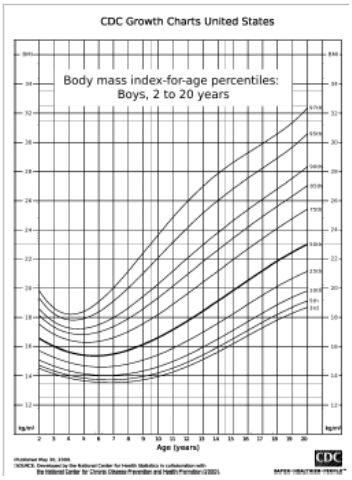

Figure 1: BMI for age percentiles for boys 2 to 20 years of age.

Although BMI is simple to calculate and interpret different BMI tables are available for different nationality and age and gender. To make appropriate decisions all aspects should be considered. Table for other groups and nations can be integrated into the software and more generalized system can be built as a future program. The recommended distinctions along the linear scale may vary from time to time and country to country making global longtitual surveys problematic. As we mentioned BMI can be changed and in 1998, the U.S National Institutes of Health and the Centers for Disease Control and Prevention brought U.S definitions into line with WHO guidelines, lowering

normal/overweight cut off from BMI from 28.5 to 25 and effect of this change 29 million healthy population becomes overweight (Who's fat: New definition adopted). BMI may differ from country to country and as an example BMI values for Japanese people are given in Table 2.

Table 2 BMI Range and Categories for Japan

Category	BMI range – kg/m^2
Normal	from 18.5 to 22.9
Overweight	from 23.0 to 24.9
Obese	25.0 and above

BMI data is becoming more and more pertinent to the growth of children, due to the majority of their exercise habits (Barasi, M. E.,2004). BMI has been used by WHO as standard for recording obesity statistics since early 1980. However accuracy of BMI is still debated. For example one problem in elderly and children is differences in bone density and that makes difference in total weight.

TNH consists of several components. The first part is the Subscription form. Subscription form allows new users to subscribe their personal information. The information submitted by the users will be recorded in the database and become a profile for user. User information can be viewed and changed when desired or needed. Keeping user information at each step will allow us to see improvements and deterioration of individual. In figure 2 submission and data gathering is shown.

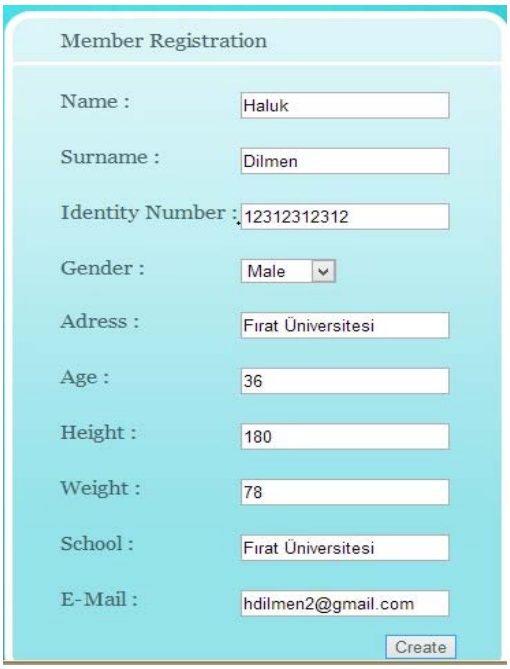

Figure 2: User information submission

The second part of the program is used for calculating BMI data for users. Based on BMI data, user will be categorized and class for user is determined. As indicated BMI range for categories are not static. From time to time depending on geographical regions and populations numbers can be interpreted differently. For example BMI number can be interpreted as a normal weight for individual in US and same number will indicate individual is overweight in Japan. Country, region, time criteria must be set for different regions and population. Once BMI data is calculated category of user is determined and written on the screen. To make interpretations and comparison easier, the user BMI

is located in the Figure 3. Since regular methods mostly just finds category for subject and let them to locate BMI on the table. In some situations process of getting exact location for BMI can be confusing. Designing system automatically to locate BMI on the chart makes system more usable and user friendly. In figure 3 result of BMI calculation is shown.

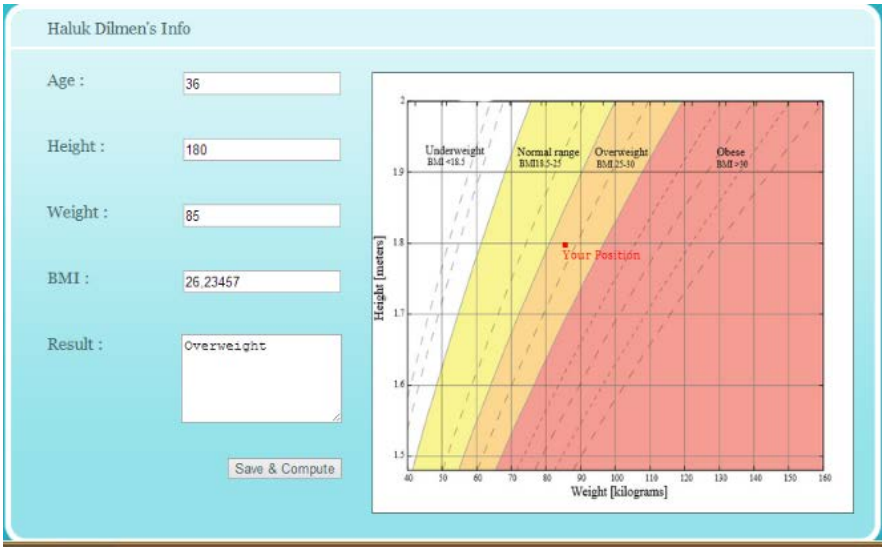

Figure 3: BMI calculation for adults

In this study our interested group was mainly young people. However since BMI calculated same way for young and the other we also make program to handle subject who is older than twenty. BMI is calculated same way but different chart is used for people are older than twenty. Result of that calculations are shown in figure 4.

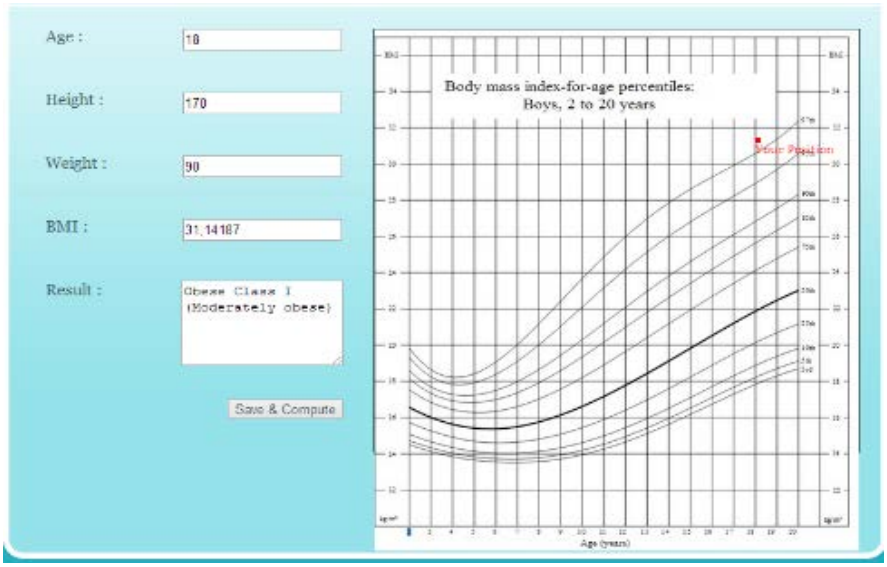

Figure 4: BMI calculation for young

The third part of the program is identifying categories to give suggestions consist of physical exercises and proper nutrition suggestions. TNH records improvements and progress has been made by subject. If no improvements are observed suggestions are adjusted accordingly. TNH is not meant to be used for medical treatment. If student conditions are worsening to get professional help TNH may suggest student to get professional help. In this study we

will not consider much about health care issues instead we will focus on computer program is built for solving addressed issues.

Conclusion and Discussion

The targeted computer program is described in above called TNH is built. Challenging issues we faced during research and implementation was the complexity of subject and methods applied to application in this area. BMI is used in this article may have different meaning for different age groups, countries and populations. Research main target youths are growing fast and people are within range of this age are under risk if the proper nutrition and care is not given. We believe the proposed system is going to help to identify and may solve issues given some tips and suggestions. BMI is used to identify and diagnose weight and height related problems. Since there is ongoing discussion about usage of BMI for diagnosing individual weight height related problems. We did not concern about is appropriateness. As a future work other measurements methods can be used instead of BMI for specific need and diagnosis.

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