

## **Nuchifive (Nutrition Application for Children Under Five Years)**

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**Abstract.** The use of internet in smartphone has increased considerably and brings a great matter about internet addiction in recent years, including in Indonesia. On the other side, problems of malnutrition among children under five years in Indonesia are constantly high. The aim of this research is to prevent malnutrition among children under five years. This research uses literature review as the research design. Application that contains information about food nutrients for children under five as well as information about complementary feeding and feeding time alarm for children under five will make mothers easier to arrange their child's menu according to their child's age. The aims of this application are to give reminder for mothers to feed their child on time and help them give nutritious food according to their child's age and need.

**Keywords:** application, children, internet, mother, nutrition.

### **1 Introduction**

Malnutrition is a condition when the body has lack of nutrition. Manifestation of malnutrition can lead to children's growth and development problems like stunting and wasting. Stunting is a condition when the height-for-age value is less than two standard deviations of the WHO Child Growth Standards median.[1] Wasting is a condition for low weight-for-height. [2]

Undernutrition defined as the outcome of insufficient food intake (hunger) and repeated infectious diseases. Undernutrition includes being underweight for one's age, too short for one's age (stunted), dangerously thin (wasted), and deficient in vitamins and minerals (micronutrient malnutrition). The term malnutrition refers to both undernutrition and overnutrition. [3]

Children under five years reputed as susceptible population in society to suffer nutrition problem such as malnutrition or undernutrition [4]. Malnutrition in children under five years is a serious problem in Indonesia. The prevalence of malnutrition in Indonesian children under five years was increasing considerably since 2010. According to Riskesdas report in 2013, the proportion both of malnutrition and undernutrition in children under five reached 19,6% of all Indonesian children age under five population. [5]

Undernutrition on children age under five can caused by mother with improper habit on complementary feeding. Mother with acknowledge about how to complementary feeding or which healthy complementary foods and other disadvantage habits directly and indirectly will be the main cause of undernutrition among children, especially on children under 2 years. [6]

Some researches claimed that undernourishment children caused by mother's habit in choosing complementary foods. This condition need appropriate solution not only on complementary food supply but also effective approach to mother adjusted her education level and knowledge about complementary feeding. [7]

In other side, the use of internet has increased and brings a great matter about internet addiction in recent years. The number of internet users in Indonesia increased every years. Based on survey held by Pusat Kajian Komunikasi (PUSKAKOM) Universitas Indonesia cooperated with APJII (Asosiasi Penyelenggara

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Internet Indonesia), on 2014 the internet users in Indonesia reached 88,1 million people or equal to 34.9% of all population. They spend an average of an hour until three hours a day for accessing the internet. Nearly half of those time used to access social media and application. Most of internet users in Indonesia using mobile phone, now as known as smartphone. Amounted 51% of internet users are women between 18 and 25 years old. [8]

The study surveyed a representative sample of more than 2,300 American parents of children ages eight and younger to gain insight into the role that new digital media and media in general are playing for parents today. The results turn two key assumptions about media and parenting on their heads: first, that new digital media like smartphones and tablets have become the “go-to” parenting tool of the modern era; and second, that the dominant pattern in most families is children driving the demand for more and more time with media, with parents constantly pulling on the reins. [9]

In the worldwide smartphones are preferred way of accessing internet including Indonesia. Based on eMarketer research, as of 2015 Indonesia has over 52.2 million smartphone users and estimated increase in 2016 up to 69.4 millions. Google Android commonly used as Operating System (OS) on smartphone with 66% in Indonesia. Those operating system provide many applications with various purposes. Indonesia in the first place on global mobile phone market with the highest number of application downloaded in third months of 2014, estimated 6 applications downloaded per capita. Inexpensive smartphones and mobile broadband connections are driving internet access and usage. [10]

All these conditions suggest to maximise the usage of internet on mother’s smartphone in to useful health education about complimentary food for their children age under five years. Thus, the objectives of this study were to explain new idea about a smartphone application which provide mother to access educational information such as an appropriate healthy food for complementary feeding based on their children’s age in range 0-5 years and to help mother full filling nutritional needs for children under five years on time by complementary feeding.

## 2 Method

This study using library research which collect data from literatures and the object of research explored through a variety of information literature (books, journals, newspapers, and documents). We examines and critically review the knowledge, ideas, or findings contained in the body of literature-oriented academic (academic-oriented literature) about health problem specified in undernutrition and malnutrition and the other side we also analyzed issue about the internet usage in recently years. The characteristic of this research is descriptive analysis, the decomposition of regular data have been obtained, and then given an understanding and explanation to be understood by the reader.

## 3 Results

### 3.1 Malnutrition and Undernutrition in Indonesia

According to Worldbank’s data about prevalence of undernourishment all over the world, Indonesia get in point 7,6% of population. Data showing as 2.5 signifies a prevalence of undernourishment below 2.5%. [11] (Fig. 1)

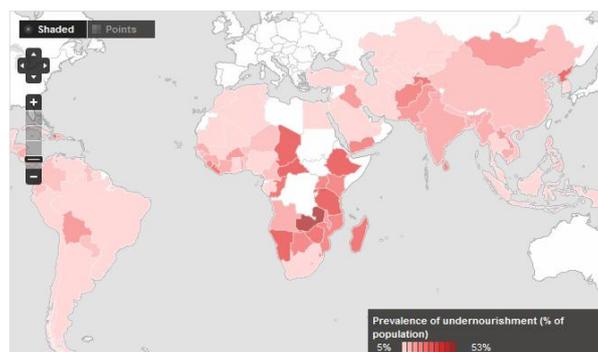


Fig. 1: Prevalence of undernourishment (% of population)

Source: <http://data.worldbank.org/indicator/SN.ITK.DEFC.ZS/countries?display=map>

Risikesdas (Riset Kesehatan Dasar) or basic health research report in 2013, the proportion of malnutrition and undernutrition in children under five reach 19,6% of all Indonesian children under five population. Those amount was increase about 18,4% compared to Risikesdas survey in 2007. In other words there were 23.708.844 children under five years in 2013 and amounted 4.646.933 children under five years who suffer malnutrition and undernutrition. (Table 1)

Table 1: Prevalence of malnutrition and undernutrition in Indonesia

No	Province	Number of Poor Societies	Number of Child <5 Years	% malnutrition - undernutrition	Absolut Number Malnutrition	Number of Village
1	ACEH	855,710	511,643	26.3	134,562	6,464
2	SUMUT	1,390,800	1,492,686	22.4	334,362	5,945
3	SUMBAR	380,630	521,355	21.2	110,527	1,145
4	RIAU	522,530	714,637	22.5	160,793	1,835
5	JAMBI	281,570	354,710	19.7	69,878	1,553
6	SUMSEL	1,108,210	806,606	18.3	174,609	3,144
7	BENGKULU	320,410	183,807	18.7	34,372	1,524
8	LAMPUNG	1,134,280	763,080	18.8	143,459	2,580
9	BABEL	70,900	139,651	15.1	21,087	380
10	KEP. RIAU	125,020	231,376	15.6	36,095	415
11	DKI JAKARTA	375,700	861,581	14.0	120,621	267
12	JAWA BARAT	4,382,650	4,342,772	15.7	681,815	5,934
13	JAWATENGAH	4,704,870	2,729,781	17.6	480,441	8,578
14	JOGJAKARTA	535,180	263,857	16.2	42,745	438
15	JAWA TIMUR	4,865,820	2,976,344	19.1	568,482	8,505
16	BANTEN	682,710	1,135,433	17.2	195,294	1,551
17	BALI	186,530	355,334	13.2	46,890	714
18	NTB	802,450	490,206	25.7	125,983	1,080
19	NTT	1,009,150	630,371	33.0	208,022	3,200
20	KALBAR	394,170	462,730	26.5	122,623	1,986
21	KALTENG	145,360	244,447	23.3	56,963	1,558
22	KALSEL	183,270	376,481	27.4	103,156	2,009
23	KALTIM	255,910	435,717	16.6	72,329	1,492
24	SULUT	200,160	209,082	16.5	34,499	1,790
25	SULTENG	400,090	305,401	24.1	73,602	1,936
26	SULSEL	857,450	815,432	25.6	208,751	3,024
27	SULTRA	326,710	284,248	23.9	67,935	2,142
28	GORONTALO	200,970	113,599	26.1	29,649	729
29	SULBAR	154,200	148,733	29.1	43,281	604
30	MALUKU	322,510	202,868	28.3	57,412	1,169
31	MALUKU UTARA	85,820	136,531	24.9	33,996	1,151
32	PAPUA BARAT	234,230	104,071	30.9	32,158	1,554
33	PAPUA	1,057,980	365,176	21.8	79,608	4,857
	<b>INDONESIA</b>	<b>28,553,930</b>	<b>23,700,676</b>	<b>19.6</b>	<b>4,645,332</b>	<b>81,253</b>

Source: Risikesdas 2013 in Pusdatin 2015

Malnutrition can lead to stunting and wasting. According to 2013 Risikesdas report, the proportion of children under five in Indonesia who are stunted is 37% and the proportion of children under five in Indonesia who are wasted is 12%. [5]

To reduce malnutrition or undernutrition that can cause stunting and wasting, which rising in Indonesia, there should be an intervention that must be focus on prevention of malnutrition during the first 1000 days from pregnancy to the first 2 years of life. 1000 days early life nutrition is very important because growth phase start from in peggant which nutrition in pregnancy phase influenced to physical and IQ the newborn baby. Then newborn baby until age two years is rapidly growth. Parental rearing pattern and nutrient that given to child in that period influence growth, development and intelegent of child in the future. In addition,

compliance of nutrition needs in conception period can decrease the morbidity and mortality on baby or mother during pregnant. [12]

### 3.2 Complimentary Feeding

Based on WHO information about complimentary feeding, the complimentary foods are given when breast milk is no longer enough to meet the nutritional needs of the infant. The transition from exclusive breastfeeding to family foods referred to as complementary feeding covers from 6 to 18-24 months of age. It is the vulnerable period when malnutrition starts in many infants, contributing significantly to the high prevalence of malnutrition in children under five years of age worldwide. Complementary feeding should be timely, meaning that all infants should start receiving foods in addition to breast milk from 6 months onwards. It should be adequate, meaning that the complementary foods should be given in amounts, frequency, consistency and using a variety of foods to cover the nutritional needs of the growing child while maintaining breastfeeding. [13]

Toddler are between 1 and 3 years of age. This period is a transition period between infant and child. Toddler problem in nutritional aspect such as loses appetite known as physiological anorexia. Not only loses appetite but toddler also more selective in foods, they only eat what they want. Preschool-Age children are between 3 and 5 years of age. Preschool-age children continue to expand their gross and fine motor capabilities. At age 4, the child can hop, jump on one foot, and climb well. The child can ride a tricycle, or a bicycle with training wheels, and can throw a ball overhand. [14]

For infants, WHO recommends that infants should start receiving complementary foods at 6 months of age in addition to breast milk, initially 2-3 times a day between 6-8 months, increasing to 3-4 times daily between 9-11 months and 12-24 months with additional nutritious snacks offered 1-2 times per day, as desired. [15] In order to fulfill their nutrient need, infants need a food pattern which appropriate to their age to encourage their growth and development. Food pattern for infants is show as Table 2 below:

Table 2: Table of foods pattern for infant

Age	Food	Frequency in Eating (per day)
0-6 months	Breast milk	As many as possible or as the baby want
7 months	Breast milk	As many as possible or as the baby want
	Milk porridge	Once
7 months (after they can eat milk porridge)	Breast milk	As many as possible or as the baby want
	Milk porridge	Once
	Fruit juice	Twice
8 months	Breast milk	As many as possible or as the baby want
	Milk porridge	Once
	Fruit juice	Once
	Filtered steamed rice	Once
9 months	Breast milk	As many as possible or as the baby want
	Milk porridge	Once
	Juice fruit	Once
	Filtered steamed rice	Once
	Egg	Once
10-11 months	Breast milk	As many as possible or as the baby want
	Milk porridge	Twice
	Fruit juice	Once
	Coarse filtered steamed rice	Once
12 months	Egg	Once
	Breast milk	As many as possible or as the baby want
	Milk porridge	Once
	Fruit Juice	Once

Source: Sri Adiningsih (2010) in *Waspadai Gizi Balita Anda*

### 3.3 Internet Users

Based on PUSKAKOM UI cooperated with APJIII survey result, internet users in Indonesia reach 88,1 million people in 2014. In comparison to Indonesian citizen, internet users in Indonesia reach 34,9% of its population in 2014. This percentage increased significantly since 2013. In 2013, internet users in Indonesia just 28,6%. Java and Bali region are number one areas with the most internet users Indonesia that reach 52 million internet users. Sumatera region is the second place with 18,6 million internet users. The third place is

Sulawesi with 7,3 million internet users. Nusa Tenggara, Papua, and Maluku have 5,9 million internet users and the last place is Kalimantan with 4,2 million internet users. In Java, West Java becomes number one province with the most internet users in Java. The internet users in West Java reach 16,4 million people. About 85% internet users in Indonesia use smart phone to browse internet. About 51% of Internet users in Indonesia are women within age of 18-25 years. In DKI Jakarta, most of internet users are women, which reach 75% of internet users in DKI Jakarta. People use internet in various purposes like social media usage, browse for information, instant messaging, video streaming, email, online shopping, online games, and many more. Most of them use internet for social media usage, which reach 87,4% of internet users in Indonesia. [8]

### 3.4 Smartphone Users

As its known many internet users accessing internet by cellular phone and smartphone reached its rising in Indonesia. According Statista research in 2014 found that users of smartphone always increase by 2011 ago and 2014 smartphone users amounted 44,7 millions. The most significant increase was in 2014. Smartphone users increased about 17,3 million people in 2014. This number estimated increase in 2015 and 2016. (Fig. 2) Other research held by eMarketer in 2015 showed Indonesia has over 52.2 millions smartphone users and estimated increase in 2016 up to 69.4 millions. [10], [16]

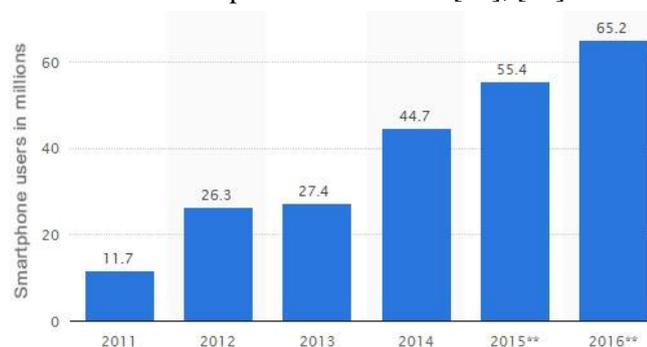


Fig. 2: Users of smartphone in Indonesia

Source: Statista 2014

## 4 Discussion

Population in Indonesia mostly are internet users with highest number on Java-Bali and the second is on Sumatera. But in high number of internet users lived there are many malnutrition and undernutrition problems both in Java-Bali and Sumatera. Data from Riskesdas (2013) shown that the highest percentage of child under five year suffered malnutrition and undernutrition in Java-Bali region is on East Java Province amounted 19,1%. Whereas in Sumatera region about 19% in average with the highest number in Aceh province reached 26% exceed the national number. [5], [8]

Based on this condition there is an appropriate way to prevent malnutrition and undernutrition by maximising the internet usage. We offer an application based on google android as strategic media promoting and aducating mother in choosing complementary foods. Not only help mother in choosing complementary foods adjust by their child's age but also provide alarm service as reminder for mother to give those complementary foods with variation menu. This application on smartphone was chosen because internet user mostly women in productive ages who accessed internet by cellular phone and most of them brings their phone to anywhere. This application named NUCHIFIVE (Nutrition application for children under five years) will running in Operating System Android which provide two main functions: first, to remind mother about the feeding time for her child and second to provide informations about healthy food especially complementary foods categorised by child's age. NUCHIFIVE as reminder is set as common alarm that will ringing to inform mother when the time to breakfast, lunch and dinner. To support the second function, this apps will consist some information menu for children under five years such as ingredients, how to make the foods and short messages about the nutrition fact for each menu. This Android apps designed with easy setup to help mother in arrange their child's menu according to their child's age.

To build NUCHIFIVE which JAVA based, we need some softwares such as NetBeans IDE, JDK (Java Development Kit), Android SDK, AVD (Android virtual device) and MySQL software. Preferred to choose

NetBeans IDE because its open source software and easy to use. NetBeans IDE also contain sample codes to build new application. JDK needed as basic support for NetBeans Installation on PC. Android SDK sourced in package by Google to develop Android application. In Android SDK package included some applications, one of them is AVD.

Preparation to build NUCHIFIVE divided into some steps. First step is operate the Netbeans IDE software and add Plugin Android. Second step is adding JAVA Platform into Netbeans IDE software, on the window Add Java Platform choose OS Android 2.2 Froyo with aim NUCHIFIVE will be compatible in lower version of Android and then click Finish. The next step is using AVD (Android Virtual Device) software to testing the NUCHIFIVE in Android device. Third step open SDK Manager.exe that bundling with Android SDK software and click New and then choose Create New Android Device. Fill some requirements on those window such as device name, target version of Android, skin setting etc. After set up all of requirements, click Create AVD button and created AVD will appear in Android SDK window and AVD Manager.exe.

After finish the preparation steps go forward to build NUCHIFIVE which include some steps. First, open NetBeans IDE, click File and New Project then choose folder Java Category and click Java Application. The result on first step appear in pop up window named New Java Application. Second, fill the first step's result with application name (NUCHIFIVE), default project location and project folder, give uncheck the line Create Main Class click Finish. As the result, source packages on NUCHIFIVE still blank. Third step is to prepare the interface design on JAVA application. Right click Default Packages and click New, choose JFrame Form and fill the requirement informations and then click Finish. Fourth Step is designing the display and content for NUCHIFIVE include text design for main menu and sub-menu. Database of all menu will created using MySQL software. Fifth step is using NetBeans to build a connection between NUCHIFIVE in JAVA with the database and to write down the JAVA coding. Sixth step is run the application project in AVD to do some error checking. Last step is maintenance all of system from error or bug to get NUCHIFIVE better.

## 5 Conclusion

Internet is appropriate media for promoting and educating people in health sector because it can cover wide areas and most of societies are internet users. NUCHIFIVE is a solution for health problem such as malnutrition or undernutrition in a country. Not only suitable in Indonesia, NUCHIFIVE can implemented in other country that has the same problem. This application is useful for parent in order to arrange a healthy food for their children under five years with various menu to fulfill their child's nutrition needs. NUCHIFIVE that contains information about food nutrients for children under five as well as information about additional food and feeding time alarm for children under five will make parents easier to arrange their child's menu according to their child's age. It can help parents feed their child on time and help them give nutritious food according to their child's age and need.

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