

# Utilization of WHO 2005 Growth Application Standard Based on the Android Smartphone (PSG Balita) on Nutrition Data Quality

Agus Hendra Al Rahmad

Department of Nutrition, Aceh Polytechnic of Health of The Ministry of Health, Aceh Province, Indonesia.

## ABSTRACT

The importance of fulfilling nutritional status information based on individuals can be fulfilled by using an online application system for recording and reporting community based nutrition. The need for interventions to support nutritional surveillance through nutritional status monitoring activities can be carried out by name by address. The research objective was to make an assessment using a "PSG Balita" software can improve data and information quality of nutritional status. Quasi-Experimental research design needs to be done with Electronic and manual intervention on two districts involving 24 nutritionists at the public health center. Primary and secondary data was collected through an interview and observations using a questionnaire. The training in the treatment group by using the tool a "PSG Balita Software", and control group used the book Kepmenkes RI No:1995/Menkes/SK/XII/2010. Information quality analysis is dependent t-test and independent t-test, using the R. Intervention results of each group indicate increase the quality of nutrition information status (p-value < 0,05). Group intervention use who anthro showing increased better (p-value < 0,05) than manual intervention. In addition, recording and reporting outputs model based on electronics can release more information, and useful in nutrition program planning, monitoring, and evaluation. The use of electronic-based systems is better quality and more data analysis outputs, both for monitoring planning and nutrition programs evaluation as well as decision-making support.

**Keywords:** Anthropometry Standards, Nutrition Status, PSG Software, Data Quality

## INTODUCTION

The report on the achievement of the millennium development agenda shows that Indonesia is making uneven progress on each indicator which is achieved for certain targets lagging behind other targets. Infant and under-five mortality rates have declined sharply but have not yet reached the MDG target in 2015.<sup>1</sup> Fulfillment of nutrition in children under five is a factor that needs to be considered in maintaining health, because infancy is a period of development that is vulnerable to nutrition. Toddlers are a group of people who experience growth and development cycles that require nutrients greater than other age groups so that toddlers most easily suffer from nutritional disorders.<sup>2</sup> The percentage of children under five with poor and poor nutrition status and the problem of stunting still cannot be addressed significantly. Thus, the health situation in Indonesia has become an unfinished homework. This emphasis is outlined in the post-2015 development agenda specifically contained in the RPJMN.<sup>3</sup>

The development and target of the Post-2015 development agenda in 2030 will end all forms of malnutrition, including achieving the international target of 2025 for reducing stunting and wasting in infants and addressing the nutritional needs of adolescent girls, pregnant and breastfeeding women, and the elderly.<sup>3</sup> According to Nadiyah et al.<sup>4</sup>, Indonesia based on the nutritional situation has a high disparity between each region or province. WHO determined the size of an area with mild

(20-30%) and severe (> 30%) nutrition problems. Based on Riskesdas data reports that Indonesia in 2018 still has problems with underweight, stunting and wasting. The results of the research showed that the prevalence of underweight under-fives by 17.7% consisted of 5.7% malnutrition and 13.9% under nutrition. Likewise with the prevalence of stunting, nationally in 2018 is 30.8%. Furthermore, toddlers with wasting, Indonesia in 2018 has a prevalence of 10.2%.<sup>5</sup> Although there was a decrease in the prevalence of nutritional problems from 2013, the number was not yet significant.<sup>6</sup>

The nutritional status of children under five in Aceh Province, based on 2018 Riskesdas data<sup>5</sup>, shows that the condition has not improved, namely the high incidence of chronic nutrition in infants in particular. There are 23.5% of children under five who experience problems with undernutrition and malnutrition (underweight) and 11.9% thinness or wasting. Furthermore, the prevalence of stunting is still very high, reaching 37.3% and ranked third after West Sulawesi (41.8%) and NTT (42.6%). While the prevalence in children under two years (baduta), Aceh has the highest prevalence of 18.9%, and the same thing also happened in 2013 (19.0%).

A Nutrition Status Monitoring (PSG) activity requires an assessment of the nutritional status that originates from the reference standard, therefore in assessing the magnitude of a population's nutritional problems it is necessary to use nutritional status indicators.<sup>7</sup> Supporting this decision-making, the development of data and health information systems in each region for health workers becomes very important and must be supported by advances in information technology.<sup>8</sup> According to Ganeshkumar et al.<sup>9</sup>, that recording and reporting is an indicator of the success of an activity, without which any form of nutrition program that is carried out has unfavorable benefits. This opinion is reinforced by Bara et al.<sup>10</sup> it turns out that timely information, completeness and high

accuracy can improve the health service process, this can be achieved through the use of technological and information advancements.

The success of health development as referred to in the National Health System (SKN) requires good health management with the support of the availability of data and health information that is relevant, timely, accurate and in accordance with the needs of the health program. Health information needs include all data from various health sectors, especially nutrition data and other sectors.<sup>11</sup>

Human resources greatly affect the work program, the low quality of human resources is an obstacle to the success of toddler monitoring and growth programs.<sup>12</sup> The availability of quality human resources is the national development capital of a nation. This can be answered through the development of human resources that are healthy, physically and mentally resilient, and intelligent.<sup>13</sup> Improving the performance and performance of the reporting system and monitoring information on nutritional status requires the development of a computer-based information system, to produce activities in a more complete, fast and presenting data in the form of mapping based on nutrition coverage indicators.<sup>14</sup>

The development of data and health information systems is as a supporter of management decision-making both in improving services and health programs directly.<sup>15</sup> According to Ford et al.<sup>16</sup>, that the indicator of the success of information starts from the good data recording and reporting of an activity. The results of recording and reporting are valuable and valuable data and information when using the right and correct method. Furthermore Guyon et al.<sup>17</sup>, concluded that timely information, completeness and high accuracy can improve the health service process, but the reality on the ground is still rarely found such as incomplete data, separate information and not on due time.

Considering the importance of fulfilling nutritional status information based on individuals can be fulfilled by using an online application system, then nutrition recording and reporting must be community-based. The update in this study is obtaining quality information on nutritional status data for toddlers using an android smartphone. Thus, the need for intervention in strengthening nutritional surveillance through nutritional status monitoring (PSG) activities can be carried out by name by address and can answer data needs in overcoming nutritional problems. The purpose of the use is to make it easier for nutrition implementers and policymakers in the region to observe nutritional problems in their area to further make decisions about and what actions will be taken, both community and individual.<sup>18</sup>

## **METHOD**

This research uses Research and Development (R&D) design. This study aims to develop products in the form of Android-based mobile applications to support the implementation of nutrition work in determining the nutritional status of children under five. Quantitative approach is also carried out which aims to assess the results of the development of the PSG Balita Software which is assessed for its effectiveness on the user. This research has been conducted in the Banda Aceh City Region, considering the high malnutrition data in Aceh, both data related to underweight, wasting and stunting. While the time for conducting the research is starting in June - October 2019. The number of subjects involved is as many as 24 nutrition workers drawn proportionally based on the place of work both at the health department and puskesmas. Sampling is based on inclusion criteria, namely nutritionist, minimum D-III Nutrition education, status as civil servant, as responsible for nutrition. While the exclusion criteria are the person in charge of nutrition but not a nutritionist and not

educated with a minimum of D-III nutrition, contract employee status or honorarium.

The stages of the research to be carried out refer to the Research and Development method by using the Waterfall model approach. Toddler PSG applications are developed through the prototyping model stage consisting of system requirements, application design and implementation, evaluating applications.

After obtaining the ethical eligibility information (Ethical Approval) with Number: LB.02.03 / 3095/2019 from the Health Assessment Ethics Commission (KEPK), then the triangulation of data collection and processing is carried out, namely comparing the data obtained from interviews and observations to obtain data consistency, completeness and certainty. The quality of information data being compared includes aspects of timely, completeness, accuracy, and benefits. Data is collected through FGDs and direct interviews, then processed by computerization through several stages, namely, editing (data checking), coding (coding), entry (inputting computer data), cleaning data entry.

The stages of analysis consist of data reduction, inferential testing and data display (data display), and drawing conclusions. Inferentially, data analysis using R statistical software is open source. The test used is the Dependent T-Test and Independent T-Test at CI: 95%.

## **RESULTS**

### **Characteristics of Respondents**

The study was conducted at 11 puskesmas in the Banda Aceh City Health Office area, all Puskesmas were included in the analysis unit and 22 subjects were taken and 2 subjects were from the Health Service. The characteristics of the research subjects according to the study group are presented in Table 1, covering aspects of age, gender, education and training. Based on the characteristics of respondents (table 1), it generally shows that respondents are aged 35-50 years (62.5%)

and are female (79.2%). Whereas based on their educational background, they have generally been educated in D-IV nutrition or in the relevant health field, which is 41.7% and 83.3% of respondents in this study have attended nutrition-related training.

**Table 1. Distribution characteristics of research subjects**

Subject Characteristics	Frequency	
	n	%
Age		
25 – 34 year	9	37.5
35 – 50 year	15	62.5
Gender		
Male	5	20.8
Female	19	79.2
Education		
D-III Nutrition / Health	7	29.2
D-IV Nutrition / Health	10	41.7
S-1 Nutrition / Health	5	20.8
S-2 Nutrition / Health	2	8.3
Nutrition Training		
Yes	20	83.3
No	4	16.7
Total	24	100.0

### Data Needs in the PSG Balita Software

Toddler PSG application was developed to answer health problems especially in the field of nutrition in the community. Making this android-based application is based on the daily problems of the community are many people who are still often found in the lower middle class people are still severe malnutrition, especially the high cases of stunting and wasting and malnutrition in children under five in Aceh Province. The results of the Focus Group Discussion (FGD) need are primarily the ease factor, as the following quote:

*“Using the WHO Anthro program that we now use to calculate PSG data is very difficult, because it has to be converted to a database. We are easier and more comfortable using Microsoft Excel. The basic data for export used is based on Microsoft Excel.”*

Furthermore, the results of the discussion found that, in various nutritional applications very many indicators were displayed and were in English, and the interpretation results only displayed z-scores and color codes. This condition greatly influences the precision and accuracy

related to the interpretation of the TPG in the field.

*“At the moment we have used the WHO Anthro application that was trained, but it is difficult for us to do our daily work. WHO Anthro cannot provide more detailed data, for example data on the number of children by sex, how many children are malnourished, the number of children who are short, and other data information. We hope that this PSG application can provide statistical results such as number of children according to sex, prevalence of malnutrition and malnutrition, prevalence of short children, and so on. We think this will be very useful in reporting data from the Puskesmas to the Health Office.”*

*“In the WHO Anthro Application there is a very good module called the Anthropometric Calculator, it is better than the Toddler PSG application also includes the module. It would be better if the PSG Toddler application also included graphic features on each indicator in calculating the nutritional status data for toddlers.”*

In addition, also a complement to the application is provided a feature or module that only provides facilities for assessing the nutritional status of children individually. The nutritional assessment index is very complete which includes all indices that are in the WHO growth standards such as WFA indicators; HFA; WFH; BFA; MUACFA; HCFA. To facilitate the interpretation of data, this module provides a z-score chart.

### Structure and System of the PSG Toddler application

Application menu structure, in addition to having an administrator page, an application has a visitor page. The visitor page is a page that can be accessed by all visitors and becomes the core page of an application. In applications developed, these features can be accessed by address through the application. The visitor page has a Home Menu, Nutrition Calculator, and Create an Account and Help Menu. The following is the visitor page menu structure.

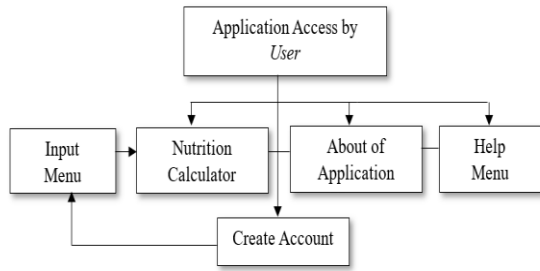


Figure 1. Menu structure of the PSG Balita software page

Visitors can see the front page (home) and try the features available in the application. However, if the visitor wants to use the Nutrition Status Survey feature and the profile must first register (register) through the account creation process. After registering, the user can validate the username and password by logging in to the

available menu. It is intended that each visitor has one membership username.

The interface in the PSG Balita Software is designed to prioritize a good User Interface which is an interface that is easy to understand and simple. In addition, the user interface must provide a convenience for users to be able to interact with programs or applications. The application was developed as a form of convenience to the user, namely nutrition workers in the health center and the community at large. This application is online at Smarphone Android and can also be accessed on the website by url: <https://psgbalita.com/>. Following is the main appearance of the PSG Balita Software.

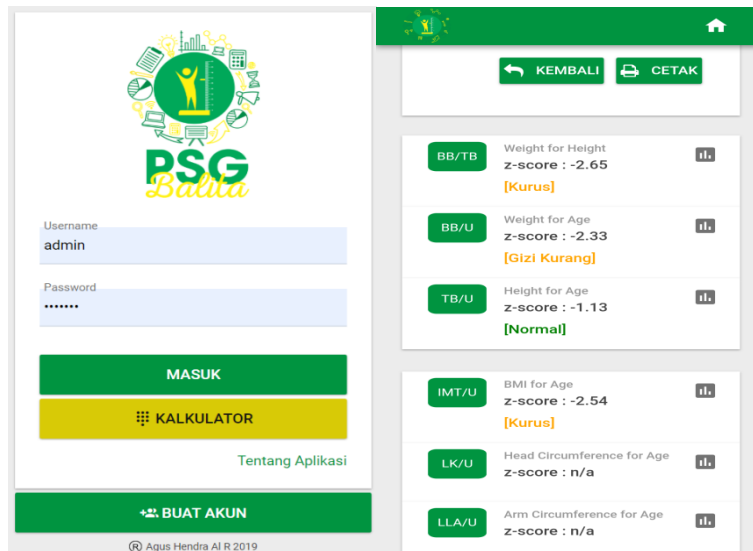


Figure 2. Initial Interface of Toddler PSG Application

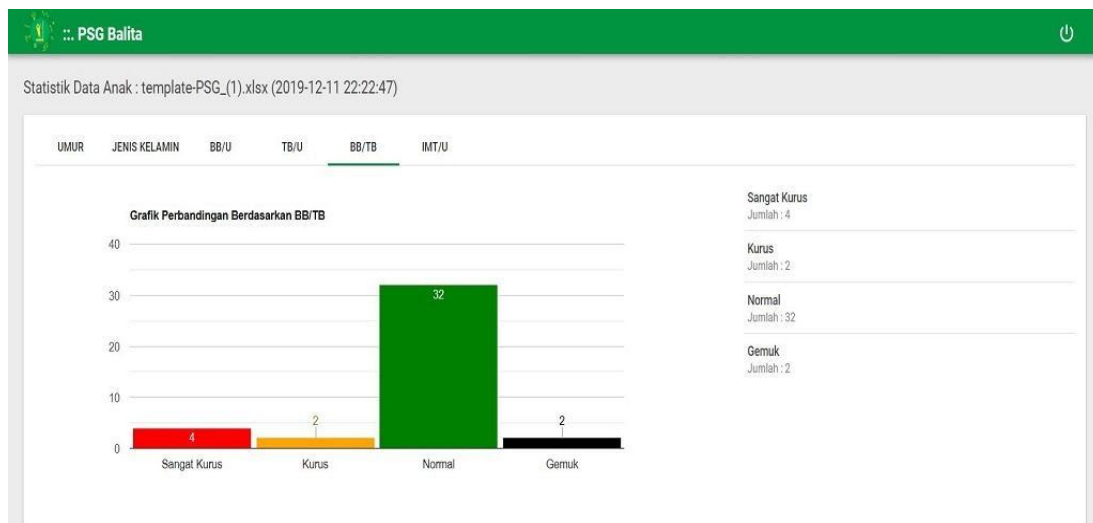


Figure 3. Interface analysis with statistics of PSG Balita software

### Effect of Application of PSG Balita Software on Nutrition Status Data Quality

Achievement of improving the quality of nutritional data, the quality of nutritional data during the application of the PSG Balita application after one month has a good improvement, especially on time, completeness, and accuracy aspects. Descriptive training on the use of the PSG Balita application for one month of its application can improve the quality of information on nutritional status of toddlers.

Statistically, based on the results of the study as presented in Table 2, it can be proven that after one month of training and application of the PSG Balita application, the percentage of quality information on nutritional status of toddlers reached 18.5% (on time, 22.0% (completeness), 7.5% accuracy, and 6,% in terms of benefits All aspects of the quality of information on nutritional status of infants (timeliness, completeness, accuracy, and benefits) after training and implementation for one month showed very significant differences ( $p < 0.05$ ) in the nutrition executive (TPG) within the Banda Aceh City Health Office area.

**Table 2. Effect of application of PSG Balita software for nutrition data quality**

Information quality aspects	Application of Toddler PSG Application			
	Pretest – Posttest 1		Posttest 1 – Posttest 2	
	$\Delta$ Mean $\pm$ SD	p-value	$\Delta$ Mean $\pm$ SD	p-value
On Time	2.3 $\pm$ 5.49	0.0828*	18.5 $\pm$ 8.13	0.0000
Completeness	11.0 $\pm$ 5.98	0.0001	22.0 $\pm$ 4.10	0.0000
Accuracy	12.3 $\pm$ 7.86	0.0012	7.5 $\pm$ 4.44	0.0004
Benefit	2.3 $\pm$ 3.02	0.0035	6.3 $\pm$ 5.82	0.0001

**Table 3. Nutrition data quality utilizing of PSG Balita software**

Data quality quality aspects	Implementation and Application of Toddler PSG Applications					
	Before Application		After application		One month of application	
	Mean $\pm$ SD	p-value	Mean $\pm$ SD	p-value	Mean $\pm$ SD	p-value
On Time PSG Balita Software	62.8 $\pm$ 7.52	0.050	65.0 $\pm$ 6.28	0.012	83.5 $\pm$ 8.75	0.000
	57.5 $\pm$ 8.81		58.8 $\pm$ 8.56		72.5 $\pm$ 6.79	
Completeness PSG Balita Software	60.3 $\pm$ 6.78	0.031	71.3 $\pm$ 6.26	0.027	93.3 $\pm$ 5.20	0.000
	64.5 $\pm$ 5.10		66.8 $\pm$ 6.13		68.3 $\pm$ 6.13	
Accuracy PSG Balita Software	74.8 $\pm$ 6.78	0.427*	87.0 $\pm$ 7.50	0.001	94.5 $\pm$ 5.10	0.000
	73.0 $\pm$ 6.96		74.8 $\pm$ 5.73		78.8 $\pm$ 6.46	
Benefit PSG Balita Software	85.5 $\pm$ 6.67	0.297*	87.8 $\pm$ 5.96	0.512*	94.0 $\pm$ 5.03	0.034
	87.8 $\pm$ 6.78		89.0 $\pm$ 5.98		90.3 $\pm$ 5.73	

\*) Not significant at CI: 95%

The quality of information on nutritional status of children under five (Table 3) shows an increase in the average value between before application, after the application of the PSG Balita Software up to one month of its application. In addition, the quality of information in the treatment group was higher than the control group. The difference in the average percentage of the quality of nutritional data information between the two groups is showing improvement between before training, after training and one month after training. Measuring the effectiveness of the application of the PSG Balita Software, it turns out, after one month of training and the application of Android-based

applications manually shows the quality of nutritional data information using the PSG Balita Software has better effectiveness than using the measurement of nutritional status manually ( $p < 0.05$ ).

### DISCUSSION PSG Balita Software

The stages of determining the need for data in processing data on the nutritional status of children under five to the ease of access and use by nutrition workers in the Community Health Center (TPG), according to Dianingrum & Suryanto<sup>2</sup>, that there is no android-based application used to conduct an analysis of monitoring the nutritional status of children, some applications that

have been developed tend to be used to assess nutritional status individually. Compared to the WHO Anthro application, when it is used in exporting a database it is relatively difficult because the exported data must be converted to .dbf or .csv and this is according to the TPG to feel a little difficult. According to Lwoga<sup>19</sup>, states that the level of satisfaction of users of information systems based on web applications affects the willingness to continue using the system to meet information needs. Randell et al.<sup>8</sup> concluded that data processing requires a device that can increase understanding and high accessibility and this is something that is very commonly done by electronic devices such as Android, computers and other devices.

Each decision making process requires at least one or more criteria as an alternative form of decision through weighting so that it will be integrated into the system before it was created.<sup>9</sup> The system depends on human resources (end users and implementers of information systems), hardware (hardware), software (software), data (data and basic knowledge) and networks that carry out the processes of inputting, processing, storage expenses and controlling activities that change raw data becomes a result of information.<sup>20</sup>

Buntin et al.<sup>21</sup>, has stated that an advancement in health information technology can improve capabilities in terms of efficiency and quality of work processes. The ability to generalize and the level of effectiveness are very important in their fields because the health information technology system is a tool in supporting the health care process. Furthermore according to Faber et al.<sup>22</sup>, the existence of applications in supporting health information related to capacity and capability improvement and the process of strengthening good management will greatly assist in increasing the coverage of health services and supported by the use of good facilities. But on the contrary, the weak organizational structure, processes and lack of knowledge and skills in health service

management are the basic factors that hinder the delivery of health services.

The PSG Balita Software has been implemented in nutrition implementers in Banda Aceh City. The model used is through Blackbox testing. According to Nidhra & Dondeti<sup>23</sup>, blackbox testing is testing software in terms of functional specifications without testing the design and program code. The test is intended to determine the functions, input, and output of the software in accordance with the required specifications. Black box testing is done by making a test case that is trying all functions using software whether it meets the specifications required. Test cases created to carry out blackbox testing must be made with true cases and false cases.

#### **Effect of Application of PSG Balita Software and Nutrition Data Quality**

The PSG Balita Software has a significant effect on the quality of nutritional data, besides that the PSG Balita Software also has a good effectiveness in producing quality nutritional data that is more specific to the quality of nutritional status data for children under five in Banda Aceh City. The results of the study are supported by other studies such as Buntin et al.<sup>21</sup>, the existence of the application of health technology has an impact on improving the quality and quality of work processes, in addition to increasing the value of efficiency. This improvement starts from understanding and positive response and has the ability to generalize, and the value of the level of effectiveness becomes very important. Also supported by Bara et al.<sup>10</sup> which concludes, the capacity building of health workers in the field is not only by reading, but to improve their understanding and perception better through a form of training activities or the application of technology.

Jones et al.<sup>24</sup>, states that data quality is highly dependent on the number of users' desire to use data. The experts consider that through information technology will increase efficiency and quality in health services. Means that the desired data must

be accurate, timely, relevant, complete, easy to understand and can be trusted. According to Chaudhry et al.<sup>25</sup>, a health information technology can show the ability to improve the efficiency and quality of work processes, starting from understanding and positive responses and the level of effectiveness is very important.

Advances in information technology in the field of health in improving data quality can be achieved and provide positive benefits, besides the efficiency of costs can also be emphasized. A learning program should be increased in formal training to produce quality information, and the capacity of health workers is getting better and better at work.<sup>26</sup>

Android-based training and application using the Toddler PSG Application as a form of human resource development has a mission to maximize the effectiveness of the TPG health center to carry out its main tasks and functions as a nutritionist in serving the community. In addition, it is also intended that the purpose of training and application of this application is to provide the latest information related to the use of WHO-2005 growth standards and increase commitment in organizing through the cognitive change of individual nutrition workers of public health center in the Banda Aceh City.

## CONCLUSION

The use of the PSG Balita Software has a positive impact and has a significant influence on improving the quality of nutrition data, especially the nutritional status data for toddlers. While from the value of its effectiveness, the application of Android-based of nutritional status assessment for toddlers (such as a PSG Balita) has a better quality value compared to the conventional use of PSG books. In addition, the use of an electronic-based system (Android-based PSG Balita Software) is of better quality, and the output of data analysis is greater, both for planning monitoring and evaluating nutrition programs as well as supporting decision-

making in handling nutritional problems in Banda Aceh City.

## SUGGESTION

Implementation is only done for one month, so the health department needs to make further observations and evaluations in maximizing nutrition workers to use the PSG Balita Software. In addition, the development of this application is only provided a nutrition calculator module and nutrition survey, so that in the future there is a need for further development to add a growth module to be able to monitor the growth and development of children anthropometrically,

## REFERENCE

1. National Planning and Development Agency. *Report on the Achievement of the Millennium Development Goals in Indonesia 2014*. 9th ed. Jakarta: Ministry of National Development Planning in Indonesia; 2015.
2. Dianingrum M, Suryanto A. Determination of Android-Based Toddler Nutrition Status Using the Analytical Hierarchy Process (AHP) Method. *JUITA: Journal of Informatics*. 2014;3(1).
3. Health OMD-G. *Ensure Healthy Lives and Promote Wellbeing for All at All Ages*. 2015; Oslo.
4. Nadiyah, Briawan D, Martianto D. Risk factors for stunting in children aged 0-23 months in the provinces of Bali, West Java and East Nusa Tenggara. *Journal of Nutrition and Food*. 2014;9 (2):125-132.
5. Health Research and Development Agency. *Summary Report on Basic Health Research Data in 2018*. In: Health Research and Development Agency, ed. Jakarta: Health Research and Development Agency, Ministry of Health in Indonesia; 2018.
6. Miko A, Al-Rahmad AH. Relationship of Parents Weight and Height with Toddler Nutrition Status in Aceh Besar District. *Indonesian nutrition journal*. 2017;40(1): 21-34.
7. AL-Rahmad AH, Sudargo T. Effectiveness of WHO Anthro Growth Standards Training on Quality and Information on Toddler Nutrition Data. *Journal of Information Systems for Public Health*. 2016;1(1):39-46.
8. Randell R, Mitchell N, Thompson C, McCaughan D, Dowding D. Supporting



- nurse decision making in primary care: exploring use of and attitude to decision tools. *Health Informatics Journal*. 2009; 15(1):5-16.
9. Ganeshkumar P, Kumar SA, Rajoura O. Evaluation of computer usage in healthcare among private practitioners of NCT Delhi. Paper presented at: MIE2011.
  10. Bara D, McPhillips-Tangum C, Wild EL, Mann MY. Integrating child health information systems in public health agencies. *Journal of public health management and practice*. 2009;15(6):451-458.
  11. Wardani RS, Astuti R. Application of Mapping of Nutrition-Prone Areas and Nutrition Status of Infants and Toddlers in Semarang Using Geographic Information Systems (GIS). *Indonesian Public Health Journal*. 2017;4(2):65-73.
  12. Mason J, Mebrahtu S, Horjus P. Developing nutrition information systems in Eastern and Southern Africa. *Food and nutrition bulletin*. 2010;31(3):S272-S286.
  13. Sartika RAD. Application of communication, information and nutrition education on breakfast behavior of elementary school students. *Kesmas: National Public Health Journal*. 2012; 7(2):76-82.
  14. Wajhillah R, Pribadi D. Information System for Toddler Growth Development in Posyandu Using the Web-Based Z Score Method (Case Study: Posyandu Durian 8, Subangjaya, Sukabumi City). *SNIT 2014*. 2014;1(1):130-135.
  15. Sanjaya GY, Hidayat AW. Drug Monitoring and Health Supplies in Indonesia: Challenges and Development. *Journal of Management and Pharmacy Practice*. 2016;6(2):159-168.
  16. Ford E, Carroll JA, Smith HE, Scott D, Cassell JA. Extracting information from the text of electronic medical records to improve case detection: a systematic review. *Journal of the American Medical Informatics Association*. 2016;23(5):1007-1015.
  17. Guyon A, Bock A, Buback L, Knittel B. Mobile-based nutrition and child health monitoring to inform program development: an experience from Liberia. *Global Health: Science and Practice*. 2016;4(4):661-670.
  18. Al Rahmad AH, Sudargo T, Lazuardi L. The Effectiveness Of WHO Anthro Growth Standard Training On The Data Quality Of Underfive Children's Nutritional Status. *Journal of Information Systems for Public Health*. 2013;1(1):21-26.
  19. Lwoga E. Critical success factors for adoption of web-based learning management systems in Tanzania. *International Journal of Education and Development using ICT*. 2014;10(1):4-21.
  20. Weiskopf NG, Weng C. Methods and dimensions of electronic health record data quality assessment: enabling reuse for clinical research. *Journal of the American Medical Informatics Association*. 2013; 20(1):144-151.
  21. Buntin MB, Burke MF, Hoaglin MC, Blumenthal D. The benefits of health information technology: a review of the recent literature shows predominantly positive results. *Health affairs*. 2011; 30(3):464-471.
  22. Faber M, Schoeman S, Smuts CM, Adams V, Ngomane T. Evaluation of community-based growth monitoring in rural districts of the Eastern Cape and KwaZulu-Natal provinces of South Africa. *South African Journal of Clinical Nutrition*. 2009;22(4).
  23. Nidhra S, Dondeti J. Black box and white box testing techniques-a literature review. *International Journal of Embedded Systems and Applications (IJESA)*. 2012;2(2):29-50.
  24. Jones SS, Rudin RS, Perry T, Shekelle PG. Health information technology: an updated systematic review with a focus on meaningful use. *Annals of internal medicine*. 2014;160(1):48-54.
  25. Chaudhry B, Wang J, Wu S, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Annals of internal medicine*. 2006;144(10):742-752.
  26. Erwin PC. The performance of local health departments: a review of the literature. *Journal of Public Health Management and Practice*. 2008;14(2):E9-E18.
- How to cite this article: Al Rahmad AH. Utilization of WHO 2005 growth application standard based on the android smartphone (PSG Balita) on nutrition data quality. *Gal Int J Health Sci Res*. 2020; 5(3): 21-29.

\*\*\*\*\*