Children's Companion Program-Holistic Integrative (Prosa Hi) – Smart E-Health To Monitoring Children's Growth And Development

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Abstract: Until today there has been no information system that can update the data of early child growth and development disorder by age. The recording is still conducted manually so far. The objective of the research was to develop an effective and efficient early detection system for growth and development with prototype and database that can support child growth and development. The recording and reporting method employed in this information system was an incremental one. The result of the research showed that the child SDIDTK program had not involved the role of the community, including Posyandu (Integrated Service Post) cadres and related cross-sector such as Kindergarten Teacher. PROSA-HI application was developed using visual programming and SQL's database equipped with data combination menu to facilitate the integration of data coming from Posyandu/PAUD where its area has no network. The result of PROSA-HI application included input, process, and output indicators of Child SDIDTK program based on child growth and development indicator. Also, there was information on under-five and pre-school age children that should be detected for their growth and development by developmental age during examination schedule.

Keywords: information system, child growth and development, holistic integrative, smart e-health

1. INTRODUCTION

The mortality rate is an essential indicator in the health sector. This is reflected in one of the Toddler Mortality Rate (AKABA) of 40 per 1000 live births. Health within the framework of the Sustainable Development Goals (SDGs) ends infant and toddler deaths in 2030, at least up to 12 per 1000 live births and Toddler Mortality Rate (AKABA) 25 per 1000 live births. Based on the results of the 2018 Riskesdas there are still many indicators of the nutritional status of children with low achievement. The proportion of less and poor nutritional status is 17.7%, the 2019 RPJMN target is 17%. The proportion of nutritional for very short and short nutritional status is still high at 30.8%, the 2019 RPJMN target is 28% (Kemenkes, 2018). This can be done by early detection and ensuring the fulfillment of nutrients needed by children (Rusmil, Prahastuti, & Luftimas, 2019).

Stunting case is a problem that must be resolved quickly since it is associated with increased risk of suboptimal brain development. Studies also demonstrate that stunting can lead to: increased risk of degenerative diseases (Picauly & Toy, 2013)(WHO, 2012)(Crookston et al., 2010), risk of obesity (Timæus, 2012) more susceptible to non-communicable diseases

(United Nations Children's Fund, 2013) even a fall of in academic achievement (Picauly & Toy, 2013). Therefore stunting can threaten the nation's potential (United Nations Children's Fund, 2013) since it is a predictor of poor quality human resources. The problem of stunting children in Indonesia is one of the priority problems that requires focused solutions, because the case is still high (Bhutta et al., 2013). Stunting children have 18-21% and 15-21% lower probability of demonstrating mathematical and writing abilities (Undurraga et al., 2017) have lower leg length, lower fat mass and lean mass, smaller kidney and reduced lung function (Wells, Devakumar, & Osrin, 2018). This can be prevented by practicing maximum effort in monitoring growth and development (Fink, Günther, & Hill, 2011), and good nutrition is a source of life for sustainable development and the foundation of a more prosperous future (Bradford & Wolfe, 2013). Early detection can also prevent or overcome conditions or complications that occur, as well as health workers can provide appropriate interventions (D, Hon, D, & Nutr, 2012).

Some studies also prove that children who get development interventions have been shown to increase children's cognitive intelligence (Aboud & Yousafzai, 2015)(Engle et al., 2011). Parental stimulation such as whispers, praise, elaboration, and diversion have been shown to foster early language skills (Fay-stammbach, Hawes, & Meredith, 2014)(Guttentag et al., 2014)(Weisleder & Fernald, 2013). Parenting interventions and stimulation have a significant effect on child development but have no effect on linear growth (Prado et al., 2019) and so also psychosocial interventions have a significant effect on child development (Tessema et al., 2019). Knowledge of nurturing and improving child development during the first 1,000 days of life (Obradovi´, Finch, Yousafzai, & Rasheed, 2016)(Yousafzai et al., 2016). There is research that there are still many children lacking stimulation and adequate learning opportunities at home (Bornstein & Putnick, 2012)(Engle et al., 2011). Therefore it is necessary to monitor the child's growth and development appropriately. Much empirical literature shows the importance of early childhood stimulation at home for early cognitive development of children (Bornstein & Putnick, 2012)(Hamadani et al., 2014)(McCoy, Zuilkowski, & Fink, 2015)(Patel et al., 2013).

In line with efforts to monitor children's growth and development, the government has developed a detection of development program for children since 1994 focusing on children aged 0-6 year. However, the results of monitoring of growth and development activities for toddlers each month indicate that an increase in the percentage of baby aged 6-59 months that has never been weighed, in 2010 (23.8%) increased in 2013 (34.3%) (Kemenkes, 2018).

From the result of activities data analysis and real facts, it shows that the information system for monitoring the child development and growth disorder in five Playgroup (KB) as research sites KB Cempaka, KB Melatisari, KB Putra Harapan, KB Amanah, and KB Harapan Bunda are as follows: 1) There is no system that can updating the child's growth and development data which must be detected according to age; 2) Recording is still performed manually; 3) There is no system that can provide early fast, precise and accurate information on cases of developmental abnormalities that can be known early; 4) There is no specific and comprehensive data on cases of child developmental abnormalities such as name, age, address and category of cases; and 5) There are difficulties in determining the percentage of children under five or toddler who must be detected routinely because the target is always changing every month following the age of the child.

The absence of specific data results in slow intervention and possible misdirection. This left actual malnourished toddlers out of sight, which would keep cases in the coming months. The existence of children who are out of sight shows that monitoring of child development that has been carried out has not been able to run according to the program. If the information system for monitoring child development is going well, it is expected that cases of malnutrition can be treated as early as possible. From the description of the situation, it shows the problem of monitoring information system of child growth and development in the SDIDTK program.

Therefore, the author would like to design a holistic model of developmental database programs to support holistic parenting. It is hoped that the new system can provide information on the identity of children who must be detected in growth and development in the current month. In addition, the new system also saves working time because the reports are no longer manually, the monitored indicators can be comprehensive.

2. METHODOLOGY

Early detection system for child growth and development (PROSA_HI) is using the incremental method. This method combines the elements in a linear sequential model with the iterative philosophy of the prototype method. This research was conducted at KB Cempaka, KB Melatisari, KB Putra Harapan, KB Amanah, and Harapan Bunda KB, Bantul Regency, Yogyakarta. The population and research subjects are all toddlers and parents of children under five whose children go to KB Cempaka, KB Melatisari, KB Putra Harapan, KB Amanah, and KB Harapan Bunda, Bantul Regency, Yogyakarta.

3. RESULT AND DISCUSSION

Growth and development deviations in toddlers and preschoolers can be determined by early detection of child growth and development. This can be interpreted the same as the assessment, to make decisions. Intervention can be maximized with early discovery of deviations / problems of child development. Intervention will be more difficult if the deviations are late to be known and will affect the child's subsequent growth and development.

First year research shows that the health promotion model of parenting through integrative holistic health-based PAUD increases early childhood development. To support the achievement of holistic parenting as a model implementation, the Sahabat Anak Clinic was formed. It is very important to record the results of examinations through the Children's Friends (Sahabat Anak) Clinic program to view the child's health history. The results showed that the information system for monitoring child growth and development disorders was still performed manually.

Technology in the field of health or application systems is a new paradigm that gives rise to evidence, promises and innovates in health technology (Kumar et al., 2013). The use of applications has a large impact on access to health services and lead to the improvement of the public welfare. According to (Davey & Davey, 2014) the use of application is cheaper, improve the quality of health services, prevention, the use of better emergency response systems such as coordination, management and supervision of human resources, decision making, and patient safety systems. This application is a model for developing database SDIDTK program holistically to support the achievement of a holistic parenting. This application is named PROSA-HI (Children's Companion Program-Holistic Integrative). It is hoped that the new system can provide information on the identity of children who must be detected in growth and development in the current month. The PROSA-HI context diagram can be seen in the following figure:

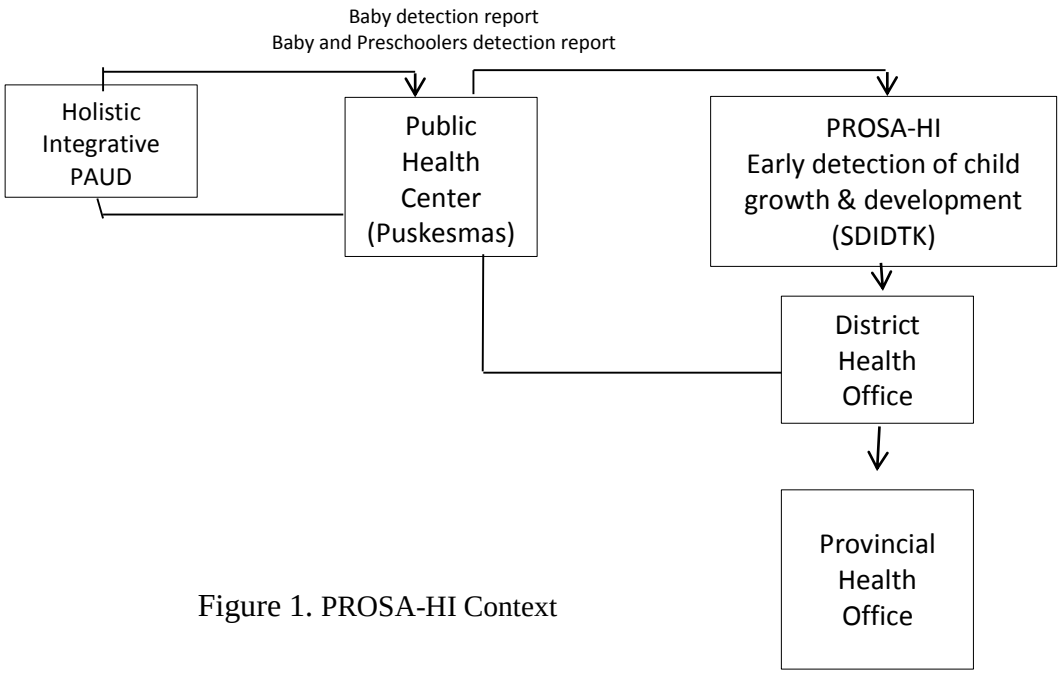


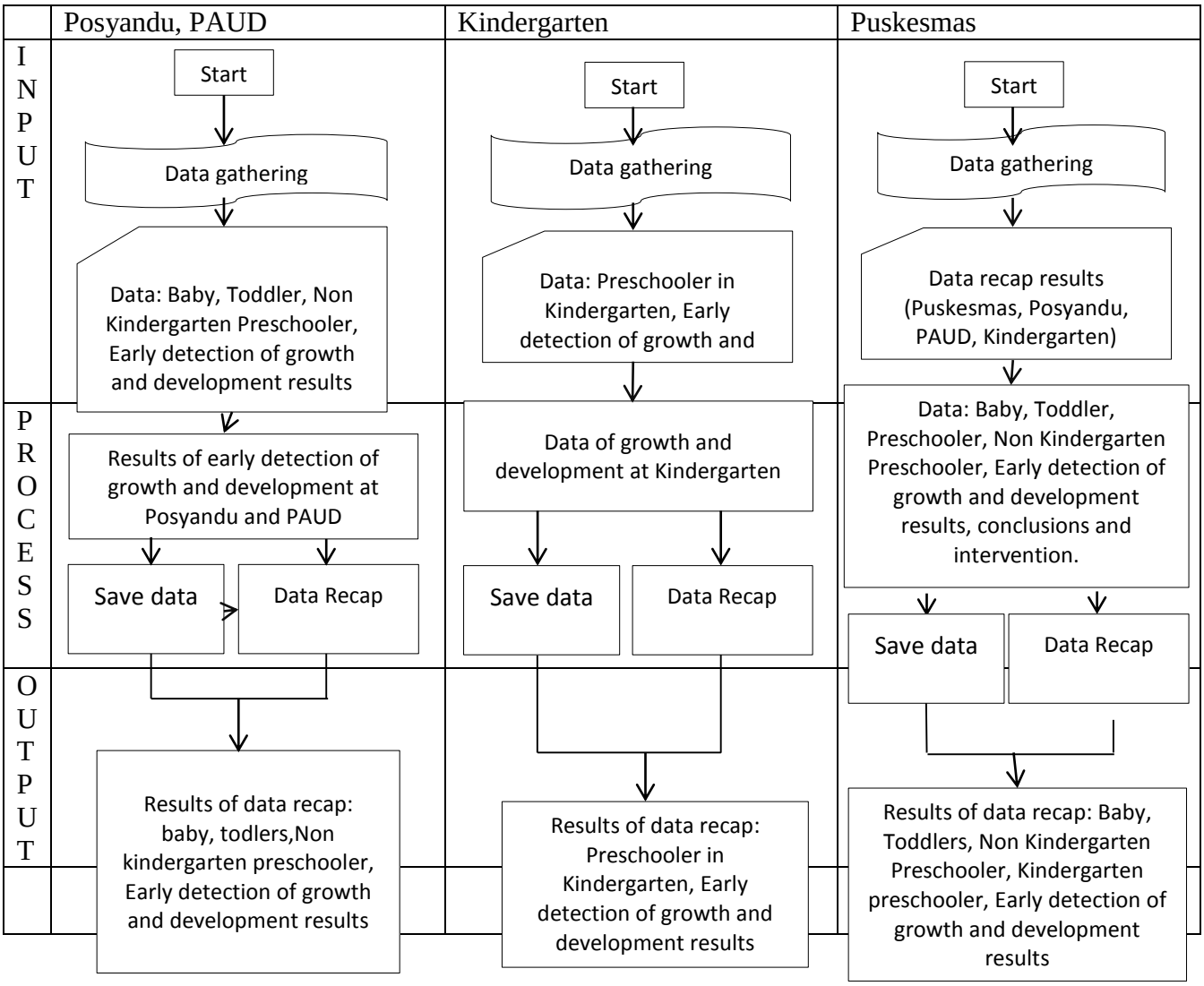
Figure 1. PROSA-HI Context

The components of the PROSA-HI application for monitoring child developmental disorders are divided into 3 namely: input, process and output. The description output generated by the PROSA-HI application is in the form of a report on the detection of child development at Posyandu, PAUD, and Kindergarten. The report is deposited by the cadre and then recapitulated by the Puskesmas (Public health center) every month to be reported to the District Health Office and Provincial Health Office. So far, the reporting is still done manually by cadres / PAUD teachers. Early detection and development activities of children have been running, but the information generated from these activities cannot be used to make decisions, because it has not been implemented according to the child's age schedule.

All this time, early detection of growth data has been collected by posyandu cadres, PAUD and kindergarten teachers. The data collection by posyandu cadres, PAUD and TK teachers is documented in the register of children's growth and development activities. The register hasn't been signed for county encoding yet. The database is only in the form of a register of child growth and development that is created manually. Determination of the target of children who must be detected by their growth and development in Posyandu / PAUD cannot be carried out yet in accordance with the age category specified in the child SDIDTK program manual book, because there are no records.

PROSA-HI flowchart is a data flow that starts from data collection in the field to the utilization of data accompanied by information about the entities involved in the system.

Flowcharts can be seen in the following figure:



The PROSA-HI data flow starts from data collection activities at Posyandu, PAUD, Kindergarten, Puskesmas. Data collected includes: data on the results of regular growth and development checks on schedule. In routine checks the data collected includes: child's identity, body weight, body length / height, head circumference of the child, results of examinations with KPSP, visibility power, hearing power and mental emotional state, detection of parental knowledge. Examination of the indications is conducted if the child has an indication of autism disorders and concentration disorders. In each examination both growth and development there are conclusions and intervention if the child experiences developmental deviations based on test results.

Using PROSA-HI application, Posyandu cadres / PAUD teachers can analyze if there are children who have not been examined according to the age schedule. The child's identity is collected from the cohort register of infants and toddlers or the posyandu register, then entered into the application. After all data is entered, it is backed up as an archive and stored. If the inspection will be conduct, the officer just type in the name and then the child's identity will come out. For non-network Posyandu / PAUD, the data is stored into a flash disk to be merged into the application. The available back up data then be analyze by considering the scope of each indicator as a regular report. Incorporated data then be analyze by comparing the achievement targets, and percentages for each category. The output from the application could

be in the form of an excel table, the number and percentage of each indicator that has been adjusted by reporting to the Health Office.

This PROSA-HI has the ability to combine the components of a comprehensive child growth and development check that is the detection of children's growth and development effectively. This system can provide information of children identity who must be detected by their growth and development in the current month. In addition, this procedure also saving work time because the report is no longer manually, the monitored indicators can be comprehensive enough to support decision making in an effort to improve the quality of child growth and development and prevent stunting.

This information system application for monitoring children's growth and development disorders was developed using the programming language "visual programming". The choice of a visual programming language with the consideration that the application can build multiple projects simultaneously.

The developed system is more interesting, because the data entry process is carried out with the help of an interface design that is designed using visual programming. Data that is entered will be stored in a database designed using SQL. Data processing and analysis on this system is done using the tools above. Have a User ID License so that it can be used by many users. Features that have been developed in PROSA-HI are early detection of child growth, KPSP, TDD, TDL, KMEE, CHAT, and GPPH.

Regarding the renewed innovation products produced, PROSA-HI uses application security technology and interoperability, until this moments there has been no application of early detection of child growth and development that can see the track record of previous examinations. PROSA-HI is packed with features that are simpler but always considering the needs so it is easy to operate.

Another PROSA-HI advantages is that Prosa-HI is an application program developed according to the needs of the SDIDTK program. PROSA-HI is a multiuser application that can be accessed by several people at the same time in accordance with their access rights so that it can be used in the area of the puskesmas as every posyandu cadre.

a) PROSA-HI Technical Specifications

The technical specifications of the PROSA-HI developed include features including:

1) Home

It has functions to see details of existing features such as: Child growth, KPSP, Hearing test, View power test, KMEE, CHAT, GPPH, and an option for printing child cards.

2) Child identity

The provided child's bio in this sub-system are: KIA number, name, sex, mother's name, father's name, address, date of birth, gestational age, birth weight, birth height, and birth process.

3) Child growth

The child growth feature has functions to record all checks of the child's physical growth. The minimum functions provided in this sub-system are: Child's weight, child's height, head circumference, and displaying the child's growth inspection history.

4) *Kuesioner Pra Skrining Perkembangan* / Pre-Screening Development Questionnaire (KPSP)

Screening KPSP conducted to determine the child's development is normal or there are some deviations happened (Kemenekes, 2016). The minimal functions available in this sub-system: Contains questions about early detection of development, real time early detection, and displays the history of child development.

5) *Test Daya Dengar* / Hearing power test (TDD)

The hearing power test (TDD) conducted to find hearing disorder early on, so that it can be immediately followed up by the effort of improving children's hearing and speech abilities

(Kemenkes, 2016). The minimal functions available in this sub-system: Contains listening test questions, early detection in real time and displays the hearing test history.

6) *Test Daya Lihat* / Visibility Power Test (TDL)

Visibility Power Test (TDL) role is to detect sight abnormalities early so that further action can be taken immediately so that there are opportunity to gain greater visual acuity (Kemenkes, 2016). The minimal functions available on this sub-system: Contains visibility test questions, early detection in real time, and displays visibility test history

7) *Kuesioner Masalah Mental Emosional* / The Emotional Mental Problem Questionnaire (KMME)

The Emotional Mental Problem Questionnaire (KMME) functions to detect early mental emotional disorders / problems in pre-school children (Kemenkes, 2016). The minimum functions available in this sub-system: Contains questions Emotional Mental Problems Questionnaire, real time early detection and displays the history of Emotional Mental Problems Questionnaire.

8) CHAT *(Checklist for Autism in Toddlers)*

CHAT (Checklist for Autism in Toddlers) serves to early detect the presence of autism in children aged 18 months to 36 months (Kemenkes, 2016). Minimum functions available on this sub-system: Contains questions Checklist for Autism in Toddlers, Early detection in real time, Displays the history of the Checklist for Autism in Toddlers.

9) *Gangguan Pemusatan Perhatian dan Hiperaktivitas/* Hyperactivity and Concentration Disorders (GPPH)

The aim is to find out early GPPH in children aged 36 months and over (Kemenkes, 2016). The minimal functions available on this sub-system: Contains GPPH questions, early detection in real time, displays history of GPPH.

10) Module PROSA-HI

It is hoped that the PROSA-HI module will facilitate and tidy up the inspection data making and use the applicable codification standards, so that is easy to find and reuse, and facilitate the preparation of reports as needed. Minimum functions available on this sub-system: connected to the entire system contained in the features, can present all data / information stored in the data repository, can be used to manage reporting, can be used by cadres, puskesmas staff to view records in electronic inspection before so that the history of previous actions can be known.

11) Master/ Administrator

This module has the facility and ability to manage users and user groups so that users can be set their access rights and manage reference data that will be used in the PROSA-HI system. The minimal functions available on this sub-system are: managing master data, managing user access rights, application adjustments, and backing up data.

12) Reporting Module

Module that produces internal and external (dynamic) reports based on needs-specific choices. Minimum functions available in this sub-system: generate reports for external (for example: puskesmas) and generate reports for Posyandu / PAUD internal needs.

The developed PROSA-HI application for monitoring children growth and development is indeed implemented in PAUD, but with the information on case trends and indicators achievement, is not just for cadres / PAUD teachers, the staff of puskesmas can also get a desccription of their achievements compared to last month's achievements and Posyandu / Other Puskesmas achievements. This information is used for action plans setting to children SDIDTK activities. This application has the following advantages: there are data sources of non-health workers and health workers involved in SDIDTK children; Detection results data

can be made based on the grouping of infants, toddlers and preschoolers and grouping based on posyandu / PAUD; outputs / conclusions of growth and development detection activities are made in a report format based on SDIDTK examination results indicators; a list of developmental abnormalities can be made based on an overall list and a list of specific cases; Coding has been made in every Posyandu / PAUD.

a. Summary

The PROSA-HI SDIDTK application for children was developed using visual programming and database from SQL which included a data merge menu to facilitate the merging of data from Posyandu / PAUD in areas where there is no network. The results of the system in the form of indicators of input, process and output of children's SDIDTK programs are based on child growth and development indicators and can be used for routine reports to the Puskesmas. The advantage of this system is the ability to produce a list of growth and development detection targets quickly, generate routine reports, reports on monitoring cases of child growth and developmental disorders and personnel who conduct the detection. As a suggestion it is necessary to carry out supporting activities such as advocacy to policy makers, outreach to cross-program and related sectors for application implementation. Management support in the form of legal aspects is needed to ensure the continuity of the system. Since the program involves outside health sector, the legal aspects of the form of teams / working groups that have cross-sector members are needed to obtain input data from posyandu cadres / PAUD / Kindergarten, as well as mobilizing targets from related sectors.

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