

System Design Analysis for Stunting Prevention in Indonesia

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Keywords: Stunting, Prevention, Decision Support, System Thinking, Mobile.

Abstract: **Background:** Stunting is becoming a worldwide problem; in Indonesia particularly, stunting is a national concern. Basic Health Research Indonesia indicated that there are 30,8% children in Indonesia whose growth is stunted. Indonesia deployed a National Strategy to urge Stunting Prevention in the period of 2018–2024 as an intervention towards the growing trend of stunting problems. One of the key concepts in prevention is effective screening of children's growth. This concept leads to a screening system that can and should be developed. **Methods:** A Stunting Screening Decision Support System was designed to maintain children's growth data. This system was designed using the system thinking approach, which allows many sources and components, in addition to those built into the system. **Analysis:** The system is intended to be widely used by healthcare professionals using mobile technology. The growth data can be aggregated therein and would be reported hierarchically. The aggregated reports will be essential for stunting prevention and will help healthcare stakeholders to find a solution to stunting prevention. **Discussion:** Stunting prevention is a combination of many aspects and elements. A decision support system can be effective for screening and prevention of stunting. Healthcare stakeholders can use the reports from this system in many healthcare-related aspects.

1 BACKGROUND

Stunting is becoming a worldwide problem. In Indonesia particularly, stunting is a national concern. In 2013, Indonesia's Basic National Health Research stated that for toddlers under five years of age, there was a 37.2% prevalence of stunting. Even though this declined in 2018, reaching only 30.8%, this is still a considerably high number. Similar declining also showed that infants under two years of age had a prevalence of 32.8% in 2013, which lowered to 29.9% in 2018.

Some points still provide a challenge to stunting rates in Indonesia. The number of low birth rates recorded in 2018 were 6.2%. Low birth length was calculated at 22.7% in 2018. Complete Basic Immunisation was low, with 9.2% not getting any immunisations (Tim Nasional Percepatan Penanggulangan Kemiskinan (TNP2K), 2018).

Research findings on risk factors for stunting are complicated and abundant. risk was reported, but not limited to, calorie intake, illness duration, birth weight, mother's education and family income (Hadi

et al., 2019; Umar and Haryanto, 2019). Other research shows that the reduction of poorer households and effective health services are improving stunting reduction for children under five years of age (Rizal and van Doorslaer, 2019). Maternal health, premature birth and exclusive breastfeeding in the first six months, along with sanitation are all risk factors. Different risks require different approaches. Indonesia has different demographics with a large disparity in the regions, so interventions require a distinct approach between provinces, regencies and cities (Beal et al., 2018).

To detect stunting, a grow chart created by the World Health Organization is typically used in many countries. In Indonesia, the grow chart used was provided in the KMS (Kartu Menuju Sehat) or Health Target Card, but only the length for age or height for age is used (Ohyver et al., 2017).

Indonesian people require adequate education, and intervention is delivered through an internal source. Therefore, a health cadre is involved in the primary healthcare centre. A health cadre usually consists of local citizens who live in the area and are

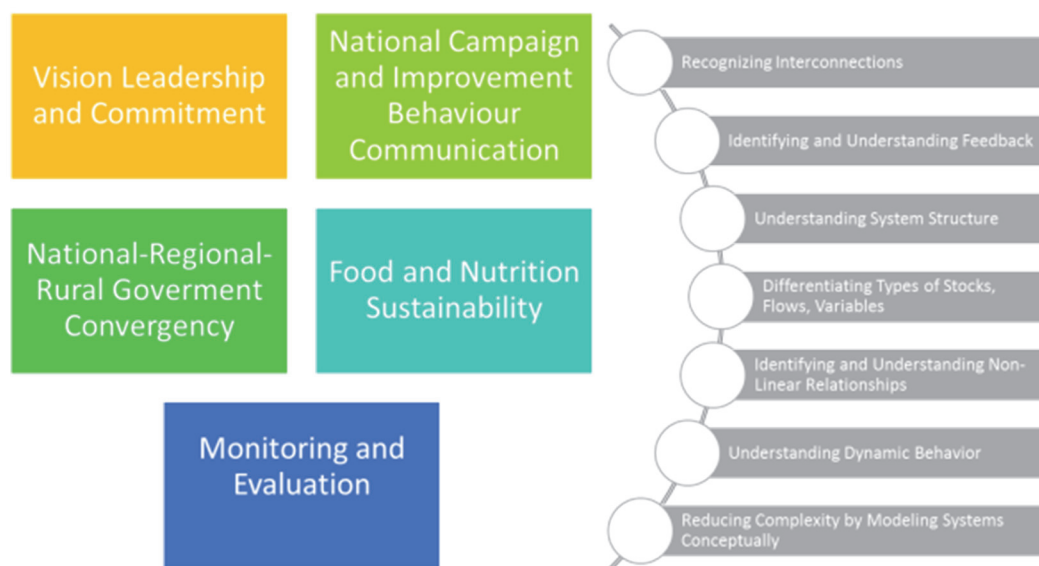


Figure 1: Design thinking on Stunting key aspect.

assigned to promote health in the area. They become the main source of health information, including information related to stunting issues. They develop interpersonal communications among the citizens to effectively ensure people’s use of healthcare facilities. Good interpersonal communication can promote rapid change in social behaviour (Kementerian Kesehatan RI, 2018a).

In addition to the existence of health cadres, an information system is proposed to assist in stunting prevention (Ohyver *et al.*, 2017). IT-based technology determines the ability of persons in an organisation that could amplify, complement, leverage and improve their capabilities. In this modern era, IT is very useful in knowledge management (Jain, 2009). This system is designed to improve problem-solving and decision-making that can in turn promote a better system (Kementerian Kesehatan RI, 2018b). To build such a value-added information system, a design-thinking approach is used. This is due to the interconnection between stakeholders that is hierarchically built (Barnes, 2017).

1.1 Aim

The system is designed to handle decision management using mobile technology. This system will be used by health cadres as the primary frontline for the people, and the data collected will be hierarchically used by stakeholders for stunting prevention measures.

The data will also include risk factor analyses, along with child nutritional statuses relevant to the region. This information will determine which region needs special awareness from the correlated stakeholders.

2 METHOD

The Stunting Screening Decision Support System was designed to maintain children’s growth data. This system was designed using the system-thinking approach. Usage of system-thinking is built using an interdisciplinary approach to support and connect intuitive and high-impact decisions. To be precise, a system that could widely be accepted was designed and noted in eight steps of system-thinking (Arnold and Wade, 2015).

Furthermore, the eight steps on system-thinking were applied towards five key aspects of stunting prevention provided by the National Strategy for Stunting Prevention to ensure all interconnection is considered, including all possible risk factors. The key process is shown in Figure 1.

This approach allows many sources and components, in addition to built into the system. The designed system allows the loop of knowledge between stakeholders to be maintained. From the convergence of the health cadres, the engineered systems can be built to match the intended factors.

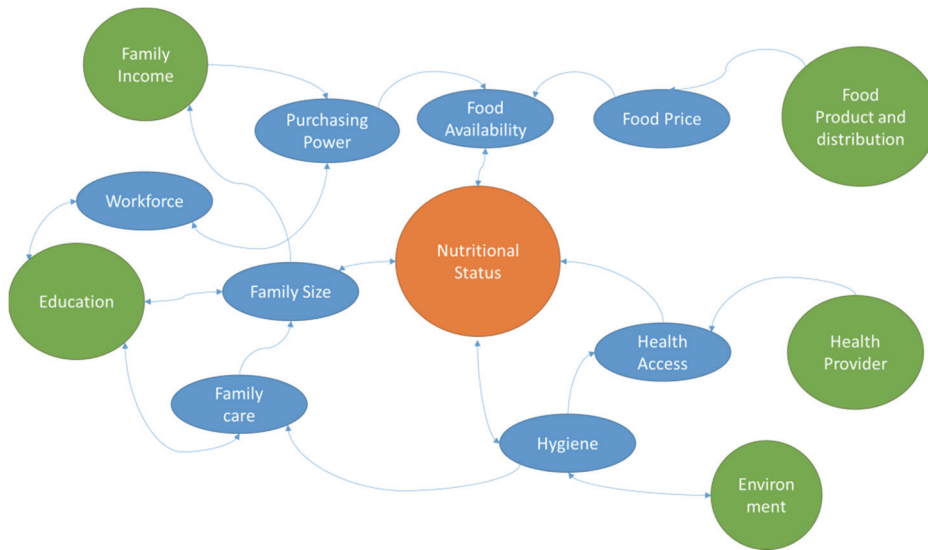


Figure 2: Interconnections between aspects.

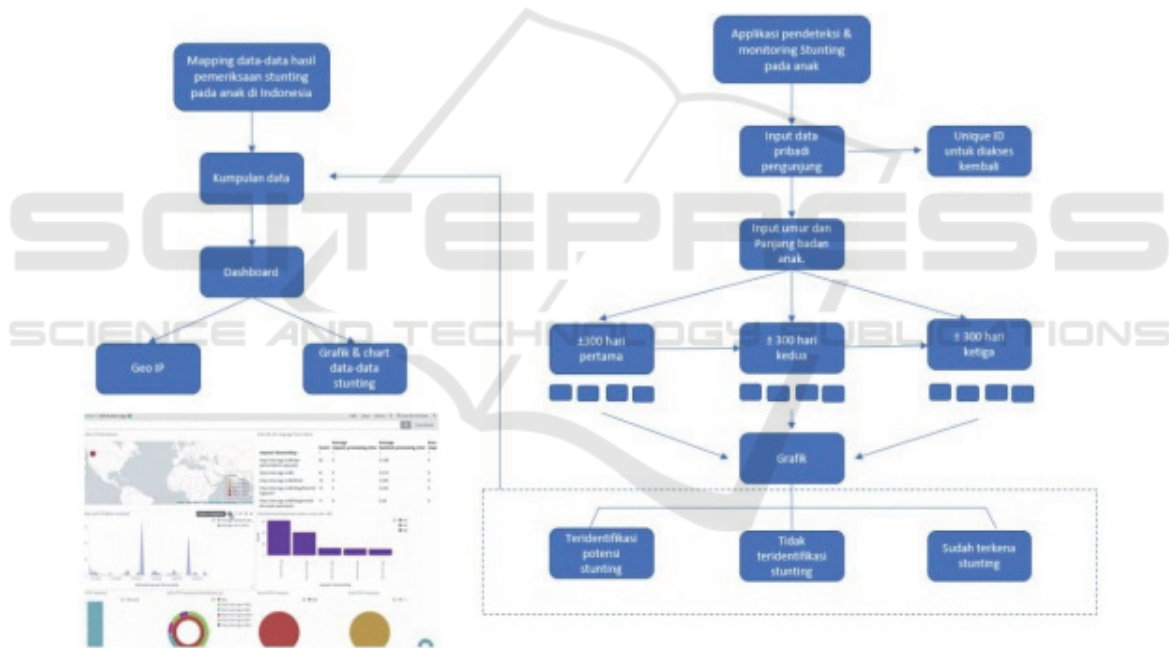


Figure 3: Mock-up of the system design.

2.1 Applications Mock-up

The interconnection between the stunting environment was analysed and described in Figure 2. The system is intended to be widely used by health cadres through the use of mobile technology. The cadre is designated to be a frontline for the people to ensure the sustainability of the system. Furthermore, a hierarchical assessment can be made from appropriate stakeholders, so the system can be used to

make effective decisions in the prevention of stunting.

A mock-up of the system can be found in Figure 3, where the system design is delivered and the variables are used. The design is intended to enable the assessment of information from gathered data in order to be a hierarchically designed Decision Support System.

3 DISCUSSIONS

Interdisciplinarity is becoming a key concept related to the system, in order to fulfil greater objectivity. A challenge found in this system is the need for effective teamwork to focus necessary attention towards stunting prevention. This can lead to stagnancy and bottlenecks with barriers to the guiding philosophy. Complexity can be simplified by firstly simplifying any contradiction found (Aragrande and Canali, 2015).

System-thinking is more than context itself. A complex system acts as a staging area to elicit thinking itself. Furthermore, an extension for this system needs to be examined to create better, more precise system-thinking (Deep, Pathan and Mitra, 2018).

This health design can relate between health providers and health recipients the convergency that needs to be generated to ensure that the design is embodied and generated by health professionals alongside design engineers (Pannunzio, Kleinsmann and Snelders, 2019).

4 CONCLUSIONS

Stunting prevention is a combination of many aspects and elements. Interconnections between the elements are led into this system. This decision support system can come through for screening in stunting prevention. The reports on this system design are expected to be used by health stakeholders, who can use the reports in many aspects of healthcare.

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