

1. INTRODUCTION

Nutritional problems in toddlers are still a severe problem that needs to be addressed in every country, including stunting. In the year 2020, as reported by the World Health Organization (WHO), Africa recorded a stunting prevalence rate of 31.7%. In the same year, according to the Asian Development Bank (ADB), Timor Leste has the highest prevalence in Southeast Asia with a value of 48.8%, and Indonesia is in second place with a prevalence value of 38.8% (Nasution & Susilawati, 2022). Many Indonesians think that the influence of a short child's body is a genetic influence from the child's parents. In fact, genetics has a negligible impact compared to environmental factors and access to health care. Some people may not understand the term stunting. Stunting is a chronic malnutrition disease caused by a lack of nutritional intake for a long time, resulting in impaired growth in children's height is lower than the standard age. Stunting is assessed as a nutritional condition by considering the toddler's height, age, and gender (Sutarto et al., 2018). The general indicator used to measure children suffering from stunting is the height for age (TB/U), which according to anthropometric standards, a child can be said to be stunted if the measurement results are at a threshold (z-score) < -2 Standard Deviation (SD) up to -3 Standard Deviation (SD) (Rahmadhita, 2020). Based on the research of the Indonesian Nutritional Status Survey (SSGI) in 2021, the stunting prevalence rate in Indonesia in 2021 is 24.4%, while in 2022, the stunting prevalence rate will be 21.6%. Therefore, one of the government's current focuses is stunting prevention, regulated in Presidential Regulation 72 of 2021 concerning Accelerating the Reduction of Stunting. This effort aims to enable children in Indonesia to grow and develop optimally and maximally.

The natural causes of stunting are nutritional intake and infectious diseases. In contrast, the indirect causes are education, family economic status, nutritional status of the mother during pregnancy, water, and environmental sanitation, Low Birth Weight (LBW), and knowledge from the mother and family (Ramdhani et al., 2021). The essential understanding required by healthcare professionals and the community regarding the underlying factors of stunting holds significance, as it is anticipated to play a role in stunting prevention and the reduction of stunting prevalence within the community (Yanti et al., 2020). Information regarding the handling of stunting in children is something that is needed by parents in the treatment and prevention of stunting for their children. Information can be easily obtained in the era of modern technology, and one way to do this is by developing a recommender system (Rachman & Nurjanah, 2019).

Mckensy-Sambola defined Ontology as an explicit specification of a conceptualization (Mckensy-Sambola et al., 2021). Apart from being a representation of knowledge, another capability of ontology is its ability to be reused as a knowledge base in other systems and can be used for decision-making. For machine readability, W3C proposes Ontology Web Language (OWL). Based on the limited ability of OWL expression, Semantic Web Rule Language (SWRL) is presented as a model rule to expand the expressiveness of OWL.

Several previous studies have demonstrated using ontology as a knowledge base for a recommendation system. Ontology-based recommendations only experience some problems associated with conventional recommender systems, such as cold-start, rating sparsity, and overspecialization problems, because ontology-based recommendations rely more on domain knowledge than ratings (Tarus et al., 2018). Research conducted by (Chen et al., 2010), represents knowledge of anti-diabetic drugs using an ontology and defines the rules for giving drug recommendations using SWRL. In the experiment, Chen combined SWRL and Java Expert System Shell (JESS) to analyze the diabetes condition, and then the most appropriate medicine is suggested. A decision support system based on an anti-diabetic drug ontology was further developed to recommend the most appropriate hypoglycemic agent and to alert physicians to what to monitor and contraindicate. Another study, namely an ontology-based diet recommendation system for each individual compared to the results of nutritionists, achieved an average accuracy of 87% (Mckensy-Sambola et al., 2021). Namahoot developed ontology to present information about food and nutrition and optimizing SWRL rules for selecting food ingredients suitable for hospital patients resulting in an accuracy value of 35% (Namahoot et al., 2016).

This study focused on designing ontologies and SWRLs using Telegram to provide nutritional recommendations for stunting patients. SWRL is used to expand ontology as a support for giving recommendations. System recommendations are generated from data on height, weight, activity level, and age of stunting sufferers. Meanwhile, the results of the recommendations are the number of calories, fat, carbohydrates, protein, calcium, fiber, and iron needed by stunting patients in one day derived from the advice of nutritionists.