A Network of Twitter User on Stunting Issue in Lampung, Indonesia

[1]FENI ROSALIA, [2]YULIANTO, [3]TINA KARTIKA, [4]JENI WULANDARI,
[5]ALBET MAYDIANTORO
[1]Department of Government Science, University of Lampung, Bandar Lampung, INDONESIA
[2]Department of Public Administration, University of Lampung, Bandar Lampung, INDONESIA
[3]Department of Communication Studies, University of Lampung, Bandar Lampung, NDONESIA
[4]Department of Business Administration, University of Lampung, Bandar Lampung, INDONESIA
[5]Department of Social Science Education, University of Lampung, Bandar Lampung, INDONESIA

Abstract: - This study analyzes the network of users and hashtag Twitter messages connected to the stunting issue in Lampung Province, Indonesia. The research process adopts social network analysis (SNA) methods. The research data comes from as many as forty thousand tweets from the Twitter API. Data is downloaded, processed, and analyzed with three R, R Studio, and Gephi. Research findings show that Twitter users linked to stunting have different: (a) degree scores (13%, 12%, <10%); (b) betweenness scores (4%, 2.67%, 1.07%, and <1%); and (c) a closeness score that divides the actors into two groups: a closeness score equal to 1 and a closeness score below 1. The hashtags #pakhalimtahanstunting and #jokowimembangundesa have become popular hashtags among Twitter users related to stunting issues. This study concludes that central and local government actors encourage preventive and cross-sectoral intervention even though there are still a few collaborations between actors and institutions involved in this process.

Keywords: social networking, big data, critically assisted discourse, stunting, Twitter.

1 Introduction

Stunting is one of the national health problems that are a priority for the Government of Indonesia to be addressed. This phenomenon is not only a medical problem but also a socio-cultural, economic, and political problem. As a socio-cultural problem, some people still consider stunting solely as an unavoidable destiny of God. As a financial problem, stunting cannot be separated from the ability of household members to provide extra nutritional support for pregnant women. As a political issue, the prevalence of stunting shows the low performance of government agencies in delivering health services to all citizens. In Indonesia, according to the Ministry of Health of the Republic of Indonesia, [1], the proportion of stunting in children under five in Indonesia has decreased by 7%, from 37.2% (2013) to 30.7% (2018). However, the trend of stunting in Lampung Province tends to increase from year to year: 22.7% (2015), 24.8% (2016), and 31.6% (2017). In 2020, when the Government of Indonesia paid serious attention to the problem of stunting, the Provincial Government of Lampung (GoLP) began to take several policies related to stunting prevention, starting from the establishment of the Lampung Stunting Agency (LSA), the Convergence of Stunting Action, and the implementation of various specific nutrition intervention programs. And sensitive. The government has also set six priority districts/cities for stunting prevention, namely South Lampung Regency, East Lampung Regency, Central Lampung Regency, Tanggamus Regency, North Lampung Regency, and Pesawaran Regency.

Stunting is a form of malnutrition phenomenon. In simple terms, malnutrition is an abnormal physiological condition caused by inadequate, unbalanced consumption of macronutrients, micronutrients, or both. Malnutrition includes undernutrition (for example, stunting), overnutrition (for example, obesity), and micronutrient deficiencies. Malnutrition is caused by many factors: biological, socio-economic, and environmental factors, [2]. Stunting is not an individual health problem. It is a public health problem that the government must intervene in because it interferes with the process of human regeneration and the quality of the future of the nation. Stunting is not only about the availability and access to nutritious food due to many factors contributing to stunting reduction, for example, economic growth, quality of health services, poverty alleviation, and pro-poor government programs, [3].

There has been a lot of research on stunting from the health aspect. Still, not much research has been done by analyzing user networks and hashtags on Twitter messages related to the issue of stunting

in Lampung, Indonesia. So this research is quite essential for the government for policy making.

2 Literature Review

2.1 Stunting

Stunting is a wicked problem. In terms of health, it is related to knowledge and healthy living behavior among the population. From the agricultural side, it relates to the availability and access to quality food. From a social policy perspective, it is related to efforts to protect the most vulnerable groups from starvation and lack of nutrition in the community due to various market fluctuations. From the aspect of national resilience, stunting will weaken the nation's resilience because it will give birth to a stunted generation with limited physical abilities. Due to its complex nature, it is not surprising that several studies have recommended that stunting be responded to with a collaborative approach, [4], [5], [6], [7].

So far, the stunting phenomenon has been mostly analyzed from a health and socio-economic point of view, both the causes and impacts. Several factors that researchers consider as contributing to the decrease/increase in stunting are income, parental occupation, age of the baby, gender, [8], Community Health Development Index, [9], household poverty [10], [11], meat consumption patterns [12], education level and location of residence [13], sanitation and drinking water quality [14], government social assistance programs [15], family food security [16], family welfare levels [17], economic growth, poverty alleviation programs, and programs social insurance [3], knowledge level of pregnant women, [18], [19], [20]. These various research results confirm the findings of a systematic review on stunting conducted by [5].

2.2 Social Network Analysis (SNA)

SNA is a quantitative social science approach influenced by graph theory belonging to mathematics. SNA starts from the idea that social life contains various social relations and forms certain patterns. These patterns then affect social life, both at the individual, group, and community levels, [21]. The term social network in the acronym of SNA can be defined as a group of actors (nodes/vertices/points) connected to one or more actors because of certain social relations, [22].

In the SNA method, relation/interaction (linkage/tie/edge) is a fundamental concept to explain various processes that occur in social life. This is because the distribution of resources, both goods (material) and services (non-material), in social life, is channeled through certain social relations. Consequently, the network structure or network of social relations that a person has will give birth to opportunities, constraints, challenges, and obstacles to individual or group action. In this situation, the actor and the actor's actions are inseparable or interdependent on each other. While the term structure refers to the patterns of interaction between actors that have recently occurred or are the most recent, [22].

To explain the relationship or structure of social networks, SNA has some special jargon. The most basic, of course, are dyads (relationships between two actors), triads (relationships between three actors), sub-groups (relationships of a group of actors in the form of dyads or triads), and groups (social networks that have relationships in the form of dyads, triads, and subgroups). Furthermore, when there are a group of actors interacting with each other, SNA borrows several terms developed by graph theory, for example, degree (number of relationships formed between actors), density (proportion of relationships that may be formed with relationships that have already been created), distance (distance between two actors), geodesic distance (the shortest distance between two actors), eccentricity (the actor with the largest geodesic distance), and so on, [22].

The relationship between actors can be directed or undirected. A relationship is directed if the relationship has an orientation (for example, actor A chooses actor B as a friend). Meanwhile, the relationship is undirected if the relationship formed is dichotomous: it may or may not exist (for example, joint membership in an organization). To measure and identify actors who have important roles in various relationships in social networks, SNA has several jargons: closeness or distance (how close the actor is to other actors), betweenness (the position of the actor between two actors), prestigious (actors who receive many relations indegree receiving relations from other actors), and outdegree (sending relations to other actors), centrality (number of actor relations in the network), [22].

3 Method

The study adopted a quantitative approach, particularly the SNA method. The research will be carried out in Indonesia to utilize big data downloaded from the Twitter API. The data download process uses the R, [23], and R Studio software, specifically the *academic twitter* R

package, [24]. The data analysis and visualization process use the *quanteda* package, one of the R packages developed by, [25]. While the calculation of user network structure attributes and hashtags will use the Gephi software, [26]. While the calculation of user network structure attributes and hashtags will use the Gephi software, [25]. Interpreting the structural attributes of user networks and hashtags will refer to the jargon of SNA methods, [22]. The research focuses on calculating and interpreting the centrality, closeness, and betweenness of the Twitter user network and hashtags containing the keywords 'stunting' and 'Lampung.'

4 Result

4.1 The Setting

According to the Central Statistics Agency of Lampung Province, [27], Lampung is a province with an area of 35,288.35 km2. Geographically, Lampung Province is located between 103°40' – 105°50' East Longitude and 6°45' – 3°45' South Latitude. In 2019, the population of Lampung Province reached 8.4 million people or 2.1 million households and spread across 15 districts/cities. The Golkar was led by Arenal Djunaidi (Governor) and Chusnunia Chalim (Vice Governor), who won the 2018 Lampung Province regional head election supported by the Golkar Party (Golkar), the National Mandate Party (PAN), and the National Awakening Party (PKB). Golkar has 16,381 civil servants across 18 offices, seven agencies, and two secretariats.

The GoLP has chosen the Lampung Provincial Health Office (LPHO) as the leading sector to respond to various health issues in Lampung Province, including stunting. Referring to the Lampung Governor Regulation Number 32/2010 concerning the Main Duties and Functions of the LPHO, it has the main tasks: carrying out provincial government affairs in the health sector based on the principle of autonomy which is the authority, de-concentration tasks, and assistance tasks given by the central government to the governor and other duties in accordance with the policies set by the governor based on the applicable laws and regulations. These tasks are translated into several functions: (a) formulation of provincial-scale health policies, regulation, planning and setting standards/guidelines; (b) management and recommendation of technical considerations for permits for special health facilities and infrastructure such as mental hospitals, leprosy

hospitals and cancer hospitals; (c) implementation of health and nutrition technology certification; (e) implementation of epidemiological surveillance and prevention of outbreaks of communicable and non-communicable diseases and extraordinary events; (f) strategic placement of health personnel, transfer of certain health personnel between districts/cities as well as provision of health personnel education and training; (g) fostering, controlling, supervising and coordinating the health sector; (h) implementation of health efforts on a provincial scale and which cannot be carried out by regencies/municipalities; (i) administrative services; and (j) the implementation of other tasks assigned by the governor in accordance with his duties and functions.

The limitations of the main tasks and functions become the legal basis for the LPHO to formulate policies and development programs in the health sector. These policies and programs are based on the identification of several main health issues in Lampung Province: (a) high maternal and infant mortality rates; (b) improving the nutritional quality of the community as a whole; (c) still high morbidity and mortality due to communicable and non-communicable diseases; (d) limited access and quality of health services; and (e) the low level of clean and healthy living behavior of the community members. Starting from the situation above, development policies in the health sector in Lampung Province are focused on several issues such as (a) improving health efforts; (b) guaranteeing health financing; (c) developing human health resources; (d) guaranteeing pharmaceutical preparations, medical devices, and food; (e) developing health management, information, and regulation; and (f) increasing community empowerment in the health sector.

4.2 Description of Data

This study uses Twitter API data as the main data. Twitter data is searched and downloaded using the academic twitter R package using the keywords "stunting" AND "lampung" with the following additional criteria: (a) tweets are the result of retweets; (b) include promoted tweets; (c) the tweet must have a link in the form of a URL; (d) tweets must be in Indonesian; (e) tweets must be posted within the period 2010 - 2020. In the first stage of the search, the researcher got 376,398 observations/tweets. After being cleared of duplicate tweets, 46,471 observations/tweets remain.

The total tweet above contains 7,046 hashtags. Of this number, there are several dominant hashtags: #pakhalimcegahstunting, #bmkg, #lampung, #jokowimembangundesa, #onehealthkipm, #repost.

Meanwhile, the total number of Twitter accounts involved in stunting data reached 15,574 accounts. However, there are only a few accounts whose main Twitter users stand out (frequency of occurrence above 50% of the total tweets collected), and are popular and connected to stunting tweets, namely: @lampung_utara, @jokowi, @putrilailawati, @se_lampung, @tribunlampung_, @daily_momentum. Through the social media Twitter, researchers tracked the existence of information about these accounts. The results of this tracking are presented in Table 1, which confirms that many of these accounts are accounts belonging to conventional mass media, except for the accounts of @jokowi and @putrilailawati.

Table 1. Short profile of Twitter account that related to stunting issue in Lampung Province

No	Twitter account	Short profile
1.	@lampung_utara	Give information about North Lampung. Official email: saibumiruwaijurai@gmail.com. Join Twitter in 2011. Following 211 people dan followed by 2.025 Twitter users. This account does not have a verified sign by Twitter Corporation.
2.	@jokowi	The official Twitter account of the President of the Republic of Indonesia, Joko Widodo. Following 58 people and followed by 16.1 million followers. Joined Twitter in 2011. It has one hashtag: #MenujuIndonesiaMaju. The account is marked verified by Twitter.
3.	@putrilailawati	The account owner is Uti, located in Pringsewu District, and she joined Twitter in 2012. Following 588 people and followed by 3,676 Twitter users. Haven't gotten a verified check from Twitter yet.
4.	@tribunlampung_	The official account of the daily newspaper Tribunlampung.co.id. Joined Twitter in 2010. Following 393 people and followed by 19.6 thousand followers. The official website is located at www.tribunlampung.co.id. The account has not yet received a verified check from Twitter.
5.	@se_lampung	The account #semesterlampung has joined Twitter since 2017 with the main activity of "sharing info about tourism, culture, local wisdom, personal, culinary, development, and lifestyle throughout Lampung. Following 501 people and followed by 1,074 people. Geographical location is in Lampung, Indonesia.
6.	@harian_momentum	Momentum Daily's official account. They joined Twitter in 2017 and are in Bandar Lampung City. Following 257 people and followed by 343 followers. Has an official web page at www.harianmomentum.com. The account has not yet received a verified sign from Twitter.

Indicators can be described as follows: first, as shown in Figure 1, in terms of the degree indicator, the actor with the largest degree score (13%) is the green actor (node) (@shintapuspitad, @infoseni_, @lampung_utara, @ecacamarica_, and @putrilailawati) and pink (@fachrilabado, @taufikmadjid71, @anwsanusi, and @jokowi). The second position is occupied by actors who have a degree score of 12% (emerald-colored nodes: @feby_maya_sari and @nyimaswulandari). The third position is occupied by the accounts @nunung_unuy15 and @riskyagustinaa, with a degree of 10. The rest are nodes that have a degree below 10%. This finding indicates the limited role of the GoLP (@pmd_lampung, @humaslampung_, @hi_hermanhn) in influencing network users. However, this network shows the significant role of

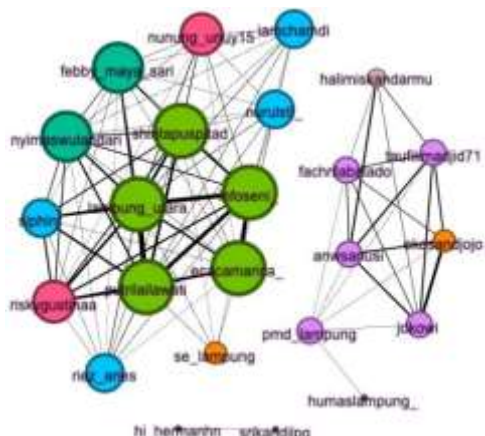online media and citizens in promoting stunting issues on social media platforms.

Fig. 1: The Pattern of Twitter network users based on degree indicator

Second, based on the betweenness score, there is only one actor (node) who has the largest score (6%), namely @pmd_lampung (pink), even though it only reaches a population of 4% of the total relations (edge) in the network. Light green actors occupy the second position with 2.67%. The green node population reaches 20.83% of the network's total relations (edges). The third position is occupied by dark green actors (nodes) by 1.07%. The rest are nodes that have a betweenness score below 1 percent. Because the @pmd_lampung account represents the GoLP institution, this finding emphasizes the important role of the government in the network of actors involved in the stunting issue. The @pmd_lampung account is owned by the Lampung Province of Village Community Empowerment and Transmigration Office Lampung Province (LPVCETO). It is very surprising that LPVCETO appears in the stunting network instead of the LPHO. As shown above, LPHO has been chosen by the GoLP as a leading sector to combat stunting in Lampung Province. In Figure 1, we do not find the MoHRI as a member of the stunting network.
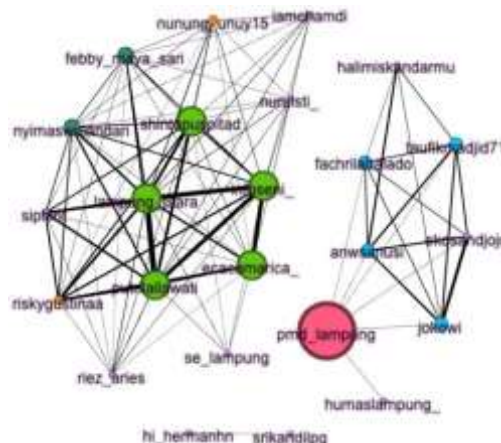

Fig. 2: The Pattern of Twitter network users based on *betweenness* indicator

Based on the closeness score, the 24 (twenty-four) actors in Figure 3 can be grouped into two categories: (a) actors who have a closeness score of 1 or pink nodes (@srikandilpg, @hi_hermanhn, @infoseni_, @shintapuspitad, @putrilailawati, @lampung_utara, and @ecacamarica_) and (b) actors who have closeness scores below 1 (other than pink). Like Figure 1, this network stresses the roles of the non-government actor in the stunting network. Based on Figure 3, we can interpret that there is strong citizen participation in promoting stunting issues on social media, especially on Twitter, in Lampung Province. However, three sub-group in this network are not fully integrated. We did not find an edge connecting the three subgroups in the stunting network. It means there is no collaboration between government, market, and civil society in stunting prevention in Lampung Province.
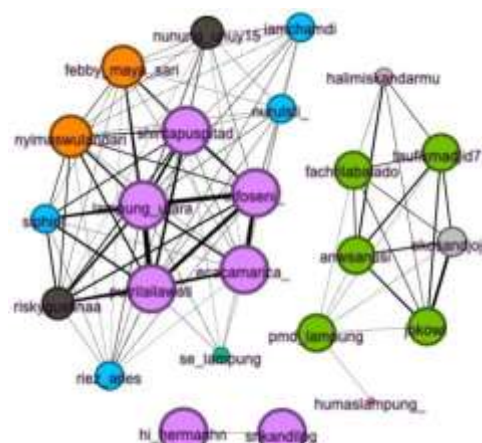

Fig. 3: The Pattern of Twitter network users based on closeness indicator

4.3 Hashtag Network
Figure 4 shows some of the hashtags commonly used by Twitter users related to the issue of stunting.

Figure 6 only hashtags with a minimum frequency of 5 percent of the total existing hashtags. The wider the blue line connecting the two hashtags, the higher the frequency of that hashtag's traffic on Twitter. This means that the intensity of users campaigning for this hashtag is getting higher. When viewed with this technique, even though the issue of stunting is considered a health domain, what appears as the most popular actor on Twitter is *#pakhalimcegahstunting* which refers to Abdul Halim Iskandar (Ministry of Villages, Development of Disadvantaged Regions and Transmigration of the Republic of Indonesia/MoVDDRT). The next hashtag that is also popular is *#jokowimembangundesa* which is often used by the official Twitter account of the Presidential Staff Office in their tweets. This finding confirms the government's attitude to adopt a multi-sectoral strategy to prevent and combat stunting. Meanwhile, the hashtag *#lampung* is quite connected to the hashtag network related to village funds, although the frequency is not too high. This can be seen from the blue line connecting the hashtag *#lampung* with several hashtags connected to village funds, which are not too wide. At the regional level, this hashtag is quite popular and has the highest frequency, and is connected to various hashtags that have regional identities, for example, *#tribunlampung* (local media) and *#bandarlampung*.
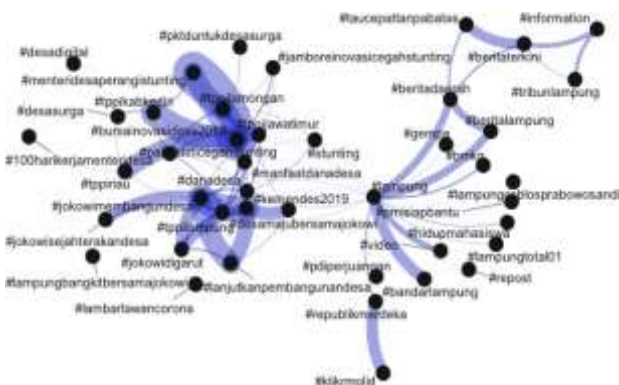

Fig. 4: Network of hashtags linked to the words "stunting" and "lampung" on Twitter

5 Discussion

Although previous research had recommended a collaborative approach to prevent stunting [1, 11, 15], it does not happen in Lampung Province. Because stunting is a health problem, we presume the MoHRI is a dominant actor in the stunting network. However, our estimate is wrong because the most popular actor is the MoVDDRT and its organization network at the district level. We have three interpretations of this finding. *First*, it shows a paradigm shift, from sectoral-centered (health sector) to territorial-centered (village based), in the GoI to prevent stunting. Until now, the rural area is still perceived as underdeveloped and the epicentrum of various social deprivation in Indonesia. *Second*, it is part of the GoI strategy to control the utility of village funds and keep it aligned with development priorities and programs set by the GoI. Third, the MoVDDRT is a newcomer in stunting policy. She uses Twitter to increase public awareness and mobilize digital public support in preventing stunting.

6 Conclusion

Stunting is one of the wicked problems in Lampung Province. The GoI and GoLP have started implementing various policies to prevent stunting. This study concludes that central and local government actors encourage preventive and cross-sectoral intervention even though there is still little collaboration between actors and institutions involved in this process. Many citizens, as personal Twitter users or online media, have participated in stunting discourse on social media. But their roles are not integrated into the network that contains government actors. The popularity of #pakhalimtahanstunting and #jokowimembangundesa as hashtags among Twitter users is strong evidence for stunting policy as a product of the technocratic and top-down process. This research recommends the central and local governments revitalize the institution of collaboration in stunting prevention.

Reference:
[1] Y. Haskas, "Gambaran Stunting di Indonesia: Literatur Review," Jurnal Ilmiah Kesehatan Diagnosis, vol. 15, no. 2, pp. 154-157, 2020.

[2] J. Ngo, A. Ortiz-Andrellucchi, and L. Serra-Majem, "Malnutrition: Concept, classification and magnitude," ed: Academic Press (Elsevier), 2015.

[3] M. F. Rizal and E. van Doorslaer, "Explaining the fall of socioeconomic inequality in

childhood stunting in Indonesia," SSM-population health, vol. 9, p. 100469, 2019.

[4] X. Liu, F. Wang, X. Ding, Y. Chen, and L. Wang, "Strengthening the maternal and child health system in remote and low-income areas through multilevel governmental collaboration: A case study from nujiang prefecture in china," Public Health, vol. 178, pp. 23-30, 2020.

[5] M. Hossain et al., "Evidence-based approaches to childhood stunting in low and middle income countries: a systematic review," Archives of Disease in Childhood, vol. 102, no. 10, pp. 903-909, 2017.

[6] J. Jeffrey, S. Sumarmi, and N. A. Damayanti, "Importance of collaborative intervention of Preconception Nutrition in Suppressing the Stunting case in East Nusa Tenggara, indonesia," Indian Journal of Public Health Research Development, vol. 10, no. 9, pp. 175-179, 2019.

[7] E. J. Levitt, D. L. Pelletier, and A. N. Pell, "Revisiting the UNICEF malnutrition framework to foster agriculture and health sector collaboration to reduce malnutrition: a comparison of stakeholder priorities for action in Afghanistan," Food Policy, vol. 34, no. 2, pp. 156-165, 2009.

[8] K. E. Agho, K. J. Inder, S. J. Bowe, J. Jacobs, and M. J. Dibley, "Prevalence and risk factors for stunting and severe stunting among under-fives in North Maluku province of Indonesia," BMC pediatrics, vol. 9, no. 1, pp. 1-10, 2009.

[9] S. Mulyati, A. Triwinarto, and B. Budiman, "Determinan Stunting Pada Anak Usia 2-3 Tahun Di Tingkat Provinsi (Determinants of Stunting in Children 2-3 Years of Age at Province Level)," Nutrition Food Research, vol. 34, no. 1, p. 223493, 2011.

[10] T. Aizawa, "Ex-ante inequality of opportunity in child malnutrition: New evidence from ten developing countries in Asia," Economics Human Biology, vol. 35, pp. 144-161, 2019.

[11] M. Aries, H. Hardinsyah, and H. Tuhiman, "Determinan gizi kurang dan stunting anak Umur 0–36 bulan berdasarkan data Program Keluarga Harapan (PKH) 2007," Jurnal Gizi dan Pangan, vol. 7, no. 1, pp. 20-27, 2012.

[12] M. Sekiyama et al., "Double burden of malnutrition in rural West Java: household-level analysis for father-child and mother-child pairs and the association with dietary intake," Nutrients, vol. 7, no. 10, pp. 8376-8391, 2015.

[13] C. N. Rachmi, K. E. Agho, M. Li, and L. A. Baur, "Stunting, underweight and overweight in children aged 2.0–4.9 years in Indonesia: prevalence trends and associated risk factors," PloS one, vol. 11, no. 5, p. e0154756, 2016.

[14] H. Torlesse, A. A. Cronin, S. K. Sebayang, and R. Nandy, "Determinants of stunting in Indonesian children: evidence from a cross-sectional survey indicate a prominent role for the water, sanitation and hygiene sector in stunting reduction," BMC public health, vol. 16, no. 1, pp. 1-11, 2016.

[15] D. Kusuma, M. McConnell, P. Berman, and J. Cohen, "The impact of household and community cash transfers on children's food consumption in Indonesia," Preventive medicine, vol. 100, pp. 152-158, 2017.

[16] T. Mahmudiono, T. S. Nindya, D. R. Andrias, H. Megatsari, and R. R. Rosenkranz, "Household food insecurity as a predictor of stunted children and overweight/obese mothers (SCOWT) in urban Indonesia," Nutrients, vol. 10, no. 5, p. 535, 2018.

[17] C. R. Titaley, I. Ariawan, D. Hapsari, A. Muasyaroh, and M. J. Dibley, "Determinants of the stunting of children under two years old in Indonesia: a multilevel analysis of the 2013 Indonesia basic health survey," Nutrients, vol. 11, no. 5, p. 1106, 2019.

[18] S. M. Damanik, D. Wanda, and H. Hayati, "Feeding practices for toddlers with stunting in Jakarta: A case study," Pediatric Reports, vol. 12, no. S1, pp. 18-22, 2020.

[19] P. D. Novitasari and D. Wanda, "Maternal feeding practice and its relationship with stunting in children," Pediatric Reports, vol. 12, no. S1, pp. 30-33, 2020.

[20] C. Starkweather et al., "An interpersonal nutrition campaign and maternal knowledge and childhood feeding practices: a case study from mothers in rural Indonesia," Archives of Public Health, vol. 78, no. 1, pp. 1-6, 2020.

[21] A. Marin and B. Wellman, "Social network analysis: An introduction," The SAGE handbook of social network analysis, vol. 11, p. 25, 2011.

[22] S. Wasserman and K. Faust, "Social network analysis: Methods and applications," 1994.

[23] R. C. Team, "R: A language and environment for statistical computing," 2013.

[24] C. Barrie and J. C.-t. Ho, "academictwitteR: an R package to access the Twitter Academic Research Product Track v2 API endpoint," Journal of Open Source Software, vol. 6, no. 62, p. 3272, 2021.

[25] K. Benoit et al., "quanteda: An R package for the quantitative analysis of textual data," Journal of Open Source Software, vol. 3, no. 30, p. 774, 2018.

[26] M. Bastian, S. Heymann, and M. Jacomy, "Gephi: an open source software for exploring and manipulating networks," in Proceedings of the international AAAI conference on web and social media, 2009, vol. 3, no. 1, pp. 361-362.

[27] B. P. S. BPS, "Lampung Dalam Angka," B. P. Statistik, Ed., ed. Bandar Lampung: Badan Pusat Statistik, 2020.