Available *online* at : http://ejurnal.stikesprimanusantara.ac.id/

Jurnal Kesehatan

| ISSN (Print) 2085-7098 | ISSN (Online) 2657-1366 |

Research

MAPPING GEOGRAPHICAL OF CHILDREN'S NUTRITIONAL DISORDERS IN BUKITTINGGI

Kholilah Lubis[1,4], *Indah Putri Ramadhanti*[2,4], *Debby Ratno Kustanto*[3,4]

[1,2] *Fakultas Kebidanan Universitas Prima Nusantara Bukittinggi, Sumatera Barat, Indonesia*
[3] *Fakultas Keperawatan dan Kesehatan Masyarakat Universitas Prima Nusantara Bukittinggi, Sumatera Barat, Indonesia*
[4] *Pusat Unggulan Riset Stunting Universitas Prima Nusantara Bukittinggi, Sumatera Barat, Indonesia*

ARTICLE INFORMATION

Received: August 09, 2022
Revised: September 01, 2022
Accpeted: Oktober 21, 2022
Available online: November 15, 2022

KEYWORDS

Mapping Geographical; Children; Nutritional Disorders

CORRESPONDING AUTHOR

Kholilah Lubis
E-mail: lilazgreeny@gmail.com

A B S T R A C T

Background: Children's Nutritional Disorders (CND) are diseases that occur when childhood's dietary intake doesn't contain the proper amount of nutrients for healthy functioning. In Indonesia, the prevalence of severely underweight is 1,4%, underweight is 6,7%, 1,1% were severely wasted and 4,3% of children were wasted. The prevalence of stunted has decreased from 27,7% in 2019 to 24,4% in 2020. However, this achievement is still far from the SDG's targets.

Objective: This study aims to determine the CND with a mapping geographical that can help the government to find the cause so the cases decrease faster.

Methods: This study was descriptive with a cross-sectional design and conducted in Bukittinggi, West Sumatera, and used secondary data (Height and Weight Measurement Reports in 2020) from Public Health Office. To present the mapping geographical using QGIS 3.16 by taking the coordinate points of the Community Health Center in the Bukittinggi area.

Results: Severely underweight, Guguk Panjang (7,55%) vs. Nilam Sari (0%). Underweight, Tigo Baleh (12,33%) vs Nilam Sari (1,55%). The risk of overweight, Tigo Baleh 23,33% vs. Gulai Bancah (4%). Severely stunted, Tigo Baleh (5,19%) vs. Gulai Bancah (3,60%), Nilam Sari (1,06%). Stunted, Guguk Panjang (15, 81%) vs. Gulai Bancah (14,75%). Severely wasted is very low in each Community health center (0,02% or 0,01%). Wasted, Tigo Baleh (0,91%) vs. Mandangin (0,08%). Overweight, Guguk Panjang (9,62%) vs. Gulai Bancah (6,12%).

Conclusion: The risk of overweight is the most cases of CND in Bukittinggi, while severely wasted is the lowest case. The cases in 2020 increased associated with the Covid-19 pandemic

INTRODUCTION

Children's Nutritional Disorders (CND) are diseases that occur when childhood's dietary intake doesn't contain the proper amount of nutrients for healthy functioning, or when the body can't correctly absorb nutrients from food. Nutrition disorders are usually caused by under-nutrition, over-nutrition, or an incorrect balance of nutrients [1][2]. CND is a complex problem worldwide. It's become a problem in nation-building, especially in developing countries (middle to low income) so it's important to identify, study and analyze the causes [3][4]. It's also linked to SDG's 2030 (read; Sustainable Development Goals 2030) target 2 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture is the only SDG's that mentions the concept of nutrition. The statement means unsustainable food production causes undernourishment [5]. To meet the SDG's targets, 53 countries are on track for stunting targets and 57 countries are on track for wasting targets. However, 22% of children under five years are still stunted and 6,7% are wasting. Meanwhile, 105 countries around the world are in the prevention of the increasing prevalence of overweight among children under five years, which currently affects 5,7% of children [6]. In Indonesia, the prevalence of severely underweight is 1,4% and underweight is 6,7% in children under five years. In the same years, 1,1% of children under five years were severely wasted and 4,3% of children were wasted. The prevalence of stunted (the main point of Children's Nutritional Disorders in Indonesia) has decreased from 27,7% in 2019 to 24,4% in 2020. However, this achievement is still far from the SDG's targets [7].

The efforts by the Indonesian government to prevent CND are the implementation of a monitoring program for the nutritional status in the first 1000 days of life (from conception through the second birthday) and family class education which's generally

DOI: http://dx.doi.org/10.35730/jk.v13i3.756

carried out by midwives [8]. The first 1000 days of life start from 270 days during pregnancy and 730 days in the baby's second life. Its condition was permanent and irreparable [9]. The first 1000 days of life program and family class education programs have been implemented in many countries and have been shown to prevent CND; stunting, underweight, and overweight [9] [10] [11].

Health professionals (midwives) play an important role in maternal and child health. Linked to the first 1000 days of life, midwives provide interventions including antenatal nutrition education, postpartum nutrition (also linked to exclusive breastfeeding) and evaluating the nutritional status of maternal and monitoring the growth and development of the children [12]. The midwives evaluate the children's nutritional status based on anthropometric features and indices - body weight [kg], body length/height [cm] and body weight-for-height ratio standardized according to the reference WHO growth charts [13][14]. In Indonesia, the application of child anthropometry standards is made by the government in form of 'The Regulation by the Minister of Health Republic Indonesia No. 2 in 2020 adapted from WHO [15]. For the practice to determine the severely underweight (-3SD until < -2 SD), underweight (< -3 SD) and the risk of overweight (> +3 SD) are used weight-for-age in z-scores. Severely stunted and stunted are detected with height-for-age. Severely stunted with point < -3 SD in z-scores and stunted with point 3SD until < -2 SD in z-scores. Then, weight-for-height is used to determine severely wasted (< -3 SD), wasted (-3 SD until < -2 SD) and overweight (> +2 SD until +3 SD) [15].

Bukittinggi is a tourist spot in West Sumatera. Previously, the study by Lubis on stunted had been carried out using mapping geographical. Based on the study, we considered stunted as a priority problem for children because the cases are quite high in Bukittinggi [16]. This study aims to determine the CND with a mapping geographical. So that the application of this method can help the government to improve programs regarding the allocation of sub-districts with high needs of healthcare and find the causes so the cases decrease faster.

METHODS

This study was descriptive with a cross-sectional design and was conducted in Bukittinggi City, West Sumatera, Indonesia. To present the data, this study used secondary data (Height and Weight Measurement Reports in 2020) obtained from Public Health Office in Bukittinggi. Before presenting the data, Public Health Office in Bukittinggi has accepted to publicate the data t for mapping geographical. The data contains: Cases of severely underweight, underweight, and risk of overweight in 2020, Cases of severely stunted and stunted in 2020, and also Cases of severely wasted, wasted, and overweight in 2020. The proportion of the data is expressed as the number of cases in the Community Health Center and its percentage on the table. To present the mapping geographical using QGIS 3.16 by taking the coordinate points of the Community Health Center in Bukittinggi area. The mapping interpretation is divided into three colors which are defined as; the number of cases in the sub-district (high or. medium or. low).

RESULTS AND DISCUSSION

Bukittinggi is the biggest city in West Sumatera Province. It's one of the largest wholesale trade centers and a famous tourist spot in West Sumatera (called "Jam Gadang). Jam Gadang is the hallmark of the city. Geographically, Bukittinggi has an area ± 25,239 Km^2 (2.523,90 ha) or ± 0,06 % of West Sumatera province area [16]. Bukittinggi located between 100°20' - 100°25' East Logitude and between 00°16' - 00° 20' South Logitude with boundaries : Nortth (Nagari Gadut and Kapau, Tilatang Kamang sub-distrct, Agam district), South (Taluak IV Suku, Banuhampu sub-district, and Agam,district, East (Nagari Tanjung Alam, Ampang Gadang, IV Angkat sub-district, and Agam district, West (Nagari Sianok, Guguk, Koto Gadang, IV Koto sub-district and Agam district [16].

The administration area is divided into three sub-districts, namely: Mandiangin Koto Selayan sub-district, Guguk Panjang Sub-district, and Aur Birugo Tigo Baleh sub-district. In the Mandiangin Koto Selayan sub-district, there're four Community Health Center; Mandiangin Plus, Gulai Bancah, Mandiangin, and Nilam Sari. In guguk Panjang sub-distric have two community health center; Guguk Panjang and Rasimah Ahmad. Then, the Aur Birugo Tigo Baleh sub-district have only one community health center; Tigo Baleh [16].

Table 1. Cases of severely underweight, underweight, and risk of overweight

Community Health Center	Severely Underweight		Underweight		Risk of Overweight	
	Cases	%	Cases	%	Cases	%
Mandiangin Plus	13	1,44	48	5,33	120	13,33
Gulai Bancah	3	0,33	23	2,55	36	4,00
Mandiangin	3	0,33	34	3,77	55	6,11
Nilam Sari	0	0	14	1,55	63	7,00
Guguk Panjang	68	7,55	93	10,33	194	21,55
Rasimah Ahmad	17	1,88	81	9,00	131	14,55
Tigo Baleh	19	2,11	111	12,33	210	23,33

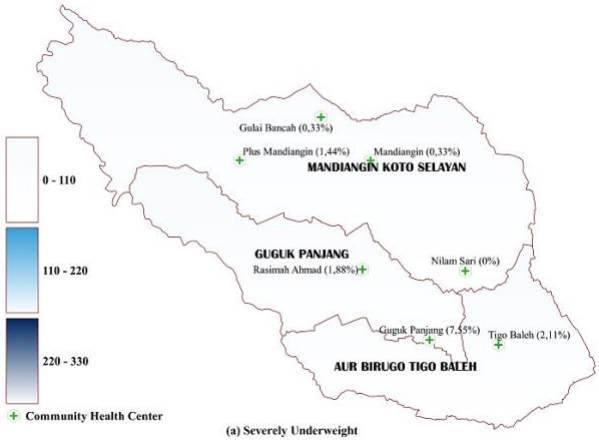

Figure 1. Mapping geographical of severely underweight in sub-districts Bukittinggi

Severely Underweight. Table 1 shows the highest case of severely underweight was found at the Guguk Panjang (7,55%) and the lowest case at Nilam Sari (0%). However, figure 1 shows that there's no difference in the cases of severely underweight in each sub-districts in Bukittinggi.

Figure 2. Mapping geographical of underweight in sub-districts Bukittinggi

Underweight. Based on Table 1, the case of underweight was highest in Tigo Baleh (12,33%) and lowest (1,55%) in Nilam Sari. However, the display in figure 2 shows the difference because the map is categorized into several sub-districts. So, some cases are added up according to where the community health center is located. The highest case (range 220 – 330) is lacking in Mandiangin Koto Selayan. Meanwhile, Guguk Panjang and Aur Birugo Tigo Baleh are categorized as less condition or moderate (range 110 – 220).

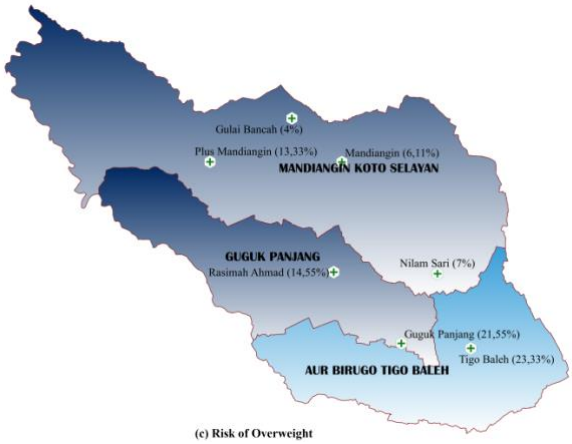

Figure 3. Mapping geographical the risk of overweight in sub-districts Bukittinggi

Risk of Overweight. 23,33% of the case is highest occurs in Tigo Baleh, and the lowest in Gulai Bancah (4%). The Risk of overweight is the most common case in children under 5 years when compared to cases of severely underweight and cases of underweight in Bukittinggi. Figure 3 also shows the same statement, the highest cases were in two sub-districts; Madiangin Koto Selayan and Guguk Panjang (range 220 – 330), Aur Birugo Tigo Baleh sub-district is moderate range (range 110 – 220).

Table 2. Cases of severely stunted and stunted

Community Health Center	Severely Stunted		Stunted	
	Cases	%	Cases	%
Mandiangin Plus	52	8,00	97	14,92
Gulai Bancah	10	3,60	41	14,75
Mandiangin	18	1,63	61	5,54
Nilam Sari	10	1,06	69	7,29
Guguk Panjang	71	6,10	184	15,81
Rasimah Ahmad	45	5,01	92	10,23
Tigo Baleh	74	5,19	168	11,79

Figure 4. Mapping geographical of severely stunted in sub-districts Bukittinggi

DOI: http://dx.doi.org/10.35730/jk.v13i3.756

Severely Stunted. Table 2 presents that Tigo Baleh becomes the highest (5,19%) community health center with severely stunted, and the lowest are Gulai Bancah (3,60%) and Nilam Sari (1,06%). Figure 4 shows the moderate cases located in Guguk Panjang (range 100 – 200). The less cases (0 – 100) located in Mandiangin Koto Selayan and Aur Birugo Tigo Baleh.

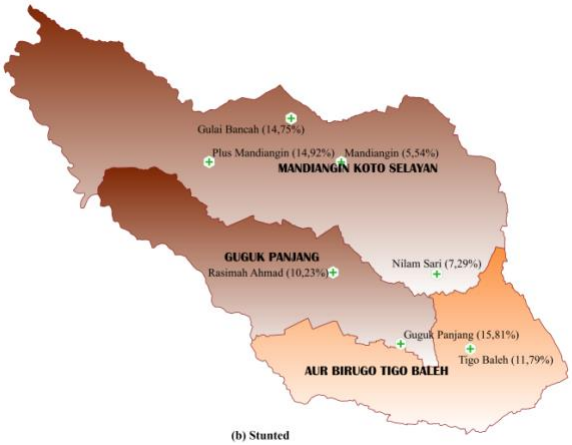

Figure 5. Mapping geographical of stunted in sub-districts Bukittinggi

Stunted. The highest case of stunted is Guguk Panjang (15, 81%) and the lowest is Gulai Bancah (14,75%). For further details in figure 5, Mandiangin Koto Selayanan and Guguk Panjang are the most cases of stunted (range 200 – 300) than Aur Birugo Tigo Baleh (range 100 – 200).

Table 3. Cases of severely wasted, wasted, and overweight

Community Health Center	Severely Wasted		Wasted		Overweight	
	Cases	%	Cases	%	Cases	%
Mandiangin Plus	0	0	37	0,37	48	7,38
Gulai Bancah	0	0	11	0,11	17	6,12
Mandiangin	1	0,01	8	0,08	33	2,99
Nilam Sari	0	0	13	0,13	44	4,65
Guguk Panjang	2	0,02	54	0,54	112	9,62
Rasimah Ahmad	0	0	49	0,49	72	8,01
Tigo Baleh	2	0,02	91	0,91	86	6,04

Figure 6. Mapping geographical of severely wasted in sub-districts Bukittinggi

Severely wasted. Table 3 shows that the case of severely wasted in each Community health center is very low (0,02% or 0,01%). The same situation can be seen in figure 6, all of the sub-districts are in the range 0 - 70 cases. In addition, the situation has a positive effect because the cases are almost non-existent.

Figure 7. Mapping geographical of wasted in sub-districs Bukittinggi

Wasted. The most cases in Tigo Baleh Community health center (0,91%) and the least in Mandangin Community health center (0,08%). However, figure 7 shows a different-results, the medium (moderate) cases are located in Guguk Panjang and Aur Birugo Tigo Baleh, while Mandiangin Koto Selayan is the least wasted case.

Figure 8. Mapping geographical of overweight in sub-districts Bukittinggi

Overweight. Based on table 3, the highest cases of overweight are Guguk Panjang (9,62%) and the lowest is Gulai Bancah (6,12%). The displays in figure 8, Mandiangin Koto Selayanan and Guguk Panjang are the most cases of Overweight (range 140 - 210). Aur Birugo Tigo Baleh is categorized as medium (range 70 - 140). Based on all data on nutritional disorders in 2020, The most case that occurs in Bukittinggi is the risk of overweight in children under 5 years (809 cases) and the least case is severely wasted (5 cases). A short interview with the Head of nutrition program at the Health Office in Bukittinggi about the factor causing the high cases of nutritional disorders than the previous year: socio-economic factors (middle or lower), poor nutrition from less food consumption, level of education the parents are low, exclusive breastfeeding (yes or no), infection (infant or maternal) and the last causing is Covid-19.

Socio-economic factor (middle or lower) has correlated with Covid-19. A decrease in family income has a negative impact on the availability and food consumption the children under 5 years. This's the reason why, the case of nutritional disorders increased, and the situation was not expected from the previous year [4]. Covid-19 has had a significant effect on nutritional status in Indonesia, especially for children under five years. The covid-19 pandemic has the potential to be proven to hamper access for mothers and children to optimal health services due to the implementation of government policies as an effort to reduce the number of transmission of Covid-19 in the general public and groups in high-risk communities such as toddlers in particular. The barriers to health services for toddlers include restrictions on Posyandu (small integrated healthcare center for mother and children) activities so that immunization services and uncontrolled weighing and height of toddlers. Immunization services in various places are also hampered so that the potential for problems with nutritional disorders in children can occur in older children [17]. From the gap, the government of Bukittinggi and Bukittinggi Health Office makes efforts to accelerate in terms of reducing cases of nutritional disorders so we hope that the cases will decrease.

CONCLUSIONS

The children with a risk of overweight are the most cases of nutritional disorders in Bukittinggi, while severely wasted is the lowest cases. The case of nutritional disorders in 2020 increased more than the previous year associated with the Covid-19 pandemic.

ACKNOWLEDGMENTS

The authors are grateful to The Directorate of Research, Technology, and Community Service (DRTCS) and The Ministry of Education and Culture in Republic Indonesia for supporting this research as national research in 2022. The authors thank for Public Health Office in Bukittinggi for supplying the data in this research and also LPPM Prima Nusantara Bukittinggi Health Institute for providing technical support.

REFERENCES

[1] F. Ozdener, F. Kirbiyik, and A. E. Dogan, "Analysis of nutrition clinical studies involving children in the Middle East and globally," *Futur. Sci. OA*, vol. 4, no. 9, 2018, doi: 10.4155/fsoa-2018-0067.

[2] L. Geurts, "Nutritional Disorders," *J. Food, Nutr. Popul. Heal.*, vol. 5, no. No. 2, 2021, doi: 10.1016/B978-0-323-01199-0.50091-8.

[3] K. Y. Ahmed, K. E. Agho, A. Page, A. Arora, and F. A. Ogbo, "Mapping geographical differences and examining the determinants of childhood stunting in ethiopia: A bayesian geostatistical analysis," *Nutrients*, vol. 13, no. 6, pp. 1–21, 2021, doi: 10.3390/nu13062104.

[4] O. Polašek *et al.*, "Research priorities to reduce the impact of COVID-19 in low- and middle-income countries," *J. Glob. Health*, vol. 12, no. 09003, pp. 1–14, 2022, doi: 10.7189/jogh.12.09003.

[5] G. Grosso, A. Mateo, N. Rangelov, T. Buzeti, and C. Birt, "Nutrition in the context of the Sustainable Development Goals," *Eur. J. Public Health*, vol. 30, no. Supplement 1, pp. I19–I23, 2020, doi: 10.1093/eurpub/ckaa034.

[6] Global Nutrition Report, "Global Nutrition Report | Country Nutrition Profiles - Global Nutrition Report," *Global Nutrition Report*, 2020.

DOI: http://dx.doi.org/10.35730/jk.v13i3.756

https://globalnutritionreport.org/resources/nutrition-profiles/latin-america-and-caribbean/south-america/ecuador/%0Ahttps://globalnutritionreport.org/resources/nutrition-profiles/asia/south-eastern-asia/indonesia/%0Ahttps://globalnutritionreport.org/resou

[7] K. K. R. Indonesia, *Profil Kesehatan Indonesia 2020*. Jakarta, 2020.

[8] K. Beluska-Turkan *et al.*, "Nutritional gaps and supplementation in the first 1000 days," *Nutrients*, vol. 11, no. 12, pp. 1–50, 2019, doi: 10.3390/nu11122891.

[9] Hijrawati, A. N. Usman, S. Syarif, V. Hadju, S. As'ad, and Y. S. Baso, "Use of technology for monitoring the development of nutritional status 1000 hpk in stunting prevention in Indonesia," *Gac. Sanit.*, vol. 35, no. S2, pp. S231–S234, 2021, doi: 10.1016/j.gaceta.2021.10.028.

[10] J. N. Wambura and B. Marnane, "Undernutrition of HEU infants in their first 1000 days of life: A case in the urban-low resource setting of Mukuru Slum, Nairobi, Kenya," *Heliyon*, vol. 5, no. 7, p. e02073, 2019, doi: 10.1016/j.heliyon.2019.e02073.

[11] M. Farzaneh, H.-B. Fatemeh-Sadat, D. Afsaneh, S. Farzad, M. Saeed, and G. Mihnea-Alexandru, "Comparison of the key modifiable factors in the first 1000 days predicting subsequent overweight and obesity in pre-school children in Tehran: a case–control study," *Br. J. Nutr.*, pp. 1–9, 2021, doi: 10.1017/S0007114521003937.

[12] W. Rahmawati, P. van der Pligt, A. Worsley, and J. C. Willcox, "Indonesian antenatal nutrition education: A qualitative study of healthcare professional views," *Women's Heal.*, vol. 17, no., pp. 1–17, 2021, doi: 10.1177/17455065211066077.

[13] O. Comandini *et al.*, "Nutritional status of Ugandan school-children: The effect of age imprecision," *Am. J. Phys. Anthropol.*, vol. 170, no. 1, pp. 88–97, 2019, doi: 10.1002/ajpa.23895.

[14] A. Mitsunaga and T. Yamauchi, "Evaluation of the nutritional status of rural children living in Zambia," *J. Physiol. Anthropol.*, vol. 39, no. 1, pp. 1–11, 2020, doi: 10.1186/s40101-020-00244-8.

[15] K. K. R. Indonesia, "Peraturan Menteri Kesehatan Republik Indonesia No. 2 Tahun 2020 Tentang Standar Antropometri Anak," 2020.

[16] K. Lubis, D. R. Kustanto, W. Fetrisia, and D. Nataria, "Analisis Geospasial Sebaran Stunting Di Kota Bukittinggi," *J. Kesehat.*, vol. 13, no. 1, pp. 41–45, 2022, doi: http://dx.doi.org/10.35730/jk.v13i1.576.

[17] P. Pansawira, "How Covid-19 pandemic affect nutritional status," *World Nutr. J.*, vol. 2, no. 1, pp. 1–2, 2021, doi: 10.25520/WNJ.V04.i2.0002.