

Empowerment Design with a Contextual Learning Model based on Regional Topography and Education Level in Families at Risk of Stunting in Banten Province

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Abstract

Banten Province topographically includes lowlands, hills, and mountains with coastal, rural, and urban classifications. With these three classifications, the level of education of the people in the Banten Province area is different. Referring to these differences, an empowerment design was made based on topography and education level. Meanwhile, to provide treatment to the community with these differences, a contextual learning model was created. The empowerment design was created with the aim of improving knowledge and economics in families at risk of stunting. To achieve this goal, it was made with a 4D model (Define, Design, Develop, and Disseminate) with the target population of people at risk of stunting in Banten Province. To test the reliability of the model, tests were carried out in coastal, rural and urban areas. In coastal areas, it is carried out in Labuan District, Pandeglang Regency, rural areas are carried out in Binuang District, Serang Regency, and in urban areas, it is carried out in Citangkil District, Cilegon City. The results of the model test in coastal communities for mechanical fish processing obtained an $N\text{-Gain}$ value of $\langle g \rangle = 0.425$, agricultural and plantation product innovations in rural communities were obtained $\langle g \rangle = 0.516$, while in urban communities related to the treatment of non-organic industrial waste by recycling, a value was obtained $\langle g \rangle = 0.502$. Referring to the results of the trial, empowerment with a contextual learning model is effective in improving the knowledge and skills of families at risk of stunting in coastal, rural, and urban areas. Although the increase in the effectiveness of the model has not been optimal, there is hope to minimize families at risk of stunting in Banten Province.

Keywords: Regional classification, education level, empowerment design, contextual learning, families at risk of stunting

Introduction

Banten Province has an area of 8,651 square kilometers (km²) with an altitude of 0-1,929 meters above sea level (masl) and is bordered by the Java Sea to the north, Samudra Indies to the south, and Sunda Strait to the west. In terms of government administration, Banten Province consists of four districts/cities with 155 sub-districts. Referring to the size of the region, topographically the area of Banten Province consists of lowlands, highlands (hills), and mountains. Based on regional boundaries and classifications, Banten Province includes coastal, rural, and urban areas. With this classification, it is assumed that each region has a different number of inhabitants.

In 2024, the population of Serang Regency will be 1,730,022 people, Pandeglang Regency will be 1,357,366 people, Lebak Regency will be 1,168,612 people, and Tangerang Regency will be 3,343,436 people.

Meanwhile, the population of Cilegon City is 474,863 people, Serang City is 735,651 people, Tangerang City is 1,945,396 people, and South Tangerang City is 1,404,785 people (BPS Provinsi Banten, 2025). The population consists of several age groups, including children aged 0-4 years (toddlers), brides-to-be (catin) aged 15-19 years, and families of childbearing age 15-49 years (Indah & Junaidi, 2021). According to Law Number 16 of 2019, the age of marriage in Indonesia for men is at least 19 years old and women are at least 16 years old. Therefore, the age group is categorized as catin, while the age group of 15-49 years is included in the category of fertile families.

In 2024, the number of families of childbearing age, cats and children under five in Serang Regency will be 534,036 families, 104,976 cats and 146,747 children under five. Then, in Pandeglang Regency there are 388,775 families, 120,906 cats and 104,994 children under five, Lebak Regency as many as 431,414 families, 92,307 cats and 123,994 children under five, and Tangerang Regency as many as 1,023,908 families, 208,659 cats and 243,139 children under five. Meanwhile, the number of families of childbearing age, cats and toddlers in Cilegon City is 146,585 families, 35,619 cats and 41,500 children under five, respectively. Then, Serang City has 226,143 families, 48,867 cats and 62,396 children under five, Tangerang City has 542,992 families, 135,573 cats and 146,851 children under five, and South Tangerang City has 356,693 families, 84,790 cats and 67,600 children under five (BPS Provinsi Banten, 2025). The difference in the number of families of childbearing age, catin and children under five, shows that there is a difference in marriage age, so it is assumed that there is a difference in the level of education in each district/city.

In 2024, the level of education in Banten Province will be 56.85% in primary education, 10.66% in secondary education, and 8.71% in higher education. The largest basic percentage is Pandeglang Regency at 65.95%, while the smallest is Tangerang City at 14.94%. Then, for secondary education, the largest is Serang Regency, while the smallest is South Tangerang City. Furthermore, for higher education, the largest is South Tangerang City, while the smallest is Lebak Regency. The level of education is related to the health of individuals, communities and the nation (Hidayat, 2019; Koçyiğit et al., 2025; Enebeli, 2025). One of the individual health in a family is the incidence of stunting in children under five.

The stunting rate in Banten Province occurs in each district/city with a ratio of 1:8 to 1:123. In 2020 in Pandeglang Regency, 1 in 36 children under five was stunted, while in Lebak Regency 1 in 13 children under five were stunted. In 2021, in Serang Regency, 1 in 8 children under five was stunted, while in South Tangerang City, 1 in 65 children under five were stunted. Then, in 2022 in Pandeglang Regency, 1 in 8 children under five was stunted, while in Tangerang City 1 in 70 children under five were stunted. Furthermore, in 2023 in Serang Regency 1 in 14 children will be stunted, while in South Tangerang City 1 in 123 children will be stunted. Referring to the level of education, it shows that districts/cities with low education levels have a high stunting rate. The high rate of stunting in children under five in the Banten Province area needs to be preventive, including by empowering families at risk of stunting.

Families at risk of stunting are limited to families that have one or more risk factors, such as having children of young women or prospective brides (catin), pregnant women, children aged 0-23 months or children aged 24-59 months (Kurniawan et al., 2025). Other risk factors include poor families, poor parental education, and poor sanitation and drinking water (Putri et al., 2023; Wulandari et al., 2025). Meanwhile, the empowerment of families at risk of stunting is carried out as an effort to detect early, provide education and counselling, and facilitate assistance to minimize stunting risk factors (Eriyani et al., 2024; Mami Trisari Nggiri et al., 2025). Referring to the classification of the region, the number of families of childbearing age and the incidence of stunting in the Banten province area, an empowerment design was made based on topography and education level. The empowerment design was developed using a contextual learning model, with the aim of improving the knowledge, economy and parenting of children under five in families at risk of stunting.

Method

Empowerment Design with a Contextual Learning Model based on Regional Topography and Education Level in Families at Risk of Stunting in Banten Province

To improve knowledge, economy, and parenting in children under five, an empowerment design based on regional topography and education level is made. The topography of each district/city has a different altitude, so it is classified into coastal, rural and urban (Ruhiat, 2022; Wei et al., 2023). Referring to the classification of the area and the level of education in the Banten Province area, the empowerment design was made with a contextual learning model.

The contextual learning model is an approach that links learning materials to the situation of empowerment areas (Paputungan & Siradjang, 2025; Sa'diah & Nahdi, 2023). Referring to the characteristics of the region, the learning model is delivered in accordance with the characteristics and level of education of the community. The application of the learning model in community empowerment uses a 4D model (Define, Design, Develop, and Disseminate). The stages of design and implementation of empowerment with a contextual learning model using 4D are shown in Figure 1.

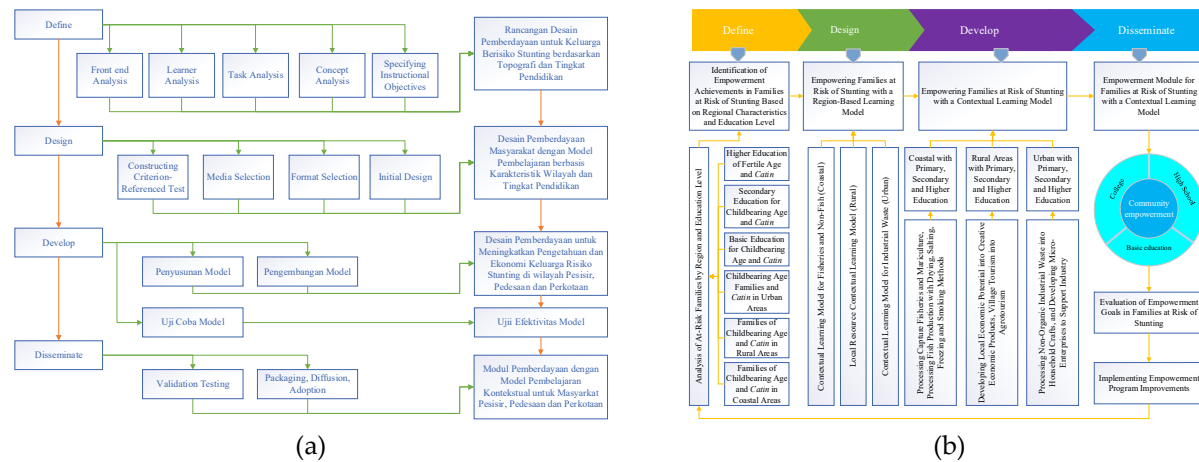


Figure 1. Design and stages of community empowerment implementation with 4D

Figure 1. a show the empowerment design, while Figure 1.b shows the implementation stages using 4D. The stages of empowerment design with 4D are as follows:

- 1) *Define*, carried out with five activities (Ardiansyah et al., 2025), namely:
 - a) *Front-end Analysis*, a potential analysis of stunting incidence in Banten Province, was carried out
 - b) *Learner Analysis*, an analysis of the topography of the area and the level of education of the community in the Banten Province area, was carried out
 - c) *Task Analysis*, identify the skills of participants to determine the objectives of empowerment
 - d) *Concept Analysis*, it is carried out to evaluate the steps of the empowerment model according to the topography and level of education of the community
 - e) *Specifying Instructional Objectives*, formulate the goal of empowerment for families at risk of stunting based on the topography of the region and the level of education of the community
- 2) *Design*, carried out in step (Li, 2025; Riniwati et al., 2025) as follows:
 - a) *Constructing a Criterion-Referenced Test*, develop theoretical standards based on the goals of empowerment in each region and level of community education
 - b) *Media Selection*, identify learning media that are appropriate and relevant to the characteristics of the region and level of education
 - c) *Format Selection*, develop a design with learning media, strategies, approaches, methods, and learning resources based on the region and level of community education
 - d) *Initial Design*, simulation of learning materials for families at risk of stunting with regional characteristics and education level
- 3) *Develop*, carried out in three stages to produce products (Ida Afidah, 2025; Kemal & Iip Permana, 2025) as follows:

- a) Model preparation, consisting of problem identification, program planning through social mapping and deliberation, program implementation, monitoring and evaluation, and sustainability management
- b) Development of models, processes of increasing public awareness, and capacity to improve quality of life, independence, and well-being through participatory approaches and appropriate strategies
- c) Model trials, to measure the effectiveness of a community or group empowerment program
- 4) *Disseminate*, the stages of product dissemination through individuals, groups, or systems:
 - a) *Validation testing*, revision after it is applied in the actual target or target
 - b) *Packaging, diffusion, and adoption*, to print a handbook of irrigation and disseminate it so that it can be absorbed (diffused) or understood by others and can be used (adopted).

With the four stages mentioned above, empowerment is carried out for families at risk of stunting in the Banten Province area. Then, Figure 1.b shows the stages of empowerment in people at risk of stunting, with the following stages:

- 1) Identification of empowerment achievements in families at risk of stunting includes analysis of regional classification and community education level
- 2) Empowerment of families at risk of stunting with a learning model that is suitable for shore, rural, and urban communities
- 3) Empowerment of families at risk of stunting with a contextual learning model adapted to the region and level of education of the community.
- 4) Empowerment module for families at risk of stunting in coastal communities, rural communities, and education for primary, secondary, and higher education

The material for empowering the parenting of children under five includes the application of love, consistency, and communication, while improving the economy includes the management of natural resources according to the characteristics of the region (Ema Martini et al., 2025; Hamat et al., 2024). Referring to the regional classification of Banten Province, the context of learning in empowering the community in each region is different. In coastal communities, empowerment materials are related to fisheries and non-fishery, in rural communities related to agricultural and plantation products, as well as regional resources for agro-tourism development, while in urban communities, they are related to non-organic industrial waste management.

To test the reliability of the model, tests were carried out in coastal, rural, and urban areas. Referring to the characteristics of the region and the level of education of the community, the coastal area is located in Labuan District, Pandeglang Regency. Then, for rural areas, it was carried out in Binuang District, Serang Regency, while for urban areas, it was carried out in Citangkil District, Cilegon City. Empowerment to improve the family economy in coastal areas was conveyed on how to process fishery production, in rural areas on how to process agricultural production, while in urban areas on the use of non-organic industrial waste.

To test the reliability of the empowerment model with the contextual learning model, a model effectiveness test was carried out (Hamat et al., 2024; Perez-Rivero et al., 2024). To measure this effectiveness, an N-Gain test was carried out with the equation:

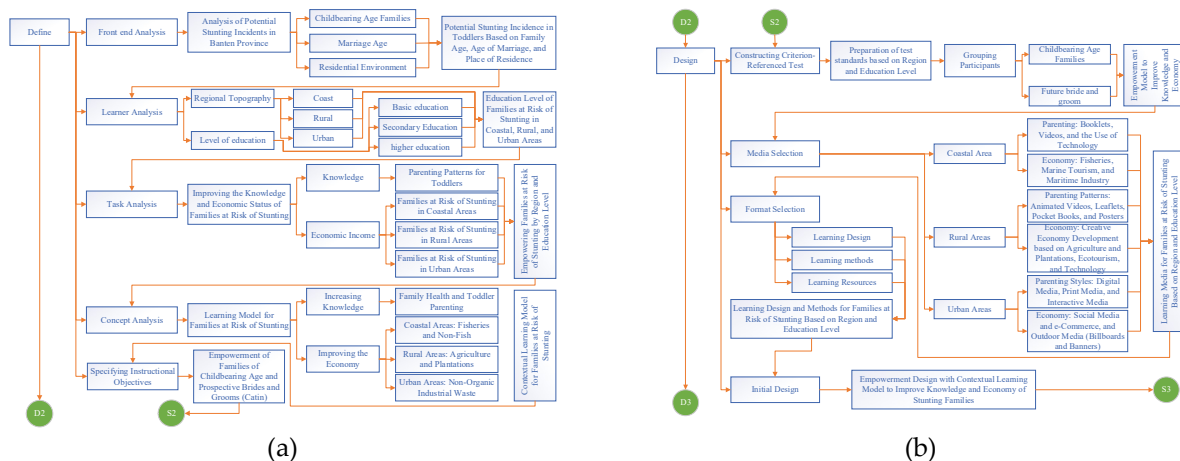
$$\langle g \rangle = \frac{T_f - T_i}{S_i - T_i}$$

With T_f is the post-test score, T_i is the pre-test score, S_i is the ideal score or maximum score, and is the $\langle g \rangle$ Normalized N-Gain score.

Result And Discussion

In designing empowerment with contextual learning models based on topography and education level, a 4D model is used. In the define stage (D1), five activities were carried out, consisting of front-end Analysis, learner analysis, task analysis, concept analysis, and specifying instructional objectives. At the front-end stage of the analysis, a potential stunting analysis was carried out based on the number of families and the number of children under five in the Banten Province area. Then, at the learner analysis stage, an analysis of the topography of the region and the level of community education is carried out, while at the task analysis stage, an empowerment model is carried out intended for the community in each region and level of education. Furthermore, at the concept analysis stage, a learning model analysis is carried out in carrying out empowerment according to the topography of the region and the level of education, while specifying instructional objectives is carried out a learning model analysis in accordance with the topography and education level of the community. Then, at the design stage (D2), four activities were carried out, consisting of constructing the criterion-relevance test, media selection, format selection, and initial design. In the constructing stage of the criterion-referenced test, standard criteria for community empowerment based on topography and community education level are established. Then, at the media selection stage, the identification of learning media according to the topography and level of education of the community is carried out.

Furthermore, in the selection format, a learning design is made with learning methods and resources according to the topography and level of community education, while in the initial design stage, an initial design of an empowerment model is made with a contextual learning model. Furthermore, at the development stage (D3), three activities were carried out, consisting of model preparation, model development, and model trial. At the stage of preparing the model, an empowerment model design was made for coastal, rural, and urban communities in accordance with the level of community education. Then, at the model development stage, an empowerment model was developed for coastal, rural, and urban communities according to the level of community education, while at the trial stage, model trials were carried out in coastal, rural, and urban areas. Meanwhile, in the last one, disseminate (D4) is carried out by means of product implementation and dissemination. Empowerment design with contextual learning models based on topography and community education level, as shown in Figure 2.



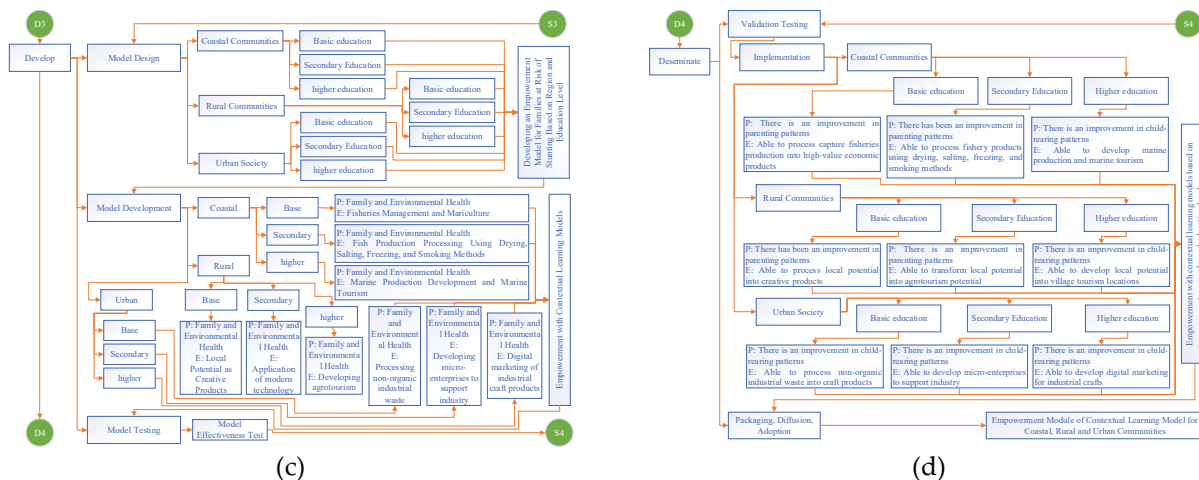


Figure 2. Empower design with contextual learning models

Figure 2.a shows the stages of analysis at the define stage (D1, Figure 2.b shows the empowerment design stage at the design stage (D2), Figure 2.c shows the stage of model preparation and development, and Figure 2.d shows the stages of product implementation and dissemination through Disseminate (D4).

At the define stage (D1) with the front-end Analysis stage, the results of potential stunting events in the Banten Province area were obtained. The prevalence of stunting rates in the Banten Province area occurs in four districts/cities. In a five-year period from 2020 to 2024, the prevalence of stunting rates in Banten Province is between 0.8 and 12.5%, with the largest occurring in 2021 in Serang Regency, while the smallest occurred in 2023 in South Tangerang City. Meanwhile, in 2024, the prevalence of stunting rates in each district/city in the Banten Province area between 1-6% will be the largest in Serang Regency, while the smallest will occur in South Tangerang City. The prevalence of stunting rates during this period is shown in more detail in Figure 3.

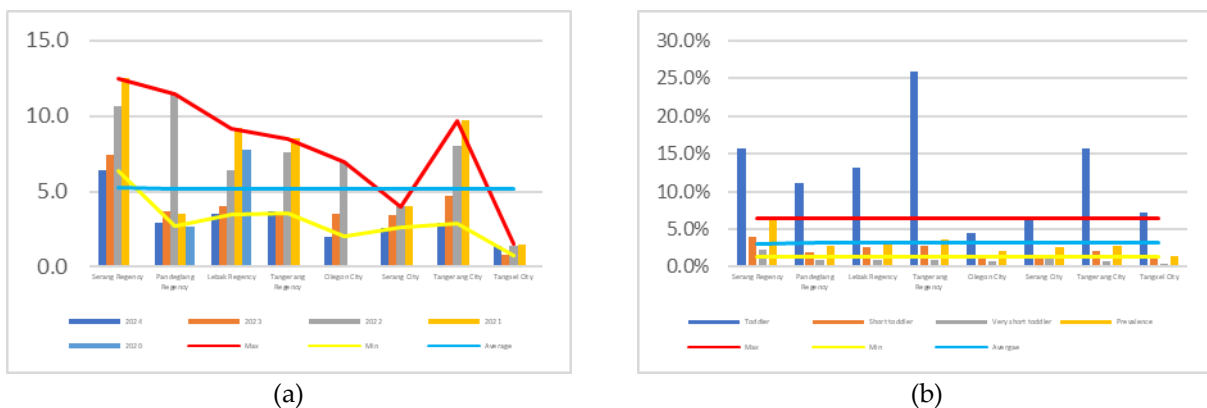


Figure 3. Prevalence of stunting in Banten Province

In Figure 3.a, the average prevalence of stunting in a period of 5 years is 5.2%. The prevalence of stunting rates in Serang Regency between 6.4 and 12.5% is the largest in 2021, while the smallest occurs in 2024. Then, the prevalence of stunting rates in Pandeglang Regency ranged from 2.7%-11.5% in 2022, while the smallest occurred in 2020. The prevalence of stunting in Lebak Regency between 3.5 and 9.2% is the largest in 2021, while the smallest occurs in 2024. Meanwhile, the prevalence of stunting rates in Tangerang Regency between 3.6 and 8.5% is the largest in 2021, while the smallest occurs in 2023. Meanwhile, the prevalence of stunting rates in Cilegon City between 2.0-7.0% is the largest in 2022, while the smallest will occur in 2024. Then, the prevalence of stunting rates in Serang City between 2.6%-4.0% occurred in 2021 and 2022, while the smallest occurred in 2024. The prevalence of stunting in Tangerang

City is between 2.9%-9.7%, with the largest occurring in 2021, while the smallest occurred in 2024. Furthermore, the prevalence of stunting rates in South Tangerang City between 0.8-1.5% is the largest in 2021, while the smallest occurs in 2023. In general, the highest prevalence of stunting rates in Banten Province occurred in 2021, while districts/cities that are below the provincial average are Serang City and South Tangerang City.

Furthermore, Figure 3.b shows the average prevalence of stunting rates in 2024 in Banten Province at 3.2%. In that year, the prevalence of stunting rates in Banten Province was between 1.4%-6.4%, with the largest occurring in Serang Regency, while the smallest was in South Tangerang City. Meanwhile, the prevalence of stunting rates in Pandeglang Regency is 2.9%, Lebak is 3.5%, Tangerang is 3.7%, while Cilegon City is 2.0%, Serang City is 2.6%, and Tangerang City is 2.9%. The prevalence of stunting rates in each district/city is caused by the large number of children under five who experience short and very short height. There are 146,747 children under five in Sobang Regency, who are short, as 5,948 children, while 3,433 children under five are of very short height. Then, 104,994 children under five in Pandeglang Regency experienced shortness, with as many as 2,079 children, while 943 children under five were of very short height. There are 123,994 children under five in Lebak Regency, who are short, as 3,222 children, while 1,117 children under five are of very short height.

Furthermore, there are 243,139 children under five in Tangerang Regency, who are fewer than 6,779 children, while 2,224 children under five are of very short height. Meanwhile, there are 41,500 children under five in Cilegon City, who are fewer than 523 children, while 321 children under five are of very short height. There are 62,396 children under five in Serang City, 930 of whom are short, while 705 children under five are very short in height. Then, there were 146,851 children under five in Tangerang City, who were fewer than 3,129 children, while 1,079 children under five were of very short height. Furthermore, there are 67,600 children under five in South Tangerang City, who experience 707 have short stature, while 226 children under five have very short height. Based on this data, the prevalence of stunting rates in districts/cities that are below the provincial average is Pandeglang Regency, and all cities in the Banten Province area. This is in accordance with the results of Dian Isnaini Arifianti et al's research, which concluded that stunting is prevalent in Banten Province, with a dominant factor, namely short birth length (Arifianti et al., 2025).

In the define stage (D1) with the learner analysis stage, the results of the classification of the region and the level of community education were obtained. The results of population analysis based on topography were obtained from the classification and contours of the area in each district/city. Banten Province, with an altitude of 0-1,929 meters above sea level, has an area of 8,651 km² bordered by the Java Sea to the north, the Special Region of Jakarta and West Java to the east, the Indian Ocean to the south, and the Sunda Strait to the west. With the height and boundaries of these areas, each district/city has a different height and area. Serang and Pandeglang Regencies are located at an altitude of 0-1,778 meters above sea level, with an area of 1,469,920 km² and 2,746.81 km². Lebak Regency, with an altitude of 0-1,929 meters above sea level, has an area of 3,312.64 km², and Tangerang Regency, with an altitude of 0-85 meters above sea level, has an area of 1,034.54 km². Then Cilegon City, with an altitude of 0-553 meters above sea level, has an area of 163.45 km². Serang City, with an altitude of 10-18 meters above sea level, has an area of 266.18 km² and 164.55 km² and South Tangerang City, with 44-88 meters above sea level, has an area of 164.86 km². Areas with an altitude of 0-200 meters above sea level include lowlands, 201-1,700 meters above sea level, including hills, and altitudes above 1,700 meters above sea level include mountains. Referring to the height of the region, Banten Province includes lowlands, hills, and mountains. Meanwhile, referring to the territorial boundaries, Banten Province includes coastal, rural, and urban areas. Based on the altitude of the area, each district/city has a different regional classification. Serang, Pandeglang, and Lebak districts consist of lowlands, hills, and mountains, while Tangerang Regency and City, South Tangerang, and Cilegon have lowlands. Referring to the classification and area of the area, each district/city has a different number of sub-districts, families of childbearing age, children,

and the number of children under five. The classification of the region, the number of families of childbearing age, and the category of each district/city are shown in Table 1. In the table, it appears that the area in Banten Province has 155 sub-districts, consisting of coastal areas of 29 sub-districts, rural areas with lowlands as many as 69 sub-districts, hills 33 sub-districts, and mountains as many as five sub-districts, while urban areas have 19 sub-districts. Serang Regency, with a population of 1,730,022 people, has 534,036 families of childbearing age, 104,976 catin people, and 146,747 children under five. Families of childbearing age living on the coast are 16.10%, in rural areas with lowlands are 50.01%, hills are 21.73% and mountains are 1.41%, while those living in urban areas are 10.74%. Pandeglang Regency, with a population of 1,357,366 people, has 388,775 families of childbearing age, 120,096 catin people, and 104,994 children under five. Families of childbearing age living on the coast are 20.19%, rural areas with lowlands are 25.19%, hills are 46.61% and mountains are 5.00%, while those living in urban areas are 3.00%. Lebak Regency, with a population of 1,168,612 people, has 431,414 families of childbearing age, 92,307 catin people, and 123,994 children under five. Families of childbearing age living on the coast are 19.85%, rural areas with lowlands are 36.13%, hills are 26.19% and mountains are 7.98%, while those living in urban areas are 9.85%. Tangerang Regency, with a population of 3,343,436 people, has 1,023,908 families of childbearing age, 208,659 catin, and 243,139 children under five. Families of childbearing age living in coastal areas are 17.84%, rural areas with low-lying areas are 65.40%, while those living in urban areas are 16.76%.

Table 1. Distribution of families of childbearing age, cats, and toddlers in Banten Province

Regency/City	Topography	Territory	Contour	ΣKc	ΣKS	ΣAB	ΣCatin
Serang	0-1,778 Masl	Shore		6	85,980	24,556	16,422
		Rural	Low	13	267,071	69,437	51,883
			Hills	7	116,069	32,494	23,620
			Mountains	1	7,540	2,318	1,507
		Urban	Low	2	57,376	15,127	11,544
Pandeglang	0-1,778 Masl	Shore		7	78,508	20,951	17,331
		Rural	Low	9	97,927	25,064	52,374
			Hills	17	18,193	50,309	44,109
			Mountains	1	17,568	5,091	3,912
		Urban	Hills	1	13,579	3,579	3,180
Lebak	0-1,929 Masl	Shore		6	85,865	24,071	17,573
		Rural	Low	9	155,853	49,464	35,288
			Hills	9	112,993	31,264	23,607
			Mountains	3	34,411	6,737	6,421
		Urban	Low	1	42,503	12,458	9,418
Tangerang	0-85 Masl	Shore		6	182,678	43,347	34,335
		Rural	Low	20	699,591	162,992	134,032
		Urban	Low	3	171,639	36,300	40,292
Cilegon	0-553 Masl	Shore		3	47,244	12,896	11,999
		Rural	Low	3	69,755	19,834	16,933
		Urban	Low	2	29,586	8,770	6,627
Serang	10-18 Masl	Shore		1	34,311	9,812	7,285
		Rural	Low	2	53,813	15,462	10,985
		Urban	Low	3	133,019	37,122	6,627
Tangerang	10-18 Masl	Rural	Low	9	300,215	88,749	78,928

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		Urban	Low	4	242,777	58,102	56,645
Tangerang Selatan	10-18 Masl	Rural	Low	4	141,182	25,785	32,112
		Urban	Low	3	215,512	41,815	52,678

Information: Regency/city means district/city, ΣKc means the number of districts, ΣKS means the number of families of childbearing age, ΣAB means the number of children under five $\Sigma Catin$ means the number of brides-to-be

Cilegon City, with a population of 474,863 people, has 146,585 families of childbearing age, 35,619 cats, and 41,500 children under five. Families of childbearing age who live in the Shore are 32.23%, Rural with Low plains are 47.59%, while those who live in Urban are 20.18%. Serang City, with a population of 735,651 people, has 226,143 families of childbearing age, 48,867 *catin* people, and 62,396 children under five. Families of childbearing age living in the Shore are 15.17%, Rural with Low plains are 23.80%, while those living in the Urban are 61.03%. Tangerang City, with a population of 1,945,396 people, has 605,810 families of childbearing age, 140,698 *catin* people, and 146,851 children under five. Families of childbearing age living in Rural areas with Low plains are 59.93%, while those living in Urban areas are 40.07%. Furthermore, South Tangerang City, with a population of 1,404,785 people, has 356,693 families of childbearing age, 84,790 *catin* people, and 67,600 children under five. Families of childbearing age living in the Shore are 15.17%, Rural with Low plains are 39.58%, while those living in Urban are 60.42%. The difference in the number of families of childbearing age and *catin* in each district/city shows that there is a percentage difference in each sub-district.

The percentage of families of childbearing age in sub-districts in the Banten Province area is between 0.13%-2.73%, the largest in South Tangerang City, and the smallest in Pandeglang Regency. Meanwhile, the *catin* is between 0.12-2.80%, the largest is South Tangerang City, while the smallest is Lebak Regency. Data on the percentage of families of childbearing age and *catin* in the Banten Province area, more details are shown in Figure 4.

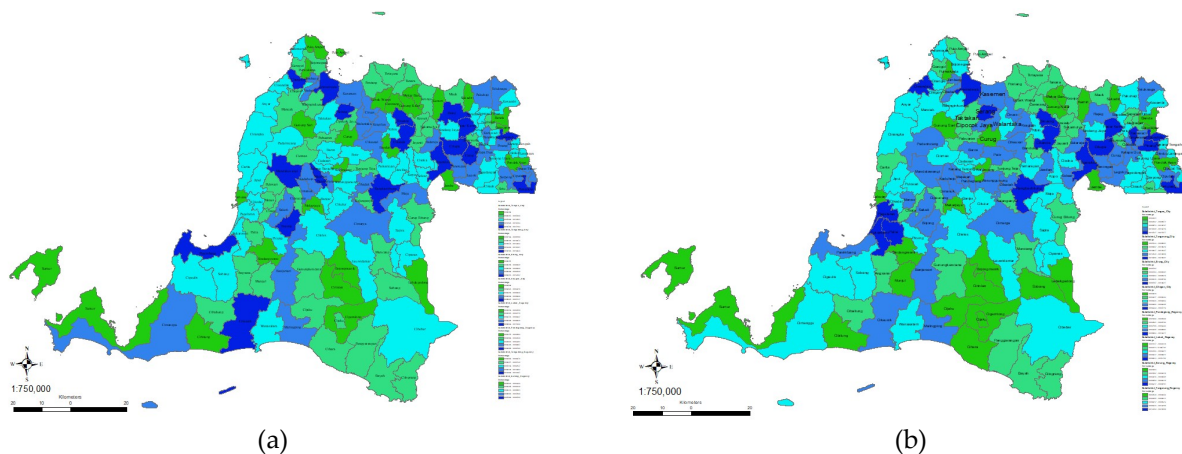


Figure 4. Distribution of families of childbearing age and *catin* in the Banten Province area

Figure 4.a shows the percentage of families of childbearing age, while Figure 4.b shows the percentage of cats in each sub-district. Figure 4.a shows the percentage of families of childbearing age in each sub-district in the Banten Province area. The percentage of families of childbearing age in Serang Regency is between 0.20 and 0.98%, the largest in Binuang District, while the smallest is in Gunung Sari District. Thus, the most prominent childbearing age families in Serang Regency are in the Rural area with the Low plains, while the smallest is in the Mountains area. Then, the percentage of families of childbearing age in Pandeglang Regency is between 0.13-0.48%, the largest in Cikeusik District, while the smallest is in

Labuan District. Thus, the largest and smallest childbearing age families in Pandeglang Regency are in the Shore area. The percentage of families of childbearing age in Lebak Regency is between 0.18%-1.148%, the largest in Rangkasbitung, while the smallest is in Cigemlong District. Thus, the most prominent families of childbearing age in Lebak Regency are in the Urban area, while the smallest is in the Mountains area.

Furthermore, the percentage of families of childbearing age in Tangerang Regency is between 0.35 and 2.24%, the largest in Pasar Kemis District, while the smallest is in Mekar Baru District. Thus, the most prominent families of childbearing age in Tangerang Regency are in the Urban area, while the smallest is in the Rural area. Meanwhile, the percentage of families of childbearing age in Cilegon City is between 0.36-0.71%, the largest in Citangkil District, while the smallest is in Purwakarta District. Thus, the most prominent families of childbearing age in Cilegon City are in the Rural area with Low plains, while the smallest is in the Urban area. The percentage of families of childbearing age in Serang City is between 0.53 and 1.93%, the largest in Serang District, while the smallest is in Curug District. Thus, the most prominent families of childbearing age in Serang City are in the Urban area with Low plains, while the smallest is in the Rural area. Then, the percentage of families of childbearing age in Tangerang City is between 0.72-1.96%, the largest in Cipondoh District, while the smallest is in Benda District. Thus, the most prominent childbearing age families in Tangerang City are in the Urban area, while the smallest is in the Rural area.

Furthermore, the percentage of families of childbearing age in South Tangerang City is between 0.43 and 2.73%, the largest in Pamulang District, while the smallest is in Pondok Aren District. Thus, the most prominent families of childbearing age in Cilegon City are in the Urban area, while the smallest is in the Rural area. Figure 4.b shows the percentage of catin in each sub-district in the Banten Province area. The percentage of catin in Serang Regency is between 0.18-0.82%, the largest in Cikande District, while the smallest is in Gunung Sari District. Thus, the largest catin in Serang Regency is in the Rural area with the Low plains, while the smallest is in the Mountains area. Then, the percentage of catin in Pandeglang Regency is between 0.17-1.64%, the largest in Pagelaran District, while the smallest is in Labuan District. Thus, the largest and smallest catin in Pandeglang Regency are in the Rural Low Plains area, while the most isolated is in the Shore area. The percentage of catin in Lebak Regency is between 0.12-1.13%, the largest in Rangkasbitung, while the smallest is in Cigemlong District. Thus, the largest catin in Lebak Regency is in the Urban area, while the smallest is in the Mountains area.

Furthermore, the percentage of catin in Tangerang Regency is between 0.25-2.48%, the largest in Pasar Kemis District, while the smallest is in Mekar Baru District. Thus, the largest catin in Tangerang Regency is in the Urban area, while the smallest is in the Rural area. Meanwhile, the percentage of catin in Cilegon City is between 0.36-0.77%, the largest in Ciwandan District, while the smallest is in Purwakarta District. Thus, the largest catin in Cilegon City is in the Shore area, while the smallest is in the Urban area. The percentage of catin families in Serang City is between 0.47-0.96%, the largest in Serang District, while the smallest is in Curug District. Thus, the largest catin in Serang City is in the Urban area with the Low plain, while the smallest is in the Rural area. Then, the percentage of catin in Tangerang City is between 0.74-2.05%, the largest in Cipondoh District, while the smallest is in Benda District. Thus, the largest cat in Tangerang City is in the Urban area, while the smallest is in the Rural area. Furthermore, the percentage of catin in South Tangerang City is between 0.29-2.80%, the largest in Pamulang District, while the smallest is in Pondok Aren District. Thus, the largest catin in Cilegon City is in the Urban area, while the smallest is in the Rural area.

The results of the analysis of the level of education in the Banten Province area were obtained by the percentage of education based on age group. In the grouping, an age group of 7-12 years is made for people who have graduated from elementary school or equivalent, an age group of 13-15 years for people who have graduated from junior high school or equivalent, an age group of 16-18 years for people who have graduated from high school or equivalent, and an age group of 19-23 years for people who have

graduated from college. People who graduate from elementary and junior high school are categorized as basic education, high school graduates in the category of secondary education, and those who graduate from college as higher education. The results of data analysis based on these age groups, in full, are shown in Table 2. In the table, shows the percentage of the population of Banten Province in 2024. In that year, it appeared that in the age group of 7-15 years, there were residents who were no longer in school, for males 3.37% and females 3.11%. Then, in the age group of 16-18, the percentage of men who did not continue school anymore was 29.92%, while that of women was 24.94%. Furthermore, in the age group of 19-23 males, who did not continue school again, the percentage was 73.01%, while for females it was 71.85%. This shows that the population that has completed basic education for males is below 3.37%, and females are below 3.11%, that secondary education graduates for males are below 29.92%, and below 24.94%, while the population that has completed higher education for males is below 24.99%, and females are below 18.15%. The level of education in Banten Province can be seen based on the economic level and school participation rate.

Table 2. Percentage of public education in Banten Province

Age	Boys (No School Anymore) (%)	Female (No More School) (%)	Boys (Still in School) (%)	Female (Still in School) (%)
7-12	-	-	99.55	99.48
13-15	3.37	3.11	96.46	96.89
16-18	29.92	24.94	69.16	24.52
19-23	75.01	71.85	75.01	27.60

In 2024, the percentage of poor people in the Banten Province area will be between 2.36%-9.18%, the largest is Pandeglang Regency, while the smallest is South Tangerang City. While the school participation rate in each group varies, the relationship between the poor population and the school participation rate is shown in Figure 5.

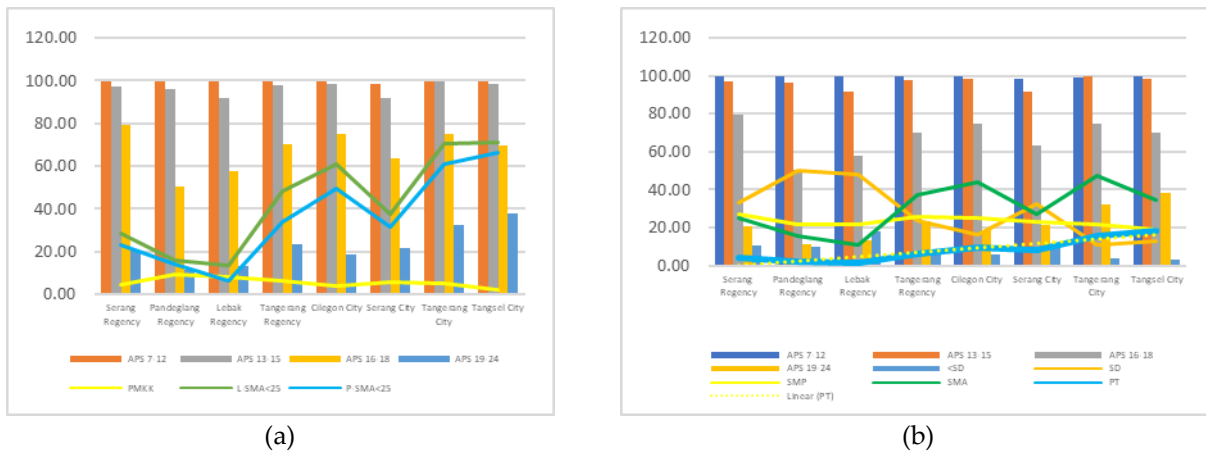


Figure 5. Community education level in Banten Province

Figure 5.a shows the relationship between the percentage of poor people and the school participation rate. In contrast, Figure 5.b shows the relationship between the percentage of schools and the level of education. In Figure 5.a, it appears that the percentage of poor people in districts/cities (PMKK) with school participation rates (APS) in each age group varies. The percentage of education in Serang Regency with PMKK is 4.51% in groups 7-12 of 99.76%, 13-15 of 97.08%, 16-18 of 79.35%, and 19-24 of 20.54%. Then, the percentage of education in Pandeglang Regency with PMKK is 9.18% in groups 7-12 of 99.62%,

13-15 of 96.15%, 16-18 of 50.61%, and 19-24 of 11.35%. The percentage of education in Lebak Regency with PMKK is 8.44% in groups 7-12 by 99.42%, 13-15 by 91.65%, 16-18 by 57.62%, 19-24 by 13.45%. Furthermore, the percentage of education in Tangerang Regency with PMKK is 6.55% in groups 7-12 of 99.39%, 13-15 of 97.49%, 16-18 of 69.94%, and 19-24 of 23.40%. Meanwhile, the percentage of education in Cilegon City with PMKK is 3.75% in groups 7-12 of 99.57%, 13-15 of 98.49%, 16-18 of 75.01%, and 19-24 of 18.44%. Then, the percentage of education in Serang City with PMKK is 5.65% in groups 7-12 of 98.32%, 13-15 of 91.51%, 16-18 of 63.45%, and 19-24 of 21.46%. The percentage of education in Tangerang City with PMKK is 5.42% in groups 7-12 by 99.34%, 13-15 by 99.45%, 16-18 by 74.85%, 19-24 by 32.46%. Furthermore, the percentage of education in South Tangerang City with PMKK is 2.36% in groups 7-12 of 99.63%, 13-15 of 98.59%, 16-18 of 69.64%, and 19-24 of 38.06%. Based on this data, it shows that the higher the percentage of poor people, the greater the school participation rate in each district/city. This is shown by the people who have graduated from high school in each district/city. The male and female population with secondary education levels in Serang Regency was 28.52% and 23.41%, Pandeglang Regency was 15.83% and 13.91%, Lebak Regency was 13.53% and 6.68%, while in Tangerang Regency it was 48.59% and 33.83%. Meanwhile, the male and female population with secondary education levels in Cilegon City was 60.70% and 49.51%, Serang City was 37.56% and 31.55%, Tangerang City was 70.54% and 61.01%, while in South Tangerang City it was 71.04% and 66.12%. Then, Figure 5.b shows the relationship between school participation rates and education levels. The percentage of education level in Serang Regency in the age group of 7-12 is 10.57% who do not graduate from elementary school and 33.19% who graduate from elementary school, 13-15 who do 27.01% who graduate from junior high school, 16-18 who graduated from high school by 25.11%, the age group of 19-24 who graduated from higher education by 4.12%. Then, the percentage of education levels in Pandeglang Regency in the age group of 7-12 is 10.05% who do not graduate from elementary school and 49.94% who graduate from elementary school, 13-15 who do 21.94% who graduate from junior high school, 16-18 who graduate from high school by 15.74%, and the age group of 19-24 who graduated from higher education by 2.33%. The percentage of education level in Lebak Regency in the age group of 7-12 is 18.01% who do not finish elementary school and 47.94% who graduate from elementary school, 13-15 who do 21.64% who graduate from junior high school, 16-18 who graduate from high school by 10.66%, the age group of 19-24 who graduated from higher education is 1.74%. Furthermore, the percentage of education level in Tangerang Regency in the age group of 7-12 is 7.52% who do not graduate from elementary school and 24.00% who graduate from elementary school, 13-15 as much as 25.40% who graduate from junior high school, 16-18 who graduate from high school by 37.25%, the age group of 19-24 who graduated from higher education by 5.85%. Meanwhile, the percentage of education level in Cilegon City in the age group of 7-12 is 5.47% who do not finish elementary school and 16.55% who graduate from elementary school, 13-15 who do 24.99% who graduate from junior high school, 16-18 who graduate from high school by 43.74%, the age group of 19-24 who graduated from higher education by 9.25%. Then, the percentage of education level in Serang City in the age group of 7-12 is 8.85% who do not finish elementary school and 32.75% who graduate from elementary school, 13-15 as much as 23.09% who graduate from junior high school, 16-18 who graduate from high school by 27.17%, the age group of 19-24 who graduated from higher education by 8.14%. The percentage of education level in Tangerang City in the age group of 7-12 is 3.76% who do not graduate from elementary school and 11.16% who graduate from elementary school, 13-15 who do 21,751% who graduate from junior high school, 16-18 who graduate from high school by 47.57%, the age group of 19-24 who graduated from higher education by 15.75%. Meanwhile, the percentage of education level in South Tangerang in the age group of 7-12 is 2.86% who do not finish elementary school and 13.02% who graduate from elementary school, 13-15 who do 18.66% who graduate from junior high school, 16-18 who graduate from high school by 34.43%, the age group of 19-24 who graduated from higher education by 18.02%. Referring to the classification of regions and education levels, an empowerment plan was carried out for families of childbearing age and cat in the Banten Province area.

Empowerment Design with a Contextual Learning Model based
on Regional Topography and Education Level
in Families at Risk of Stunting in Banten Province

The plan to implement empowerment in the community group is carried out in the stages of task analysis, concept analysis, and specifying instructional objectives.

In the three stages above, empowerment is carried out based on the classification of the area, contour, and level of education. Referring to these three differences, to improve the economy of families at risk of stunting, empowerment is carried out with a contextual learning model. With this learning model, the material in each regional classification varies according to the level of education. As for the empowerment material, the full details are shown in Table 3.

Table 3. Empowerment materials to improve the family economy

Territory	Contour	Education	Material
Shore	Low	Basic Education	Processing capture fisheries (tuna, skipjack, cob, shrimp, and snapper) and marine aquaculture (seaweed and shellfish)
		Middle Education	Fish production management by drying, salting, freezing, and smoking methods
		Higher Education	Marketing development of marine production and development of marine tourism
Rural	Low	Basic Education	Development of local potential into creative products (handicrafts) and processed products
		Middle Education	Development of agricultural production with modern agricultural techniques
		Higher Education	Development of information technology for marketing agricultural products
	Hills	Basic Education	Processing garden products, such as sugarcane, coffee, and tubers
		Middle Education	Developing the potential of agriculture and plantation-based village tourism
		Higher Education	Developing gardens into educational agro-tourism
	Mountains	Basic Education	Develop horticultural cultivation, tea, and coffee plantations
		Middle Education	Developing crop yields, such as packaged coffee powder, into products with high selling value
		Higher Education	Developing tourism based on natural tourism
Urban	Low dan Hills	Basic Education	Processing non-organic industrial waste into handicraft products
		Pendiidikan Menengah	Developing micro, small, and medium enterprises that are relevant to the needs of the industry
		Higher Education	Developing digital marketing of non-organic industrial waste handicraft products

Because the empowerment material in each region and level of education is different, the empowerment is different. Based on this, empowerment was created and developed, as shown in Figure 6.

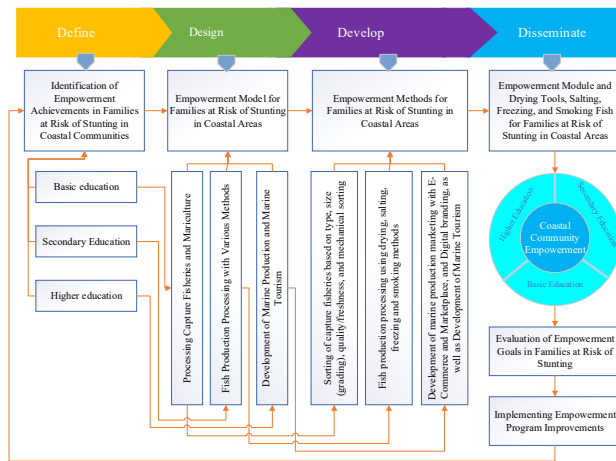


Figure 6.a shows empowerment for communities in the Shore region. The empowerment of capture fisheries sorting is carried out mechanically using a separator machine. Then, the production processing method (drying, salting, freezing, and smoking) is used with a solar-powered ERK-type cabinet machine. Furthermore, marketing, e-commerce, and digital branding are carried out.

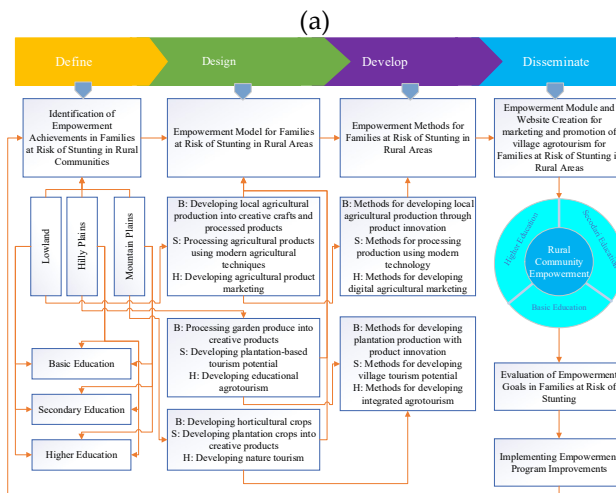


Figure 6.b shows empowerment for rural communities. In rural communities, the empowerment of agricultural and plantation production is carried out into creative and processed handicraft products with modern technology. Then, the method of developing digital marketing for agricultural and plantation products, and empowering the potential of agricultural and plantation areas into integrated agrotourism areas.

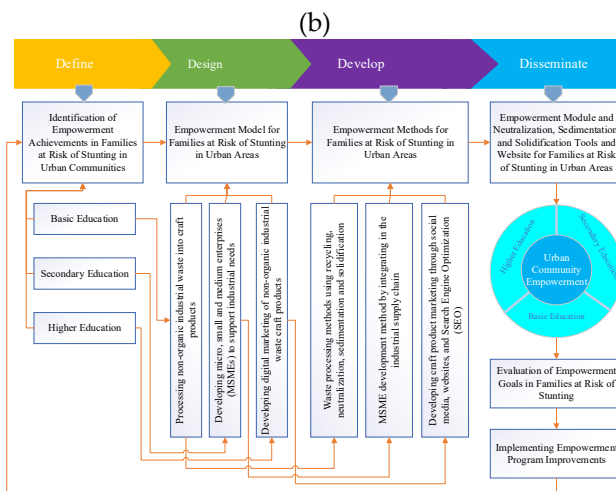


Figure 6.c shows empowerment for the Urban community. In urban communities, empowerment is carried out to process non-organic industrial waste into handicraft products and market them digitally. In processing the waste, it is carried out by means of Recycling, neutralization, settling, and solidification. Then, developing micro, small, and medium enterprises (MSMEs) to support industrial needs, by integrating them in the industrial supply chain.

(a)
(b)
(c)
Figure 6. Community empowerment design

To test the effectiveness of empowerment with a region-based contextual learning model, a trial was conducted on Shore, Rural, and Urban communities. The model reliability test in the Shore area was carried out in Labuan District, Pandeglang Regency. Then, for the Rural area, it is carried out in Binuang District, Serang Regency, while for the Urban area, it is carried out in Citangkil District, Cilegon City.

The results of the test in the Shore community for mechanical fish processing obtained an average pre-test score of 60,625, with the highest score of 75 and the lowest score of 45, while the average post-test score was 70,982, with the highest score of 85 and the lowest score of 60. With this data, a value is

obtained $\langle g \rangle = 0.425$, based on the N-Gain value indicator, the value is included in the "Medium" category. Then, the results of the trial in rural communities by innovating agricultural and plantation products obtained an average pre-test score of 61,339, with the highest score of 75 and the lowest score of 50, while the average post-test score was 73,304, with the highest score of 85 and the lowest score of 60.

With this data, a value is obtained $\langle g \rangle = 0.516$, based on the N-Gain value indicator, the value is included in the "Medium" category. Furthermore, the results of the trial in urban communities related to the treatment of non-organic industrial waste by recycling obtained an average pre-test score of 62,054, with the highest score of 75 and a low score of 55, while the average post-test score was 73,571, with the highest score of 85 and the lowest of 65. With this data, a value is obtained $\langle g \rangle = 0.502$, based on the N-Gain value indicator, the value is included in the "Medium" category. Referring to the results of model tests conducted in Shore, Rural, and Urban communities, the model design is in the "Medium" category.

This shows that empowerment with contextual learning models is efficacious in improving the knowledge and skills of families at risk of stunting in Shore, Rural, and Urban areas.

Conclusions

Banten Province, with an altitude of 0-1,929 meters above sea level, has Low, Hills, and mountain plains, while referring to regional boundaries, including Shore, Rural, and Urban areas. Serang, Pandeglang, Lebak, Tangerang, Cilegon City, and Serang City have Shore, Rural, and Urban areas. However, Serang, Pandeglang, and Lebak Regency have the contour of the Low plain, Hills, and Mountains. In contrast, Tangerang Regency, Cilegon City, and Serang City have the contour of the Low plain. Meanwhile, Tangerang City and South Tangerang have Rural and Urban areas with Low flat contours. The difference in regional classification and contour, the level of education of families of childbearing age, and catin in each district/city is different. Based on these differences, the distribution of childbearing age, catin age, and education level in each district/city is different.

In 2024, in the Banten Province area, the number of families of childbearing age will be 3,718,324 families, the number of cats will be 836,892 people, and children under five will be as 937,221 children. The distribution of families of childbearing age, catin and adolescent children is largest in Tangerang Regency, while the smallest is in Cilegon City. The most significant percentage of distribution of childbearing age, cats, and toddlers in the city is 27.57%, 24.93%, and 25.94%. Meanwhile, the prevalence of stunting rates in the Banten Province area is between 0.8%-12.5%, with the largest occurring in Serang Regency, while the smallest is South Tangerang City. The significant prevalence of stunting in the Banten Province area is due to differences in education levels.

The level of public education in the Banten Province area is mostly Basic Education. The percentage of Basic Education level is the largest in Lebak Regency at 87.59%, Middle Education in Tangerang City at 47.57%, while Higher Education in South Tangerang City is 15.75%. The prevalence of stunting and the level of public education occur in areas with low education levels. Referring to regional classification, education level, and stunting incidence, an empowerment design was made with a contextual learning model.

The design of empowerment in the Shore community for the Basic Education level is a mechanical fish production processing model with a machine separating the size and freshness of fish. For the community with Middle Education, a dryer, acidification, freezing and smoking machine is made with solar energy, while for Higher Education, a website is developed for marketing development and marine tourism. Then, empowerment in rural communities for the Basic Education level, processing agricultural and plantation production by innovating products. For people with Middle Education, agricultural and

plantation processing is carried out with modern technology applications, while for Higher Education, a website is developed for marketing agricultural and plantation production, as well as agro-tourism potential. Furthermore, empowerment in urban communities for the Basic Education level is carried out to empower non-organic industrial waste processing through recycling. For the community with Middle Education, non-organic industrial waste is processed by neutralization, sealing, and solidification, while for Higher Education, a website is developed for marketing the production of non-organic industrial waste. The results of model trials in Shore, Rural, and Urban communities show that the design of the model is included in the "Medium" category, meaning that the model has quality at the intermediate level.

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