PREDICTING CAPACITY AND DISTRIBUTION OF HEALTHCARE FACILITIES IN WEST JAVA

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Abstract

Inequitable distribution of healthcare infrastructure is a barrier to universal access. This research analyzes gaps in primary care facilities across 627 districts in Indonesia's West Java Province. A data-driven approach identifies shortages and proposes an evidence-based strategic construction plan to improve equity. Demand was forecast using national standards of 1 clinics per 30,000 population. While some areas meet or exceed standards, severe shortages affect many districts. Gap analysis quantified deficiencies by subtracting existing clinics from projected demand for each district using simple linear extrapolation for each kota and kabupaten. Quantifying gaps at district level highlighted disparities not evident in provincial summaries. The gap analysis methodology substantiated widespread inequities by comparing granular demand modeling to current infrastructure. Findings demonstrate analytical techniques incorporating sub-regional data can identify hidden disparities and inform targeted policy. The technique provides a data-driven approach to inform healthcare planning and resource allocation, with applications for regional systems globally. In 2020, Average demand was 2 puskesmas, ranging up to 15. In total 363 districts fell below the minimum national standard for clinics per capita. Mapping visualized clusters of highly deprived regions. In 2020, with West Java's 47 million residents, total modeled demand is 1771 puskesmas and up to 1959 in 2032. Current healthcare quantity was collected through web scraping district websites, finding only 1016 existing puskesmas. This reveals a significant shortage, with over 55% of districts below the standard. Distribution inequity was evident, with puskesmas density spanning 0-10 across District. These findings clearly demonstrate a need for expanded investment in primary care infrastructure. To achieve more equitable access, a multi-year strategic construction plan was proposed targeting new clinic development in underserved districts. The plan stratified districts into priority tiers based on the severity of shortages. Construction will be phased over 3 stages, focusing first on districts with the highest deprivation to rapidly improve equity.

Keywords: healthcare capacity, gap analysis, demand forecasting, web scraping

Introduction

Primary health care is defined as "essential healthcare based on practical, scientific, socially acceptable, and universally accessible methods and techniques for individuals, families, and communities". The entitlement to healthcare for all individuals entails that each person should have the means to access the required healthcare services, at the time and location of their need, without any financial impediments. The primary healthcare system is a crucial element of the right to health. It plays a pivotal role in addressing the major health concerns of the community by

offering promotive, preventative, curative, and rehabilitative services (WHO, 2017). The provision of primary healthcare access to its citizens is a responsibility of the government, as it is a crucial human right that has been acknowledged by international human rights standards. It is the duty of the governments to ensure that their citizens can avail primary healthcare services, which is the most comprehensive, equitable and cost-effective approach in improving people's physical and mental health (WHO, 2021). Therefore, it is the obligation of every nation to offer primary healthcare to its citizens, guaranteeing their right to health and promoting the well-being of the population.

Indonesia's healthcare system has undergone notable transformations in recent times. In 2014, the country initiated a mandatory health insurance scheme named Jaminan Kesehatan Nasional (JKN) with the aim of providing fundamental medical care and facilities to all its citizens which was conducted by the Badan Penyelenggara Jaminan Sosial (BPJS). The health insurance program within the Jaminan Kesehatan Nasional (JKN) is implemented through a mandatory Social Health Insurance mechanism. It is developed with the concept of ensuring the health of the entire population universally (Kemenkes, 2014).

Furthermore, to ensure the sucess of Jaminan Kesehatan Nasional (JKN), there are several factors that need to be improved, one of which is the availability of primary healthcare facilities and competent doctors serving in primary care services. They need to be evenly distributed throughout the country (Laksono, Wulandari, & Soedirham, 2019).

There are several factors that contribute to the uneven distribution of healthcare workers in Indonesia. To begin with, there exists an unequal geographic distribution, whereby healthcare workers tend to concentrate in urban and more developed regions, while rural and remote areas experience scarcity (Laksono et al., 2019). Furthermore, population density plays a pivotal role, with regions having higher population densities typically having more healthcare workers (Suryanto, Plummer, & Boyle, 2017). The availability of hospitals and primary healthcare centers also significantly influences the distribution, as regions with more facilities tend to attract healthcare workers (Suryanto et al., 2017). Income opportunities also impact the distribution, with specialist doctors often preferring private practice (Hipgrave & Hort, 2014). Finally, the lack of infrastructure, including limited healthcare facilities and inadequate healthcare infrastructure, poses significant barriers to accessing healthcare services in certain regions of Indonesia (Geleto, Chojenta, Musa, & Loxton, 2018). Collectively, these factors contribute to the inequitable distribution of healthcare workers in the country.

This study serves as an initial stage of study that is supposed to be improved on for further implementation. This study will only evaluate the healthcare facilities demand that are in the area under West Java Governance (Galloway et al., 2002). West Java consists of 627 districts. There are a few limitations of this research. One of them is the data limitation. The healthcare facilities data collected in this study only acquires information of healthcare that is limited to the availability of data in google maps. It does not include the healthcare workforce quantity of each facility due to data

unavailability. The number will be assumed and its detail can be seen in Table II.2. While on the demand side, the demand estimation relies heavily on the use of the standard national ratio of healthcare facilities which means that any factors that influence demand is represented only by the ratio to the number of population of each District. Additionally, the population projection used historical data of growth rate in kota/kabupaten from 2011 to 2022 to project future demand. Another limitation is that the healthcare facilities included in this study is strictly public owned due to the unavailability of the quantity and standard ratio data (Seyoum, Alemayehu, Christensson, & Lindgren, 2021).

Healthcare demand refers to the quantity of healthcare services that individuals or populations desire or require at a given time (Ghorbani-Dehbalaei, Loripoor, & Nasirzadeh, 2021). It is influenced by several factors, including population demographics, prevalence of and diseases health conditions, healthcare needs, and individual preferences. The demand for healthcare services can be measured using various indicators, such as the number of patient requests for appointments, the number of visits made or appointments completed, and the number of healthcare professionals available to provide services (Goodman et al., 2016). Understanding healthcare demand is important for policymakers and healthcare providers to ensure that healthcare services are available and accessible to those who need them (Mwabu, 2008).

Method

Research Design

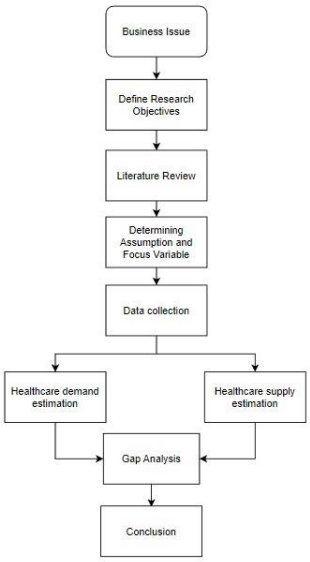

Figure III.1 Research Design

The figure depicts the structure of significant concept by the author in this study. According to the Figure 1 Research design, the author begins by identifying business issues and obstacles that have occurred or may rise in addressing uneven healthcare distribution such as misallocating healthcare development to a district that does not

require it, unequal healthcare demand distribution and the inadequacy of existing infrastructure. In analyzing this situation, the author uses variables of healthcare demand and healthcare supply to assess which District need more healthcare development. The author used a combination google maps web scraping, public population data, assumption of supply ratio, demand proportional rate and recommended healthcare-to-population ratio to generate the estimation which will be evaluated using gap analysis. Then the author used scenario planning understand to produce and conclude a recommendation.

Data Collection

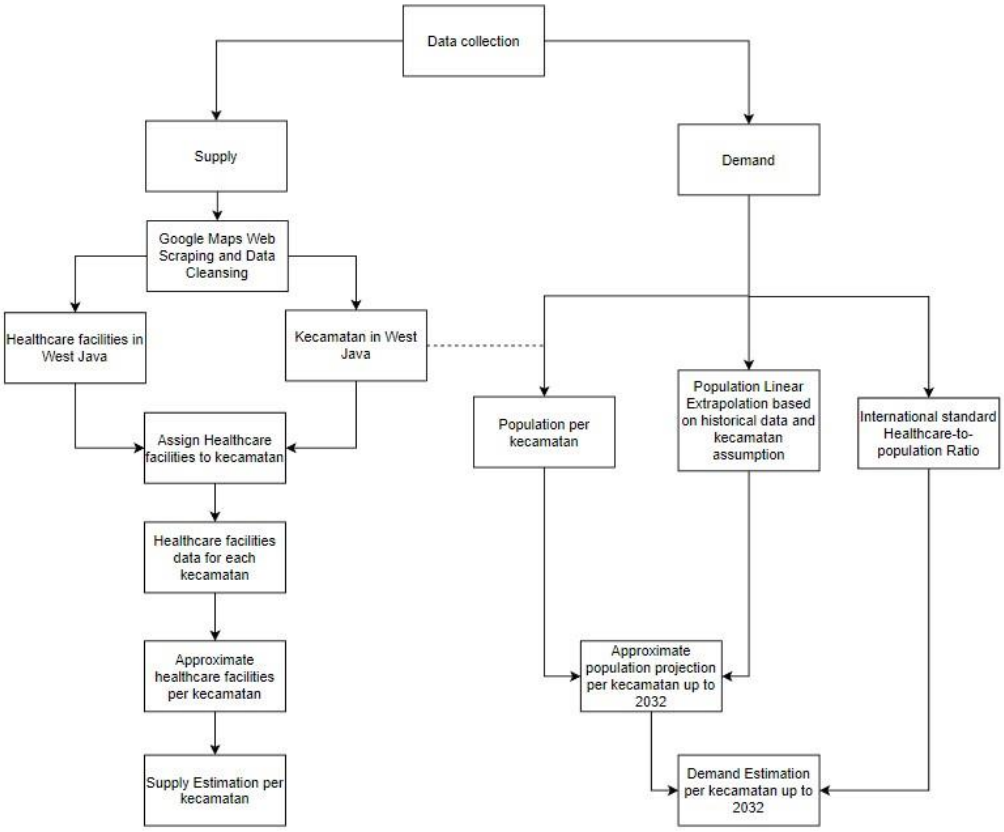

Figure III.2 Data collection framework

The data in this research is secondary data which can be obtained from verified website. The data that can be obtained from several sources on the table 2 source of data.

Results and Discussion

In this chapter, the author will present estimations of demand and supply for each type of healthcare facility in West Java. This research utilizes data collection through web scraping, followed by data processing using Excel and Python, and subsequently

analyzed descriptively. From the descriptive analysis, a gap analysis is conducted to determine the districts with the largest disparities between demand and supply.

Findings

Pusat kesehatan masyarakat in 2020

Table 1 Descriptive Statistics for puskesmas

	Variable	Supply data	Demand data
1	Puskesmas quantity	1016	1552
2	Average puskesmas per District	1.62	2.47
3	Median	1	2
4	Mode	1	2
5	Standard deviation	1.53	1,73
6	Coefficient of variation	0,94	0,7
7	Skewness	1,479	2,273
8	75th percentile	2	3
9	25th percentile	0,5	1
10	Range	10	15

In table IV.1, it can be seen the summary descriptive statistics of supply and demand for pusat kesehatan masyarakat in West Java. Using gap analysis to find the districts that have shortage, 10 District that has the widest gap between supply and demand has been founded as shown in Table IV.2. Since puskesmas assigning method is strictly using nearest District distance as the sole factor that determines whether a puskesmas is in a District or not, supply_puskesmas does not represent the registered puskesmas in a District, instead it represent the nearest puskesmas in a District. That does not mean that District that has zero value has zero puskesmas, it rather means that puskesmas was registered in that District is actually closer to another District.

Table IV.2 District with biggest shortage

kota_kabupaten	kecamatan	populasi_2020	supply_puskesmas_2020	demand_puskesmas_2020	gap_2020
KABUPATEN BOGOR	CIBINONG	363424	2	12	-10
KABUPATEN BOGOR	GUNUNG PUTRI	294338	2	10	-8
Kota Bekasi	Pondokgede	251195	0	8	-8
KABUPATEN BEKASI	TAMBUN SELATAN	441034	7	15	-8
Kota Bekasi	Bekasi utara	337013	4	11	-7
Kota Depok	Pancoran Mas	244975	1	8	-7
Kota Depok	Sukmajaya	252531	1	8	-7
Kota Bogor	Bogor Barat	233637	2	8	-6
KABUPATEN BOGOR	BOJONG GEDE	213210	1	7	-6
Kota Cimahi	Cimah Utara	165652	0	6	-6

To further understand the shortage distribution of puskesmas in each District, the author used graphical representation using Tableau, as can be seen in figure IV.1.

This shows that there is a number of District that does not meet required national standard. The exact number is 363 District, while the number that exactly met the demand and exceeded is 136 District and 128 respectively. The puskesmas supply data in appendix 2.

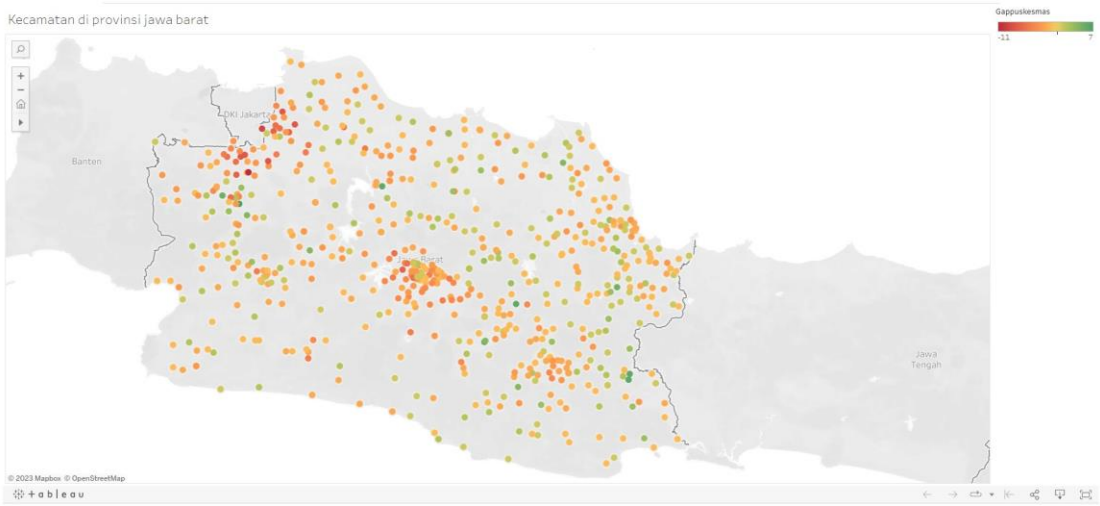

Figure IV.1 Gap District di Jawa Barat 2020

From table IV.2, it is shown that the total shortage of districts is 536 puskesmas. However, the calculation also includes District that has surplus which means that the number is inflated and does not represent the actual shortage. The shortage estimation must exclude the puskesmas quantity of District that at least has met the standard demand. Thus, the puskesmas quantity of District that has shortage or deficit is the one that needs to be calculated which is in 363 District. The number of puskesmas shortage in these District is 755 puskesmas in 2020.

Pusat kesehatan masyarakat in 2021-2032

As the baseline of the analysis, projected healthcare demand is compared to current supply capacity in order to quantify potential gaps in the system. Current supply represents the existing infrastructure and capacity based on recent government planning, thus providing a realistic baseline rooted in real-world investments and constraints (Bird, Daveau, O'Dwyer, Acha, & Shah, 2022). Comparing this to projected future demand, which estimates increased needs based on population growth and other trends, reveals the magnitude of unmet needs. This approach frames the supply expansion problem in concrete terms by quantifying the magnitude of new facilities required to meet projected service needs. (Ahmad, Chen, Guo, & Wang, 2018) By anchoring the analysis to current supply and modelled future demand, the methodology provides data-driven insights into capacity gaps over the relevant planning horizon. The summary of the current supply data and its visualisation is shown on Table IV.1 and on Appendix B respectively. To predict the condition of puskesmas in the future, demand projection and supply scenarios have been utilized to calculate the gap that needs to be filled. Demand projection of west java province in 2032 is summed up in Table IV.2. The

result shows that the average and median of puskesmas have increased while the mode stays the same.

Table IV.3 Descriptive Statistics for puskesmas

	Variable	Supply data	Demand data
1	Puskesmas quantity	1016	1782
2	Average puskesmas per District	1,62	2,84
	Variable	Supply data	Demand data
3	Median	1	2
4	Mode	1	2
5	Standard deviation	1,53	1,944
6	Coefficient of variation	0,94	0,684
7	Skewness	1,479	2,25
8	75th percentile	2	3
9	25th percentile	0,5	2
10	Range	10	17

Comparing Table IV.1 to Table IV.2, it shows that there is an increase in puskesmas demand from 2020 to 2032 of 230 puskesmas. However, similarly to the preceding data, the dataset pertaining to the quantity of puskesmas comprises the sum of surpluses and deficits across District. In 2032, the number of District that is below standard is 412 District which is an increase of 49 District in 2020 as can be seen in Figure IV.2. From these District that are below standard, the actual shortage for puskesmas is 943 in total. The following graph is shown in Figure IV.3.

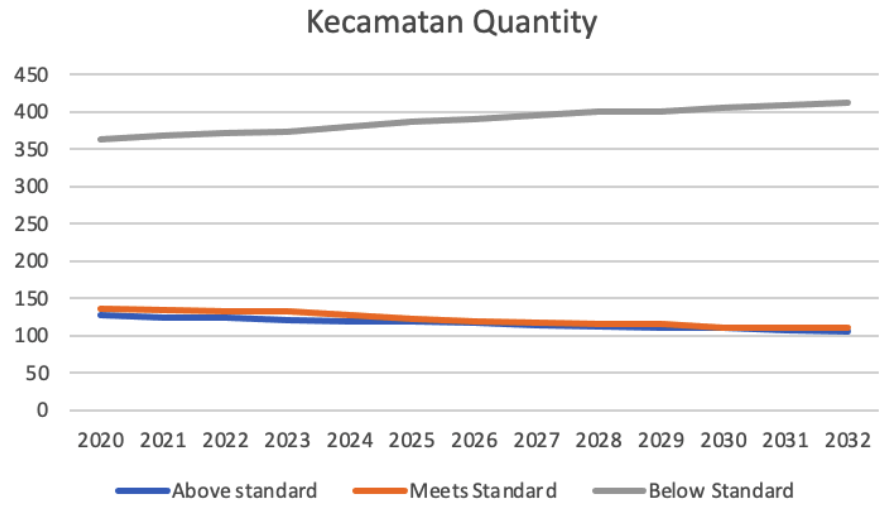

Figure IV.2 District Quantity Graph

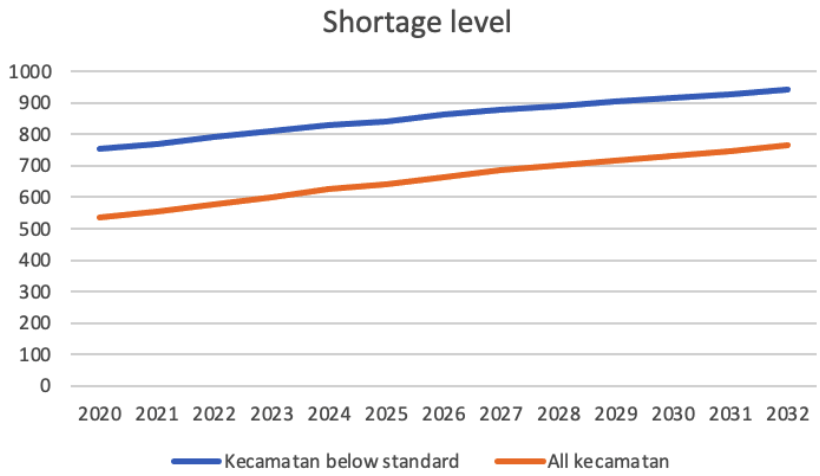

Figure IV.3 Puskesmas Shortage level Graph

From Figure IV.2, it shows that if healthcare facilities quantity stays the to 2032 level, District below standard quantity has a downward trend while District that is up-to-standard has an upward trend. The shortage level also shows that it keeps increasing in trend. The 10 District that has the biggest shortage have also slightly changed due to varying population growth for each kota/kabupaten, it can be seen in Table IV.4.

Table IV.4 10 District with biggest shortage

kota_kabupaten	kecamatan	populasi_2020	populasi_2032	demand_puskesmas_2020	demand_puskesmas_2032	gap_2020	gap_2032	selisih
KABUPATEN BOGOR	CIBINONG	363424	411261,6966	12	14	-10	-12	-2
KABUPATEN BEKASI	TAMBUN SELATAN	441034	505559,0054	15	17	-8	-10	-2
KABUPATEN BOGOR	GUNUNG PUTRI	294338	333081,8693	10	11	-8	-9	-1
Kota Bekasi	Pondokgede	251195	264655,6792	8	9	-8	-9	-1
Kota Depok	Sukmajaya	252531	292473,7626	8	10	-7	-9	-2
Kota Bekasi	Bekasi utara	337013	355072,3717	11	12	-7	-8	-1
Kota Depok	Pancoran Mas	244975	283722,6321	8	9	-7	-8	-1
Kota Bogor	Bogor Barat	233637	256854,9739	8	9	-6	-7	-1
KABUPATEN BOGOR	BOJONG GEDE	213210	241274,947	7	8	-6	-7	-1
Kota Depok	Cipayung	171587	198726,8712	6	7	-6	-7	-1

To be able to utilize the gap analysis for future healthcare planning, the shortage distribution of puskesmas in each District has been illustrated, the author used graphical representation using Tableau, as can be seen in figure IV.4. A histogram to visualize the District amount in shortage amount has also been created and can be seen in Figure IV.5

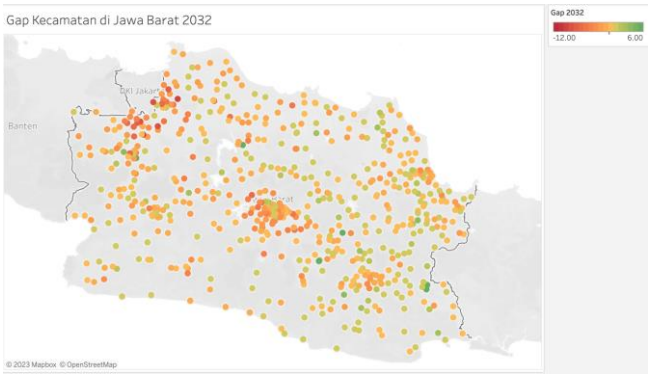

Figure IV.4 Gap District di Jawa Barat 2032

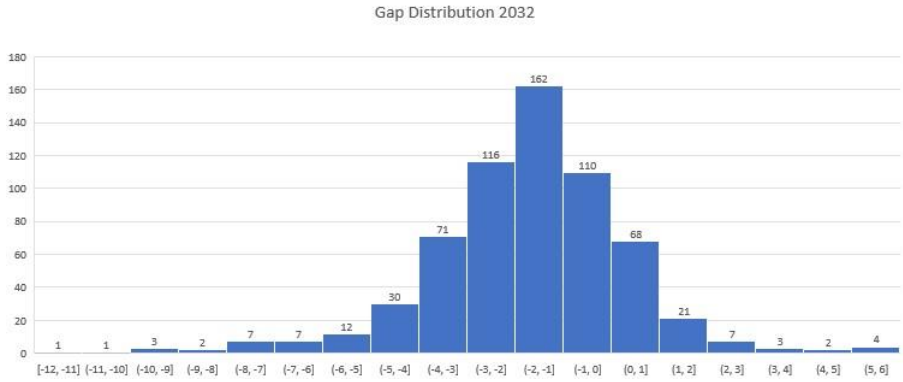

Figure IV.5 Histogram of District puskesmas gap distribution in 2032

Business Solution

Based on the analysis, there is 57,8 % District from 627 kecaman that is in shortage of puskesmas in 2020 while the number is also keep on increasing each year up to 65,7% in 2032. The complete data of shortage for each District can be seen in appendix 3. The data presented is ranked based on the kecataman which has higher shortage and higher projected shortage growth. Utilising the shortage data as reference, Dinas Kesehatan have varying solution to fill the gap. The possible solutions proposed by the author includes a few type of governmental action that can be done by Dinas Kesehatan which were ranked by how much puskesmas needs to be build.

1. Strategic Construction Plan

   Aligned with the initial purpose of the study which is to identify districts in need and its puskesmas shortage quantity, the proposed solution is to construct new puskesmas in need based on puskesmas shortage quantity of District data. The solution mentioned relates to Strategic Construction Planning which in this case was based on the shortage and its projected shortage. The data allows for targeted 10-year construction plan to expand clinics in all up to 412 District in 2032 that are below national standard.

   In detail, Dinas Kesehatan Jawa Barat would use the data to pinpoint areas that has the highest shortage and to prioritize them based on shortage level and then to match the healthcare facilities to the demand projection findings. From previous 5 year data of healthcare facilities quantity, in jawa barat the average puskesmas addition is 11 puskesmas a year, ranging from 20 to 5 puskesmas over the 5 year span. Therefore, not only that construction plan needs to be prioritized for certain districts, the total puskesmas construction also needs to be increased to an average of 79 puskesmas a year for Dinas kesehatan to solve puskesmas shortage in Jawa Barat in 2032. It needs 755 puskesmas in 2020 to 943 puskesmas in 2032 Though capital-intensive initially, permanent local facilities provide the most equitable path to meet long-term primary care, assuming that demand will be growing so long with the population to match the District in surplus of puskesmas.

2. Strategic construction plan and Healthcare patient forwarding

   Dinas Kesehatan create a system which makes them appoint the nearest puskesmas

whose Puskesmas Quantity is exceeding its district demand become the second go-to redirection for district that is in shortage. The system would be a healthcare optimization network that Dinas Kesehatan needs to be developed. The solution is less burdering financially since it does not build any physical properties, only a study and regulation changes. The shortage of puskesmas needs to be constructed reduced to 536 puskesmas in 2020 and 766 puskesmas in 2032. This means that in 2032, it is 177 less puskesmas shortage. These 177 puskesmas span across 105 District in which is the District names and locations are included in Appendix C.

3. Strategic construction plan and Healthcare facility efficiency improvement
   Dinas Kesehatan could prioritize and employ healthcare service system that only applies to puskesmas on the District in shortages. A new system that would increase of how many people can be facilitated in 1 puskesmas. For example, regulation that incentivize high quality workers to be placed on these District or setting a strict queueing system that would decrease waiting time for patients or tax break policy etc. Developing and implementing new system to all over puskesmas in Jawa Barat would take significant financial cost. The gap analysis of the District in shortage would be valuable to know exactly which district need to be invested. Although needs further study, there is possibility that there is an improvement plan that could improve how much 1 puskesmas can serve more people so that the several kecamatan that are currently in shortage could possibly not in shortage anymore which lessen the requirement for Dinas Kesehatan to build puskesmas.
4. Strategic construction plan, Healthcare patient forwarding and Health efficiency improvement
   Dinas Kesehatan could try develop new patient forwarding system and improve healthcare efficiency then see the how well these solution increase districts' healthcare capacity in shortage. Combination of both could potentially reduce healthcare capacity needed and decrease financial cost.

In deciding which alternative to be chosen by Dinas Kesehatan, Weighted Criteria Framework has been used to find the best alternative solution. There are 6 criteria used in the framework. They are as follow:

1. Strategic Impact
   This criterion evaluates how well each alternative delivers on the core strategic goal of expanding healthcare access and reducing facility shortages in underserved districts. Alternatives that directly expand physical infrastructure capacity score highest on strategic impact, as increasing permanent clinics is the primary objective. Options that indirectly address shortages by rerouting patients or improving productivity have less direct strategic impact. This criterion is weighted as the most important at 25% due to alignment with the central strategic aim.
2. Cost
   The cost criterion assesses the upfront capital expenditures and ongoing operating costs of each alternative solution. Lower cost options are preferable given budget constraints faced by the health system. Alternatives that require major infrastructure

spending on new construction score lower on cost, while options leveraging existing assets score higher. This is an important criterion weighted at 20% given finite health system resources.

3. Implementation time
   This criterion measures how quickly each alternative can be rolled out to start providing impact after being selected. Speed is valued given the pressing need to improve healthcare access across underserved districts. Alternatives requiring major new construction tend to have longer implementation timeframes. Options focused on new processes, routing protocols, or productivity can often be rolled out faster. This criterion is moderately weighted at 15% as urgent impact is desired but not the only consideration.
4. Sustainability
   The sustainability criterion evaluates whether the impact of each alternative will be lasting or temporary after implementation. Solutions providing permanent infrastructure and lasting gains are more sustainable. Approaches relying more on technology, protocols, or human behavioral change may degrade over time. This criterion is moderately weighted at 15% as sustainability is valued but not absolutely critical.
5. Feasilibility
   Feasibility examines how easily each alternative can be implemented based on organizational change management, process changes, stakeholder coordination, and disruptiveness of the required initiatives. Easier, lower disruption options have higher feasibility. Complex construction projects or major process overhauls score lower. This is an important consideration weighted moderately at 15% given other higher priorities as well.
6. Risk
   This criterion assesses the overall risk level of each alternative, including risks of delays, cost overruns, implementation failures, technology glitches, lack of adoption, and other uncertainties. Higher risk options are less preferable. Major construction initiatives tend to carry more risks, while process and routing changes may be lower risk. This is weighted at 10% as a consideration but not central factor.

To enable objective comparison of the alternative solutions, weighted criteria were defined along with a clear 1-5 scoring range for each criterion. The table IV.5 summarizes the descriptions associated with a score of 1, 2, 3, 4 or 5 points for each of the six evaluation criteria. A score of 1 represents the least preferred option and 5 the most preferred option for each criterion. Defining this scoring range provides a consistent framework to rate each alternative's performance on factors like strategic alignment, cost, implementation timeline, sustainability, ease of implementation, and inherent risk. With clear scoring definitions, the alternatives can be reliably assessed across these key dimensions to support a data-driven selection.

Table IV.5 Criteria Scoring Details

Criteria	1	2	3	4	5
Strategic Impact	Does not directly address infrastructure gaps	Indirectly addresses gaps through rerouting patients	Improves utilization of existing assets	Combination of infrastructure expansion and productivity gains	Directly builds new permanent facilities
Cost	Very high capital and operating costs	Moderately high costs	Moderate costs	Low costs leveraging existing assets	Very low or no costs
Implementation time	Very long timeline, over 5 years	Long timeline, 3-5 years	Moderate timeline, 1-3 years	Fast timeline, under 1 year	Very fast, less than 6 months
Sustainability	Temporary or very short term impact	Some degradation expected over time	Moderate sustainability, lasts 5-10 years	Highly sustainable for 10-15 years	Permanent infrastructure sustained indefinitely
Feasiblity	Very complex with high barriers	Challenging with significant process changes	Moderate complexity	Relatively straightforward implementation	Very simple rollout
Risk	Very high uncertainty and probability of failure	High risk of issues and delays	Moderate risks that can be managed	Low risks overall	Very low risks and uncertainties

Table IV.6 Weighting Criteria Table

Criteria	Weigh	Alt.1	Alt.2	Alt.3	Alt.4

	t				
Strategic Impact	0.25	5 Directly addresses infrastructure gaps through new construction	3 Partial impact on gaps by redirecting patients	4 Improves utilization of existing assets	4 Hybrid approach
Cost	0.25	2 High - Large capital expenditure on new construction	4 Low - Minimal infrastructure needed	3 Moderate - Systems improvement investments needed	3 Moderate/High - Combined initiatives
Implemetation time	0.2	2 Long - Years required for construction projects	4 Fast - New processes in months	3 Moderate - Pilots and rollouts extend timeline	3 Moderate, phased rollout
Sustainability	0.15	5 High - Permanent facilities sustained long-term	2 Low - Relies on processes/behavioral change	3 Moderate - Productivity gains may degrade over time	4 Moderate/High - Multipronged sustainability
Feasibility	0.15	3 Moderate - Major construction projects have complexity	4 High - Minimal physical change eases implementatio	3 Moderate - Change management adoption challenges	3 Moderate - Multi-initiative coordination
Risk	0.1	3 Moderate - Budget/timeline risks with major construction	4 Low - Limited infrastructure risk exposure	3 Moderate - Change management implementation risk	3 Moderate - Integration risk across initiatives
Total		3.6	3.45	3.35	3.5

Based on the Table IV.6, Alternative 1, which is the strategic construction plan, has the highest score of all other alternatives. Alternative 1 scored highest overall with a total weighted score of 3.6 out of 5.0. It outperformed the other alternatives on several key criteria which are the strategic impact and sustainability. While Alternative 1 is not rated as highly on strategic implementation time, its strengths on other critical factors make it the best balanced option. Strategic construction plan solves the shortage directly through building permanent infrastructure and provide lasting healthcare access for communities served considering that demand could significantly become much higher than initial predictions. Although the project require land, contracting, oversight as well as the commonality of delays and overruns in in this scale, it is still considered moderate in feasibility and risk. With all that said it is still important to acknowledge and be aware of its limitations which are the long time required to implement and significant cost incurred due to large number of infrastructure development required.

Implementation Plan & Justification

The strategic construction plan will be implemented in sequential steps in Jawa Barat. A gantt chart has been developed to showcase of how the project could be implemented in Figure IV.6. The following steps are the steps to achieve it in these 3 phase:

Activities	PIC	2021				2022				2023			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Establish Governance Structure	Head of West Java Health Provincial Service; Secretary of Planning & Reporting												
Conduct Needs Analysis	Steering Committee												
Define Project Scope	Steering Committee												
Develop Construction Plans	Steering Committee; 3rd party EPCC vendor												
Prepare Budgets and Financing	Steering Committee; Secretary of Finance												
Design Implementation Framework	Steering Committee;IT vendor												
Initiate Community Engagement	Steering Committee												
Construction	EPCC vendor												
Equipment procurement and staffing	Steering Committee; 3rd party vendor												
Operations and Monitoring	Steering Committee												

Figure IV.6 Gantt Chart of Project Implementation

Project Preparation

1. Establish Governance Structure

   The steering committee will provide oversight and strategic direction for the healthcare facility development program. The committee will be comprised of directors from key provincial government agencies including health, planning, buildings, licensing, and finance. It will be chaired by the Director General of Healthcare Services who will set the agenda and run the meetings. The function of

this activity is to ensure seamless execution of healthcare infrastructure development. This committee, composed of relevant government stakeholders with diverse expertise that will align the project's strategic vision with local needs. It will use stakeholder theory to define distinct roles and responsibilities to optimize decision-making efficiency, and establish a set of operating procedures to facilitate effective communication, swift conflict resolution, and cohesive progress tracking. Key responsibilities will include approving district prioritization plans, reviewing annual program budgets, providing guidance on regulatory compliance, briefing political leadership. The committee will meet quarterly to evaluate progress on construction timelines, budgets, risks, community engagement, and other key aspects of the program.

2. Conduct Needs Analysis

   This activity initiates with a thorough analysis of needs, incorporating insights derived from data. Decisions are underpinned by data-driven insights, obtained by gathering data on the accessibility of healthcare facilities across various districts. The aim is to identify latent gaps and pinpoint areas that require improvement. This preliminary study findings will be utilized to conduct a comprehensive gap analysis, enabling targeted resource allocation for each district. Population projections will be employed to forecast demand, empowering dinas kesehatan to proactively cater to future healthcare needs. The resource allocation will focus on prioritizing districts that face the most urgent infrastructure gaps, demonstrating strategic foresight.

3. Define Project Scope

   The project scope will be defined through a collaborative process involving stakeholders and expert input. Clear and measurable objectives will be outlined to guide the project's progress and evaluate its success. By specifying the number of new clinics to be constructed, the plan ensures alignment with district requirements and addresses healthcare access gaps. The phased timeline, developed with input from construction experts and healthcare professionals, will facilitate efficient allocation of resources over the project's multi-year duration. This timeline accounts for construction complexities, regulatory approvals, and other potential challenges, ensuring a realistic and achievable project schedule.

4. Develop Construction Plans

   The process of developing construction plans are tailored to the unique characteristics of each respective district. The design of facility specifications will be crafted in collaboration with healthcare professionals, taking into account various factors including patient volume, medical services provided, and the technological requirements of each clinic. The selection of sites will entail a rigorous assessment of land availability, accessibility, and proximity to target populations. In addition, construction schedules will be intricately crafted, considering factors such as weather conditions and resource availability. This planning will ensure the seamless execution of construction activities, thereby guaranteeing that clinics are constructed to meet the specific healthcare needs of each district.

5. Prepare Budgets and Financing
   A thorough evaluation of capital expenditures for the purposes of construction and procurement of equipment is indicative of financial precision. The operational budget, which has been thoughtfully created, encompasses staffing, maintenance, and daily operations. Dinas kesehatan's financial positioning, which is strategic in nature, is a combination of government appropriations and diversified external funding sources, thus promoting sustainability and reducing fiscal risk. The financial strategy, which leverages the expertise of financial specialists and involves the participation of government stakeholders, is well-positioned to withstand the challenges of the project lifecycle.
6. Design Implementation Framework
   The achievement of strategic execution relies heavily on a carefully constructed implementation framework. The strategic blueprint outlines a clear construction bidding and procurement process that is aimed at enhancing cost-efficiency. Dinas Kesehatan will commit to regulatory alignment by implementing policies for staffing, training, and compliance. The combination of a robust IT infrastructure and strategic reporting mechanisms facilitates data-driven decision-making. Through the harmonious design of this framework, we ensure that project execution seamlessly navigates complexities, adheres to standards, and drives optimal outcomes.
7. Initiate Community Engagement
   To foster community support and gather valuable input, proactive community engagement strategies will be implemented. Outreach efforts will involve educational campaigns aimed at informing citizens about the project's goals, benefits, and anticipated outcomes. This engagement will serve as a platform for citizens to voice their opinions, concerns, and expectations, allowing the project to incorporate valuable insights into its planning. By actively involving the community, the project will create a sense of ownership and ensure that the healthcare facilities cater to the unique needs of the local population. Feedback collected during this phase will be carefully analyzed and integrated into project plans, further enhancing the project's alignment with community needs and aspirations.

Infrastructure development

1. Construction
   The bidding process leverages the Principal-Agent Theory to align the project's objectives with contractor interests. By soliciting bids from a diverse pool of contractors, the project strategically fosters competition, driving the selection of partners who offer optimal value for the project's strategic goals. Strategic contract negotiations will emphasize accountability, risk-sharing, and alignment with strategic quality benchmarks. This strategic approach ensures that the project's construction partners are strategically invested in delivering high-quality facilities within the strategic framework of timelines and budgets. Strategic commencement

of construction activities draws insights from the concept of Just-in-Time (JIT) inventory management. Similar to JIT's strategic principle of minimizing waste by delivering resources exactly when needed, breaking ground strategically initiates construction as per the project's timeline, minimizing idle resources and maximizing construction efficiency. Strategic foundation work focuses on quality and strategic stability, aligning with principles from Quality Management Theory. Adhering to stringent quality standards and strategic construction best practices will ensure that the foundation work strategically establishes a robust basis for the clinics' future operations, longevity, and strategic alignment with healthcare standards. Strategic project managers will employ milestone-based monitoring, tracking strategic progress against timelines and adjusting strategic strategies as needed. Quality control will be strategically maintained through strategic inspections and benchmarking against established standards.

2. Equipment procurement, staffing and community outreach
   The strategic acquisition of clinical equipment and skilled talent is the cornerstone of operational excellence. Dinas kesehatan will strategically procure imaging machines, beds, and instruments in strict alignment with facility plans and medical services spectrum. The approach extends to healthcare IT systems, strategically chosen to streamline records management, billing, and telehealth services. Meticulous installation and rigorous testing, integral to strategic process, ensure optimal equipment functionality. The equipment procurement and staffing phase of the healthcare infrastructure enhancement initiative strategically aligns resource allocation and human capital management to optimize service delivery, uphold quality standards, and ensure operational excellence. By strategically integrating procurement practices, technology implementation, human resource management, and strategic communication, this phase sets the stage for efficient and effective healthcare service provision. Strategic development of operational policies and procedures draws insights from the Resource-Based View. By strategically optimizing internal processes, the project aligns with operational efficiency goals. Policies will be strategically tailored to align with regulations while maintaining strategic flexibility to accommodate evolving healthcare needs. These policies will guide strategic decision-making, ensure standardized practices, and strategically promote seamless healthcare service delivery across facilities. The purchase of medical supplies strategically follows the principles of Inventory Management Theory. By strategically optimizing supply chains, the project ensures the timely availability of medical supplies, linens, pharmaceuticals, and other consumables. Strategic inventory management will prevent stockouts and minimize excess inventory, aligning with resource optimization goals. Simultaneously, strategic marketing and branding efforts will employ concepts from Strategic Communication, strategically raising awareness of the new facilities among the community. By strategically engaging in public outreach initiatives, the project will establish a strategic foundation of trust and community support.

Monitoring

The healthcare development initiative will establish a comprehensive monitoring and evaluation system to assess the project's effectiveness and make data-driven decisions. Building upon evaluation results, continuous improvement strategies will be implemented to address any identified gaps and optimize healthcare services. The robust monitoring and evaluation system will be implemented to assess the project's impact and effectiveness. Utilizing key performance indicators, data will be collected to evaluate healthcare access improvements, patient outcomes, and operational efficiency. This data-driven approach will facilitate evidence-based decision-making, enabling timely adjustments and improvements to project strategies. Building upon evaluation results, continuous improvement strategies will be devised and implemented to address identified gaps and further enhance healthcare services. Moreover, the project will focus on empowering local healthcare institutions, ensuring that they are equipped with the knowledge and resources required to sustain and build upon the project's achievements beyond the initial multi-year timeframe. By nurturing institutional capacity, the project will leave a lasting legacy of improved healthcare delivery in the region. The project's success will hinge on the efficient daily operations, which will require multifaceted management efforts across various domains. The seamless management of staff, encompassing recruitment, training, and scheduling, will be crucial in ensuring that healthcare facilities are adequately staffed to meet patient needs. The project will guarantee the consistent delivery of health services across primary care, diagnostics, and pharmacy departments, supported by comprehensive operational policies and procedures. Moreover, meticulous management of business functions such as billing, insurance, and health records management will be implemented to streamline administrative processes. The project's commitment to supply chain management will ensure the uninterrupted supply of medical supplies, linens, pharmaceuticals, and other consumables. Prioritizing facilities maintenance will involve regular repairs, upkeep, and janitorial services, creating a safe and comfortable environment for patients and staff.

Conclusion

In addressing the business problem regarding the unequal distribution of healthcare facilities, an evaluation as well as projection of demand is needed to be able to conduct gap analysis of the puskesmas shortage happening over many District in Jawa Barat. Specific District that is in shortage has be founded as well as the total number which is 363 District in 2020 and 412 in 2032. The number of shortage for each District has also been founded which is 755 in 2020 dan 943 District in 2032. Using the data from appendix 3, strategic construction plan would be an ideal solution to selectively choose District that needs to be prioritized in building puskesmas. However, alternative solutions mentioned in Chapter 4 is also viable as long as there is a study conducted to make on how exactly the system would take place.

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