Regional Development Performance of Nduga Regency

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Abstract

This study aims to identify the progress of macro indicators of regional development as well as strategic development issues in Nduga Regency. The background of this research is based on the importance of measuring regional development in a multidimensional manner to understand inequality and to guide more accurate policy directions. The results show that macro indicators such as GRDP per capita, the Human Development Index (HDI), and the electrification ratio have shown an increasing trend. However, major challenges remain in terms of equitable access to education, healthcare, and poverty alleviation. In addition, strategic issues identified include demographic bonus, labor market disparities, limited infrastructure, technological disruption, and regional economic transformation. These findings highlight the need for data-driven, cross-sectoral, and inclusive development strategies to promote sustainable growth and improve the well-being of communities in Nduga Regency.

Keywords: *Development Indicators, Regional Development, Welfare, Strategic Development Issues.*

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A. INTRODUCTION

Regional development is widely recognized as a multifaceted and complex concept encompassing several dimensions, including economic growth, social welfare, infrastructure advancement, and environmental sustainability. Measuring regional development performance is essential to capture progress and challenges across these dimensions, enabling stakeholders to gain a comprehensive understanding of development trends in a given area. This performance measurement integrates a variety of indicators, including economic outcomes, social equity, infrastructure resilience, and environmental integrity, ensuring a holistic assessment of regional progress.

Development measurement is critical to the success of planning and evaluation, thus monitoring mechanisms need to be strengthened within regional development regulations (Amalia, 2019). A study in Luwu Raya emphasized the importance of economic, social, infrastructure, and environmental indicators, with infrastructure acting as the main driver of development (Amir, 2024). Analysis of regional transformation highlights the need for a comprehensive quantitative basis to assess development performance, from industry to agriculture (Mamonov, 2024). Over time, measurement approaches have shifted toward multidimensional and composite indices to better reflect the complexity of development. These approaches combine economic data with social, governance, and environmental indicators to identify regional disparities and nuanced growth patterns. A study in China showed that

entropy weighting is more accurate than single-weight methods, as it considers regional dynamics (Zhang, 2024). Filenta and Kydros (2022) also noted that simple statistical methods have evolved into more complex quantitative approaches, such as social network analysis, to understand spatial and temporal disparities. In Russia, assessments of regional universities have added education and knowledge economy indicators as complements to GRDP, reinforcing the diversification of regional development performance metrics (Kotomina, 2024).

Nevertheless, measuring regional development presents its own challenges due to regional heterogeneity, variations in data availability and quality, and the evolving nature of development goals. There is an urgent need to unify and empower monitoring systems and reporting regulations to address inefficiencies arising from duplicated and overlapping frameworks, as highlighted by Amalia's analysis of regional development regulations in Indonesia (Amalia, 2019). Moreover, a comprehensive review of the European Structural and Investment Funds (ESIF) revealed that heterogeneity in governance quality and economic freedom significantly affects the effectiveness of development fund utilization, indicating the need for nuanced and region-specific metrics to capture such variations (Spilioti, 2024). Additionally, Chamusca's framework for territorial cohesion emphasizes the importance of integrating governance and connectivity components alongside traditional economic and social measures to more effectively capture asymmetries, underscoring the need for targeted and place-based policy responses (Chamusca, 2025). Collectively, these considerations affirm that accurate multidimensional performance measurement is crucial not only for evaluating the current development landscape but also for guiding sustainable and equitable regional growth strategies.

Based on the background described above, the objectives of this study are as follows; 1) To identify the development of macro-level regional development indicators in Nduga Regency and; 2) To identify strategic development issues in Nduga Regency.

B. LITERATURE REVIEW

Regional development has slowed down due to weak decision-making foundations and the lack of use of modern tools, highlighting the need for measurable performance indicators (Mamonov, 2024). Development strategies must incorporate socio-ecological-economic dimensions, local empowerment, interregional cooperation, and enhancement of long-term competitiveness (Kostyrko, 2023). According to Rismayanti Amir (2024), competitiveness measurement should include economic, social, infrastructure, and environmental variables to accurately reflect development disparities. GRDP and HDI are important tools to measure economic capacity and community welfare (Pambudi, 2020), although challenges such as fiscal dependence and disparities continue to hinder evaluation (Purba, 2025). Good regional financial management, supported by public spending on research, can help reduce inequality (Svobodova, 2024). Mamonov et al. also emphasize that systematic approaches and economic modeling are necessary to identify adaptive trends

(Mamonov, 2024). It is also essential to utilize innovation ecosystems and intellectual capital (Lerro, 2007), as well as technology and entrepreneurship for economic transformation (Al-Sulaiti, 2023). Pino and Ortega stress the integration of knowledge institutions, businesses, and policies in the Regional Innovation System (Pino, 2018). Social and environmental indicators must complement HDI to ensure more inclusive and sustainable development (Pambudi, 2020; Suhyanto, 2021).

The shift toward composite indices and sustainability concepts reflects a paradigm change from purely economic focus to a more holistic development framework. The contribution of each dimension needs to be analyzed separately to ensure more targeted development strategies (Akyuwen, 2016). Decentralization since 1999 has increased regional autonomy but also widened capacity gaps between regions, especially between eastern and western Indonesia (Sendouw, 2024). Therefore, performance measurement must take into account decentralized governance and local characteristics (Hill, 2008). Fiscal imbalances remain a constraint, making it essential to increase local revenue capacity (Khairi, 2021; Suhyanto, 2021). Local revenues through taxes, levies, and investments support the financing of public services and infrastructure (Masduki, 2021; Ayun, 2022). HDI serves as a key social indicator reflecting welfare through education, health, and income (Pambudi, 2020). Life expectancy is influenced by the distribution of services and the balance between medical personnel and infrastructure (Suharsih, 2024). Welfare measurement now also includes social capital and participatory governance. In Cibulao, social capital strengthens the local economy (Guswandi, 2018). Environmental indices such as the Environmental Quality Index (IKLH) and Regional Sustainability Index (RSI) assess ecological carrying capacity and preparedness (Pambudi, 2020; Pravitasari, 2018), while sustainability conditions are also influenced by surrounding areas (Ichsan, 2021).

C. METHOD

This study relies on secondary data, which refers to information that has been previously collected and published by other institutions. The main sources include government agencies such as the Central Bureau of Statistics (BPS), Regional Development Planning Agency (Bappeda), and other relevant institutions. Data collection was conducted through a literature review.

The research employs a mixed-methods approach, combining both quantitative and qualitative methods. The quantitative approach is used to analyze measurable data, such as growth trends, policy impact projections, and regional disparities. The findings are presented in the form of graphs, tables, or statistical figures. The qualitative approach aims to understand social phenomena and human-related issues through direct observation at selected research sites. All data obtained from various sources were processed and analyzed using both approaches, which include growth analysis, disparity analysis, and descriptive statistical analysis.

D. RESULTS AND DISCUSSION

1. Development of Welfare Indicators and Regional Development in Nduga Regency

a. GRDP Growth

The Gross Regional Domestic Product (GRDP) growth including the mining sector in Nduga Regency showed a fluctuating downward trend from 2010 to 2022. In 2010, the GRDP growth including mining reached 13.64%. However, this figure continued to decline, reaching just 0.48% in 2015. The growth rate then increased again in 2017 to 7.25%, before slowing down once more to 3.05% in 2022.

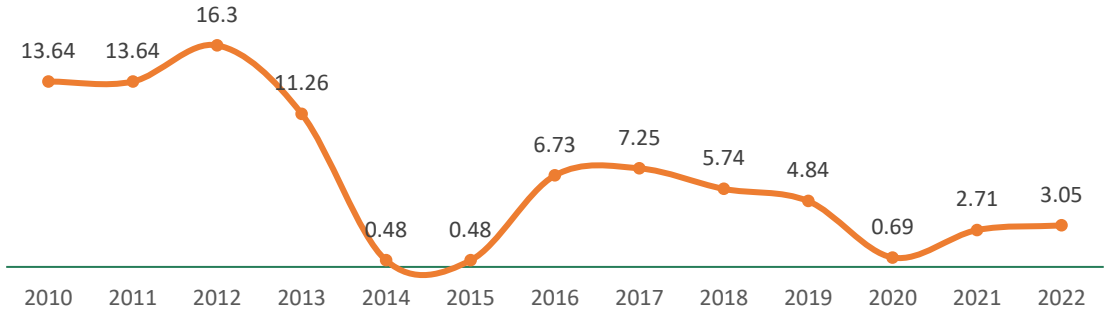

Figure 1. GRDP Growth Rate at Constant Prices (Including Mining) in Nduga Regency 2010–2022 (Percent)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

When examining the GRDP growth of Nduga Regency excluding the mining sector, the trend shows a tendency to decline throughout the years 2010–2022. In 2010, the GRDP growth rate without mining in Nduga Regency was recorded at 13.63%, but it depreciated to 0.48% by 2015. The growth rate rose again in 2017 to 7.24%, before experiencing another slowdown to 3.05% in 2022.

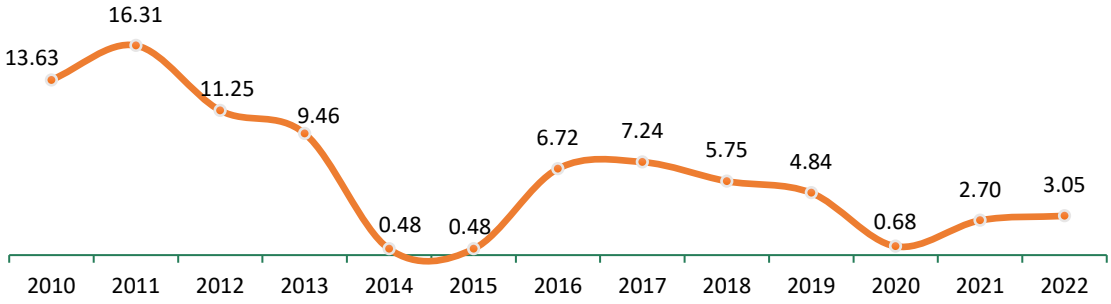

Figure 2. Growth Rate of GRDP at Constant Prices (Excluding Mining) in Nduga Regency 2010–2022 (Percent)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

b. Growth Rate of GRDP per Worker

Over the past seven years, the growth rate of GRDP per worker in Nduga Regency has shown a tendency to increase. In 2010, this figure reached 7.46% and

continued to rise, reaching 12.35% in 2017. Although still relatively small, this achievement indicates that each available worker in Nduga Regency is able to generate more economic added value effectively.

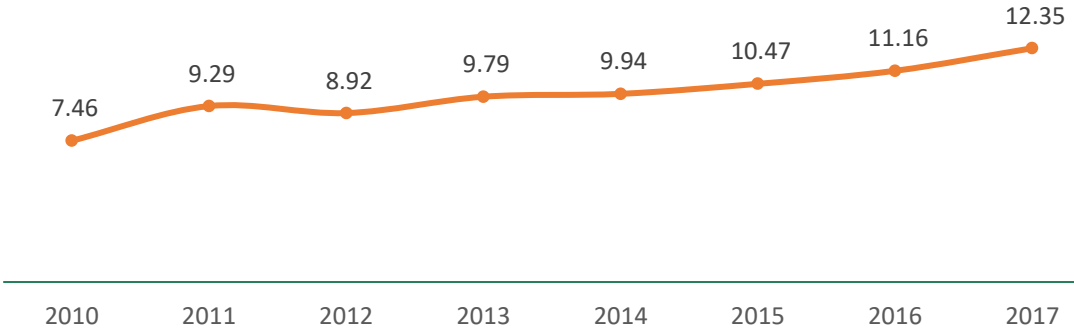

Figure 3. Growth Rate of GRDP Per Worker (Percent)
Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

c. Contribution of the Agriculture, Forestry, and Fisheries Sector to GRDP

The contribution of the agriculture, forestry, and fisheries sectors to a region's Gross Regional Domestic Product (GRDP) is crucial in illustrating the economic structure and the well-being of the community. These sectors, commonly referred to as the primary sector, often have a significant impact on the economy and people's livelihoods. The agriculture sector includes activities related to food crop farming, plantation crops, livestock, and other food production-related activities. The forestry sector involves activities such as logging, forest management, and the production of other forest products. Meanwhile, the fisheries sector includes fish capture, aquaculture, and other marine-related activities.

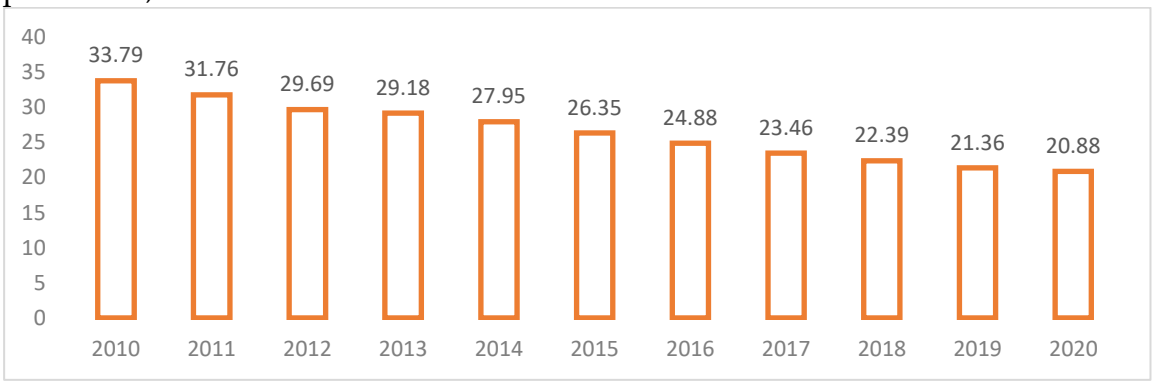

Figure 4. Contribution of the Agriculture, Forestry, and Fisheries Sector to the GRDP of Nduga Regency, 2010–2020 (Percent)
Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past ten years, the contribution of the agriculture, forestry, and fisheries sectors to the Gross Regional Domestic Product (GRDP) of Nduga Regency has shown a tendency to decline. In 2010, this contribution reached 33.79%, but by 2020 it had slowed to only 20.88%. Although this trend indicates a decrease, it may also suggest an increasing contribution from other sectors to the GRDP of Nduga Regency.

d. Contribution of the Wholesale and Retail Trade Sector; Repair of Motor Vehicles and Motorcycles to GRDP

The contribution of the Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles sector to the Gross Regional Domestic Product (GRDP) refers to the proportion or share of the total production value generated by this sector within a specific region over a given period. This sector includes activities related to the wholesale and retail trade of goods, as well as services for the repair of motor vehicles such as cars and motorcycles.

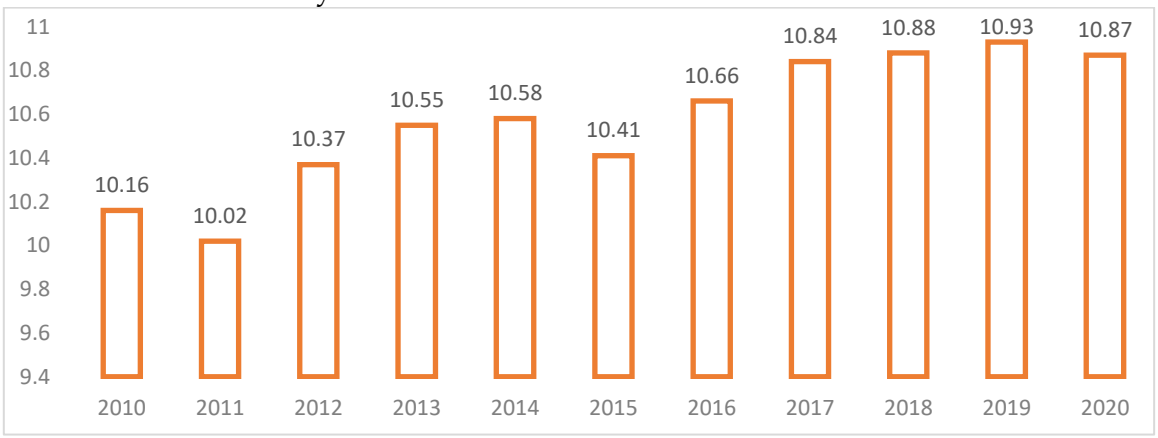

Figure 5. Contribution of the Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles Sector to the GRDP of Nduga Regency, 2010–2020 (Percent)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past ten years, the average contribution of the Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles sector to the Gross Regional Domestic Product (GRDP) of Nduga Regency has reached 10.57%. In 2010, the contribution of this sector was recorded at only 10.16%, but it then experienced significant growth, reaching 10.87% in 2020. This achievement indicates that the sector's contribution to generating economic output in Nduga Regency has started to develop positively.

e. GRDP Per Capita

Gross Regional Domestic Product (GRDP) per capita is an economic indicator used to measure the average GRDP of a region divided by the number of residents living in that area. GRDP per capita provides an overview of the average economic output or income generated by each individual in a region over a specific period. It is a useful indicator for comparing the level of economic welfare between different regions. A high GRDP per capita value generally indicates that the average income per individual in the region is relatively high, while a low value may suggest a lower income level.

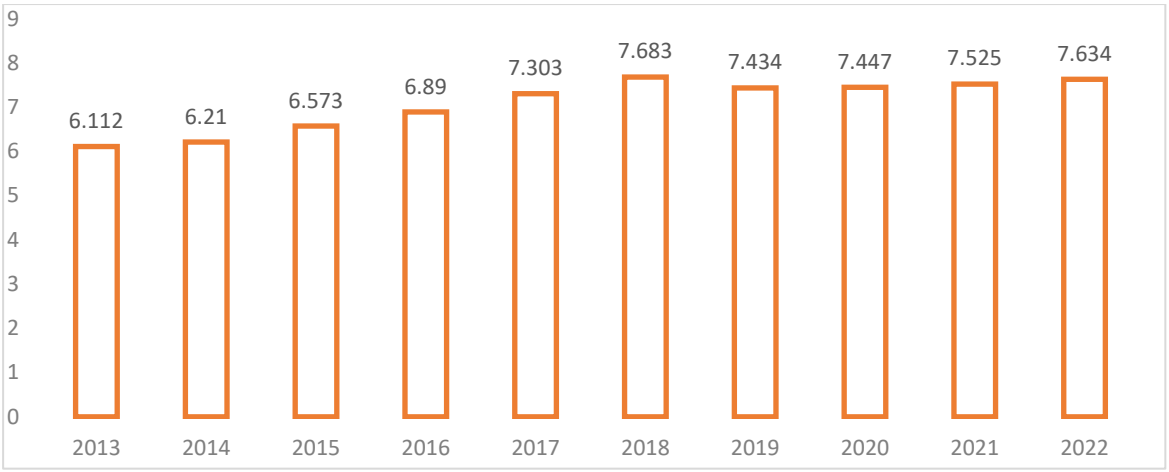

Figure 6. GRDP Per Capita of Nduga Regency, 2008–2022 (Million IDR)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past fourteen years, the average GRDP per capita in Nduga Regency has been approximately IDR 5.443 million. In 2008, the GRDP per capita was recorded at just IDR 1.493 million, and this figure saw a substantial increase, reaching IDR 7.634 million by 2022. This upward trend indicates that the average income per individual in Nduga Regency has shown consistent growth over time.

f. Gini Ratio Index

The Gini Ratio Index, more commonly known as the Gini Index, is a measure used to assess the level of inequality in the distribution of income or wealth within a population or region. It is widely applied in economic, social, and development contexts. In economics, the Gini Index helps to evaluate how evenly income or wealth is distributed among the population and supports the formulation of policies aimed at reducing inequality. The index ranges from 0 to 1, where 0 represents perfect equality (everyone has the same income or wealth) and 1 signifies perfect inequality (one individual possesses all the income or wealth).

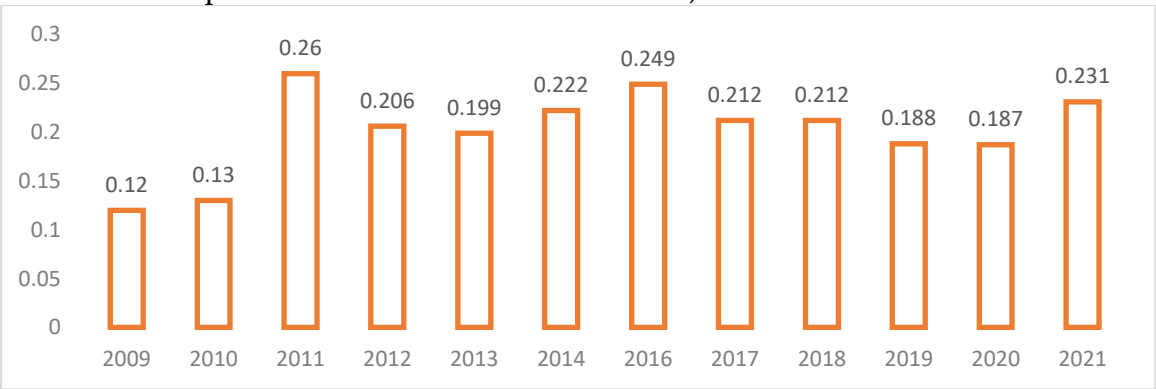

Figure 7. Gini Ratio Index Trends in Nduga Regency, 2009–2021 (Index

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past twelve years, the development of the Gini Ratio Index in Nduga Regency has shown a fluctuating trend, with an average value of 0.201 points. In 2009, the Gini Ratio Index in Nduga stood at 0.120 points, rising to 0.260 in 2011, before

declining again to 0.231 points in 2021. These results indicate that income or wealth distribution remains unequal in Nduga Regency.

g. Human Development Index (HDI)

The Human Development Index (HDI) is generally defined as a measure used to evaluate the progress of human well-being in a development area. Unlike purely economic indicators, HDI takes a broader approach, incorporating three key dimensions of human development: health, education, and income. HDI values range from 0 to 1, with higher scores indicating a higher level of human development. This index enables comparisons between regions based on their human well-being and provides valuable insight into the education, health, and income levels of the population.

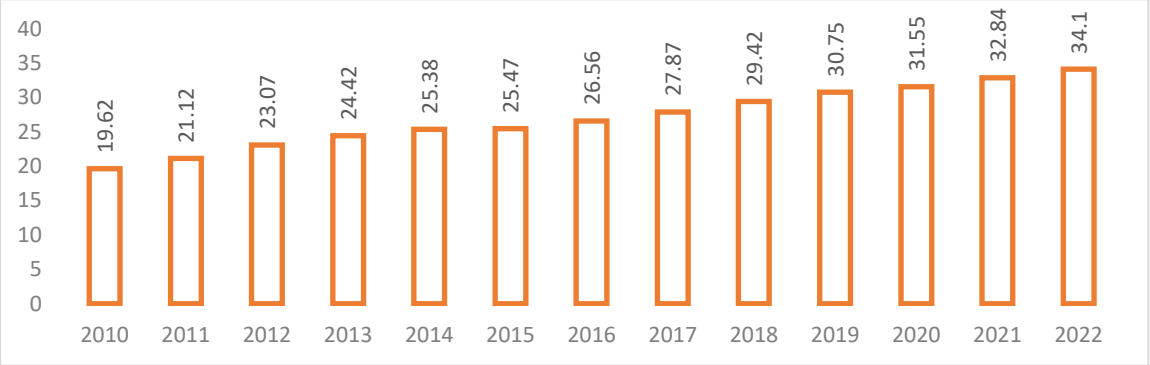

Figure 8. Human Development Index (HDI) Trends in Nduga Regency Years 2010–2022

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past twelve years, the Human Development Index (HDI) in Nduga Regency has shown a consistent upward trend, with an average of 29.82 points. In 2010, the HDI in Nduga Regency was recorded at only 19.62 points, and this figure escalated to 34.10 points by 2022. This increase indicates that the level of human development in Nduga Regency has continued to grow in a positive direction.

h. Life Expectancy at Birth

Life expectancy at birth is a measure that estimates the average number of years a person is expected to live from birth, or from a specific point in time, within a given population or region. This indicator is essential for analyzing demographic and public health conditions, providing an overall picture of a population's life expectancy. Life expectancy is used to assess health levels, social development, medical care, and other factors that influence individual longevity. An increase in life expectancy often reflects improvements in quality of life and overall well-being in a society.

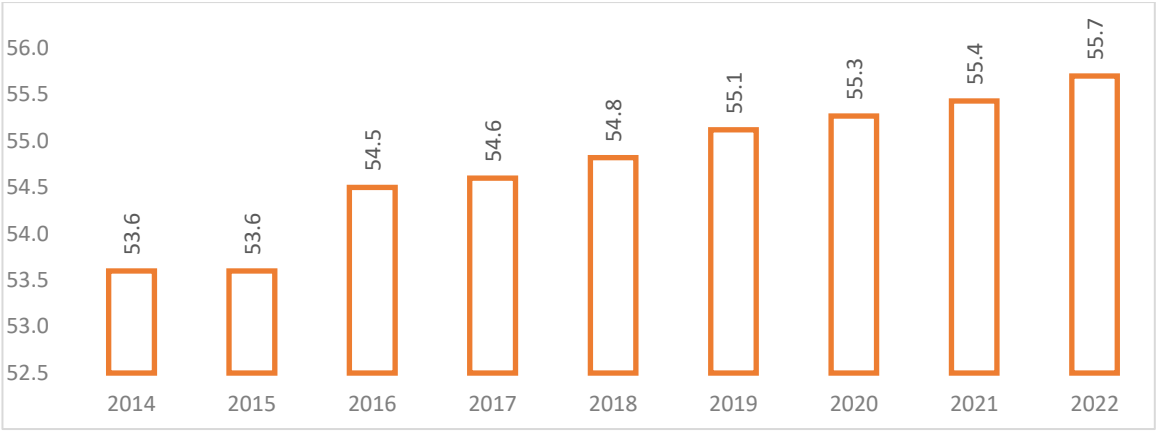

Figure 9. Trends in Life Expectancy in Nduga Regency, 2008–2022 (Years)
Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

The life expectancy achievements, based on the new methodology, show a generally increasing trend from 2014 to 2022, with an average life expectancy of approximately 54 years. This indicates that, during this period, the average individual in Nduga Regency could expect to live to around 54 years of age. The outcomes over the past fourteen years should serve as a serious concern for the Nduga Regency Government to undertake a fundamental transformation in healthcare and other supporting aspects. This is essential so that, over the next twenty years, life expectancy in Nduga can improve consistently and be more comparable to other regions within the Papua Highlands.

i. Poverty

Poverty is a complex and critical issue in regional development. It is a condition where individuals are unable to meet basic needs such as food, clothing, shelter, education, and healthcare. Poverty is not only measured by the number or proportion of poor individuals (P0), but also by the depth of poverty (P1) and the severity of poverty (P2). The Poverty Gap Index (P1) measures how far, on average, the expenditures of poor individuals fall below the poverty line the higher the P1, the farther their spending is from the poverty threshold. The Poverty Severity Index (P2) assesses the inequality of expenditure among the poor a higher P2 indicates greater disparity among the poor population. In Nduga Regency, the percentage of people living in poverty has shown a downward trend over the past twelve years. In 2009, the poverty rate was recorded at 47.28%, and by 2021, it had decreased to 37.18%, marking a 10.10% reduction over the 2009–2021 period.

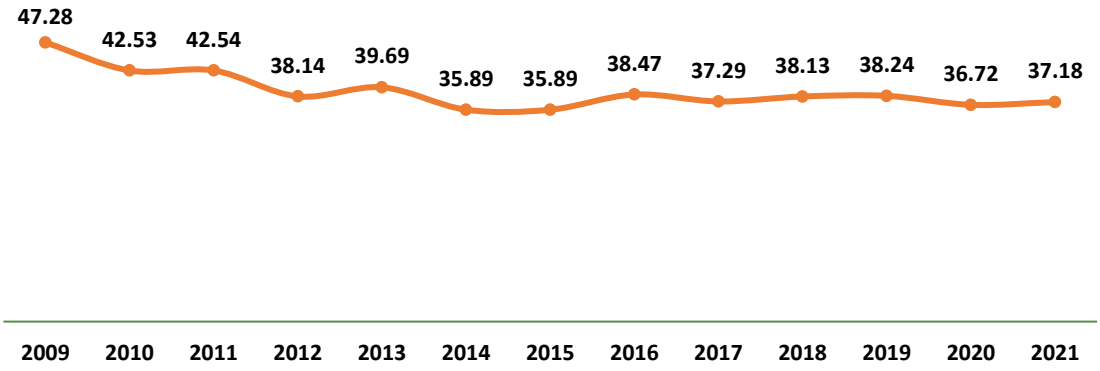

Figure 10. Trends in the Percentage of Poor Population in Nduga Regency (2009–2021) (%)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

Over the past twelve years, the poverty line in Nduga Regency was recorded at Rp 194,643 per capita per month in 2009, and this figure continued to rise, reaching Rp 392,990 per capita per month in 2021. This means that the stated amount represents the minimum threshold that an individual must meet each month to fulfill their basic needs, including both food and non-food necessities.

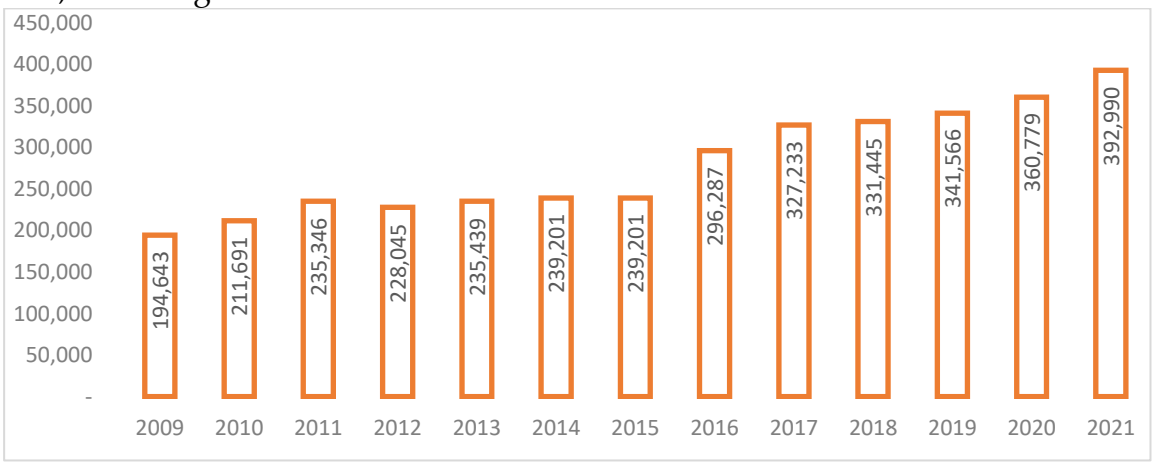

Figure 11. Poverty Line Trends in Nduga Regency, 2009–2021 (Rp/Capita/Month)

Source: Statistics Indonesia (BPS) of Papua Province, (processed data, 2023)

2. Strategic Development Issues in Nduga Regency

Considering the various challenges in Nduga Regency, as well as national and provincial strategic development issues, the following are identified as the key strategic development issues in Nduga Regency:

a. Demographic Bonus and Population Dynamics. The dominance of the productive-age population, high urbanization, and population mobility require inclusive strategies for employment absorption tailored to local characteristics.
b. Quality and Access to Education and Health Services. Inequality in access and the low quality of basic services demand the strengthening of infrastructure, human resources, and equitable coverage of quality education and healthcare.

c. Extreme Poverty and Social Welfare Issues *(PMKS)*. Extreme poverty and the increasing number of people with social welfare problems must be addressed through social protection, vocational training, and sustainable community economic empowerment.
d. Infrastructure and Transportation Lag. The lack of basic infrastructure hampers economic connectivity, requiring spatially aware and sustainable development based on local needs.
e. Regional Economic Transformation. The consumption-based economy must shift to a production-based model through inclusive and efficient corporate agribusiness that enhances the competitiveness of local actors.
f. Socio-Economic Challenges of the New Consumer Class. The "social customer" demands innovative, transparent, and participatory services; the government and business actors must adapt to the expectations of the younger generation.
g. Security and Public Order. The vast territory and limited personnel necessitate a comprehensive security approach based on community involvement, traditional leaders, and the strengthening of social cohesion.

E. CONCLUSION

Nduga Regency has shown improvement in several welfare indicators, such as GRDP per capita, Human Development Index (HDI), and electrification ratio. However, significant challenges remain in education quality, healthcare, inequality, and persistently high poverty levels. The economic sector has yet to be optimally diversified, and income distribution disparities are still prominent. While the population's welfare has gradually improved, it still lags behind the provincial average. Nduga's development faces multidimensional strategic issues, ranging from demographic bonuses, labor market disparities, poor quality of basic services, to underdeveloped infrastructure and food security.

Digital disruption, socio-cultural challenges, and weak village governance further contribute to the complexity of development problems. All these issues demand a cross-sectoral and collaborative approach to realize the vision of Nduga Maju 2045 (Progressive Nduga 2045). The government needs to strengthen human resource development through education and health, expand basic infrastructure, and boost productivity in agriculture and trade sectors. Expanding electricity access, transforming the local economy, and reducing inequality through integrated social programs will accelerate community welfare improvement.

The demographic dividend must also be optimized through workforce training and the creation of employment opportunities based on local potential. An inclusive and adaptive development strategy is needed, focusing on strengthening priority sectors, institutional transformation of governance, and active involvement of the community and youth. Integration of information technology, equitable infrastructure development, preservation of local culture, and public service reform will be key pillars. The government must adopt a penta-helix approach to address strategic issues and align development visions with both local and national challenges.

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