

Food Security and Vulnerability Atlas of Indonesia **2015**



Food Security and Vulnerability Atlas of Indonesia 2015

*Food Security
Council*

*Ministry of
Agriculture*

*World Food
Programme*

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Food Security and Vulnerability Atlas of Indonesia 2015

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MESSAGE

PRESIDENT OF THE REPUBLIC OF INDONESIA/ HEAD OF FOOD SECURITY COUNCIL

The fulfillment of food needs for the people is deemed not only as the realization of the fulfillment of the most fundamental rights, but also as the prerequisite for the fulfillment of other rights, such as the right to employment and education. The importance of the fulfillment of food needs for the continuation of the life of the nation has become the great attention of the first President of the Republic of Indonesia, Ir. Soekarno, as enunciated at the occasion of the groundbreaking of the construction of Agriculture Faculty Building of Univeritas Indonesia in Bogor on 27 April 1952: "...what I am about to convey is very crucial for us, very crucial as a matter of fact, it relates to the existence of Indonesia in the future. ... For what I am about to convey is regarding the food supply for the people".

Food supply for the people is not sufficient to be met through the improvement of food security. Therefore, the issuance of Law Number 18 of 2012 on Food serves as the legal basis for the food management that puts fundamental foundation in the effort to the provision of food by underscoring that food management is performed basen on the principles of sovereignty, self-sufficiency, security, safety, benefit, equity, sustainability and justice. The fundamental changes carried out are by promoting the principle of food self-sufficiency and sovereignty. The latter means the rights of the country and the nation which independently establish the food policies that ensure the right to food for the people and give the right to the people to determine the food system that meets the local resource potentials. Meanwhile, food-self sufficiency is construed as the capability of the state and the nation of producing a variety of food from domestic resources that can assure the fulfillment of food needs which is sufficient at the individual level by harnessing the potential of natural, human, social, economic resources and local wisdom in a dignified way.

Indonesia, the second largest biodiversity in the world after Brazil, is blessed with an abundance of biodiversity resources which comprise food plant species, herbal plant spesies, and thousands of plant and animal spesies. Moreover, Indonesia is also blessed with fertile soil – a place for various plants to grow, and has wide territorial waters. Accordingly, the Government gives priority to the attainment of food self-sufficiency by taking into account the Nawa Cita (nine priority programs) principles.

In the effort to realize food self-sufficiency and sovereignty, a mechanism is required to assess achievements, strengths and weaknesses for the endeavor that has been carried out as well as to fix the efforts that will be conducted. Such mechanism is outlined in the 2015 National Food Security and Vulnerability Atlas (FSVA) to change and complete the previous Atlas. The 2015 National FSVA contains the description of the root cause of the problems on the food security and vulnerability in the region.

Hence, it can be harnessed as a reference to establish appropriate policies and intervention strategy in an effort to reduce the number of people who suffer from food insecurity.

For the last five years, the Government together with the people has succeeded in curbing food insecurity-prone area in Indonesia. However, we have not succeeded in reducing fundamental problems facing the consumers and farmers, namely fluctuation in food prices and the less opportunity of land tenure by the farmers. This has caused our farmers in difficult circumstances to enhance productivity and to expand the scope of commodity option.

In this regard, I would like to extend my appreciation to the World Food Programme (WFP) for the cooperation so that the update of the 2015 National FSVA can be done in a timely manner. The new Atlas serves as a reference for the Government to be more focus in prioritizing resources in order to address crucial issues on food insecurity in a comprehensive way in years to come.

It is my sincere hope that the Food Security Council in the Province and Regency/City can play an active role in coordinating and synchronizing with the regional working units to take further measures and necessary action in an effort to eradicate food insecurity and poverty; improve the welfare of the farmer; and address issues of food security as recommended in the Post-2015 Development Agenda.

Jakarta, May 2015
PRESIDENT OF THE REPUBLIC OF INDONESIA,



The image shows a handwritten signature in black ink, which appears to be "JOKO WIDODO". The signature is fluid and cursive, with some loops and variations in line thickness.

JOKO WIDODO



MINISTER OF AGRICULTURE
REPUBLIC INDONESIA

MESSAGE FROM THE MINISTER OF AGRICULTURE/ CHIEF EXECUTIVE OF THE FOOD SECURITY COUNCIL

During the last five years under the presidency of Dr. Susilo Bambang Yudhoyono, Indonesia Bersatu cabinet had implemented food security programs. As a result, Indonesia was able to isolate national food security situation from the impacts of global financial crisis and that the food security situation at district level was improved as indicated by Peta Ketahanan dan Kerentanan Pangan (Food Security and Vulnerability Atlas - FSVA) 2015. At the provincial level, almost all provinces in Indonesia have managed to increase cereal production. The Atlas shows that the majority (77.4%) of districts have been able to meet their food needs (surplus in cereal production), except districts in Papua Barat, Kepulauan Riau, Bangka Belitung provinces, and most districts in Papua, Riau, Jambi, Kalimantan Tengah, and Malukuprovinces.

However, as most Indonesian are rice consumer, increasing rice availability cannot be avoided, at least for the next short period. If rice availability is used as benchmark, with consumption rate between 109,5-127,8 kg/cap/year, then the number of districts having surpluses will only be about 61-65%. This figure will further decrease as the consumption rate higher.

Furthermore, those achievements have not been able to solve a more fundamental problems at both consumers and producers level, especially at the farmers level. Recent food price volatility has shown that fundamental of food economy is still vulnerable. As most farmers have still small piece of land even less than 0,5 hectare or landless/peasants only, efforts to increase farmers' productivity and welfare will be certainly difficult. Food security could not be achieved through improvement of food availability efforts only, but through comprehensive and simultaneous efforts such as better health access, improvement of infrastructures, and food distribution. Apart from that, as big country with very rich natural resources and biodiversity, food self-sufficient is a must to avoid negative impacts of future possible global food crisis, as a bridge to achieve food resiliency and food sovereignty as stipulated by Law No. 18/2012 on Food.

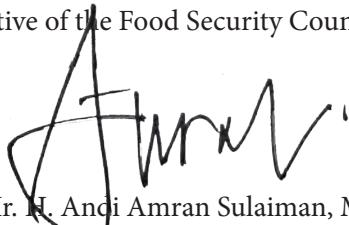
The FSVA, produced by Food Security Council cq Badan Ketahanan Pangan (Agency for Food Security), covers 32 provinces and 398 rural district (including 91 new districts, comprising of 41 original and 50 newly estbalished districts) and is based on a number of food security aspects such as food availability, access, distribution, nutrition and health. Out of 50 newly established districts, only 17 (34%) are food secure (priority 5-6), 20 (40%) districts are severely vulnerable (priority 1-2), and 13 (26%) districts are moderately vulnerable (priority 3-4). In general, 20 out of 58 (34,5%) severely vulnerable to food insecurity (priority 1-2) come from newly established districts. Newly established districts are generally at moderately vulnerable (priority 3-4) status, or are even worse at severely vulnerable (priority 1-2) status while their original districts are mostly stays at the current status.

I believe this FSVA can be used as reference and guidance for efforts to eliminate food insecurity, as well as improving the welfare of farmers as part of poverty reduction program, as recommended in Development Agenda beyond 2015.

I wish this FSVA would continue up to village level, so each government authorities could prioritize and synergize its resources to reduce food insecurity, improve people welfare, and eradicate poverty. With this Atlas, effective monitoring and early warning system could be implemented so that potentials of food insecurity can be detected earlier and negative impacts for the victims could be minimized.

I would like to extend my appreciation to WFP for this enthusiastic collaboration, and wish to have better and more beneficial collaboration in the future, especially in the form of transfer of technology, knowledge and skills to the provincials' and districts' officers. I wish this partnership can be used as model of cooperation between the government and other international agencies.

Jakarta, April 2015
Minister of Agriculture/
Chief Executive of the Food Security Council



Dr. Ir. H. Andi Amran Sulaiman, MP



PREFACE

Indonesia has achieved the first Millennium Development Goal, halving the percentage of its people living in hunger and extreme poverty. The new Government of President Joko Widodo has prioritized food and nutrition in its National Medium-Term Development Plan for 2015-19.

To help Indonesia meet its goals, the 2015 Food Security and Vulnerability Atlas identifies which districts are most vulnerable to food and nutrition insecurity, and what makes them vulnerable. It is a powerful tool to ensure that policies and resources have the maximum effect.

Since the first Atlas was published in 2005, and the second edition in 2009, there have been significant improvements at national level in the availability of food. Poverty has been reduced, improving access to food. More households now have access health facilities, and life expectancy has increased. Electricity and roads have reached more areas.

However, inequality, infrastructure, natural disasters and climate change continue to pose challenges to Indonesia's food security. And the levels of vulnerability to food insecurity still vary substantially by geographic region, with the eastern parts of Indonesia more likely to be food insecure.

Sadly, malnutrition continues to stymie Indonesia's potential, as more than one third of Indonesia's children under five are stunted – too short for their age. This indicates a history of undernutrition, and forebodes a future of poorer health and wealth. At the same time, a rapidly growing number of adults are overweight or obese, in what nutritionists refer to as the "double burden."

This paradox of increased incomes and food production alongside high levels of malnutrition highlights the importance of focusing on all aspects of food and nutrition security and involving all of the stakeholders needed from agriculture, finance, health, education, environment, transport and infrastructure.

Since 1964, the World Food Programme and the Government of Indonesia have collaborated to improve food security and nutrition for the most vulnerable people in the country. In a country growing and changing as fast as Indonesia, greater accuracy and frequency of data collection and analysis would produce even sharper results. WFP looks forward to working with the Ministry of Agriculture on innovative ways to make the Atlas even more useful.

For now, I hope that the 2015 Food Security and Vulnerability Atlas will help Indonesia attain Sustainable Development Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.



Anthea Webb
Representative and Country Director
United Nations World Food Programme, Indonesia

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ACRONYMS

BPS	<i>Central Bureau of Statistics</i>
BNPB	<i>National Disaster Management Agency</i>
CoD	<i>Cost of Diet</i>
ENSO	<i>El Niño/Southern Oscillation</i>
FAO	<i>Food and Agriculture Organization of the United Nations</i>
FIA	<i>Food Insecurity Atlas</i>
FSC	<i>Food Security Council</i>
FSA	<i>Food Security Agency</i>
FSVA	<i>Food Security and Vulnerability Atlas</i>
GDP	<i>Gross Domestic Product</i>
GHG	<i>Greenhouse Gas</i>
MCPE	<i>Monthly per Capita Expenditure</i>
MDG	<i>Millennium Development Goal</i>
MOH	<i>Ministry of Health</i>
MOE	<i>Ministry of Environment</i>
NCD	<i>Non-communicable Disease</i>
OUR	<i>Open Unemployment Rate</i>
PCA	<i>Principal Component Analysis</i>
PODES	<i>Village Potential Survey</i>
RASKIN	<i>Rice for Poor Households</i>
RAN-API	<i>National Action Plan for Climate Change Adaptation</i>
RDA	<i>Recommended Daily Allowance</i>
RISKESDAS	<i>National Basic Health Research</i>
RPJMN	<i>National Medium-Term Development Plan</i>
SST	<i>Sea Surface Temperature</i>
SUSENAS	<i>National Socio-Economic Survey</i>
TNP2K	<i>National Team for the Acceleration of Poverty Reduction</i>
UNDP	<i>United Nations Development Programme</i>
UNICEF	<i>United Nations Children's Fund</i>
UNIDO	<i>United Nations Industrial Development Organization</i>
WFP	<i>World Food Programme</i>
WHO	<i>World Health Organization</i>

Indonesian province names and English equivalents

D.I. Yogyakarta	<i>Yogyakarta Special Region</i>
D.K.I. Jakarta	<i>Jakarta Special Capital Region</i>
Jawa Barat	<i>West Java</i>
Jawa Tengah	<i>Central Java</i>
Jawa Timur	<i>East Java</i>
Kalimantan Barat	<i>West Kalimantan</i>
Kalimantan Selatan	<i>South Kalimantan</i>
Kalimantan Tengah	<i>Central Kalimantan</i>
Kalimantan Timur	<i>East Kalimantan</i>
Kepulauan Bangka-Belitung	<i>Bangka-Belitung Islands</i>
Kepulauan Riau	<i>Riau Islands</i>

<i>Maluku Utara</i>	<i>North Maluku</i>
<i>Nusa Tenggara Barat (NTB)</i>	<i>West Nusa Tenggara</i>
<i>Nusa Tenggara Timur (NTT)</i>	<i>East Nusa Tenggara</i>
<i>Papua Barat</i>	<i>West Papua</i>
<i>Sulawesi Barat</i>	<i>West Sulawesi</i>
<i>Sulawesi Selatan</i>	<i>South Sulawesi</i>
<i>Sulawesi Tengah</i>	<i>Central Sulawesi</i>
<i>Sulawesi Tenggara</i>	<i>Southeast Sulawesi</i>
<i>Sulawesi Utara</i>	<i>North Sulawesi</i>
<i>Sumatera Barat</i>	<i>West Sumatra</i>
<i>Sumatera Selatan</i>	<i>South Sumatra</i>
<i>Sumatera Utara</i>	<i>North Sumatra</i>

EXECUTIVE SUMMARY

1. Background and Objectives of the 2015 Food Security and Vulnerability Atlas

The Government of President Joko Widodo has prioritized food sovereignty as a pivotal component of his Nine Priority Agenda (Nawa Cita) for Indonesia. The Nawa Cita highlights the goal of food sovereignty and the role of the government to implement policies and programmes which meet domestic food needs while also improving the welfare of food producers. The successful implementation of these programs and policies relies on accurate data on food and nutrition security. Data on food security and nutrition span multiple sectors and sources of information. Bringing these pieces of information together comprehensively is a challenge of increasing importance as Indonesia seeks to attain its goals of food sovereignty.

Since 2002, in collaboration with the World Food Programme (WFP), the Government of Indonesia has sought to provide a comprehensive geographic profile of food and nutrition insecurity across the country, to enhance targeting, inform policy and improve the design of programmes for reducing vulnerability to food and nutrition insecurity. In 2005, these joint efforts resulted in the first national Food Insecurity Atlas, which identified 100 vulnerable rural districts for priority attention. The atlas was updated in 2009 and renamed the Food Security and Vulnerability Atlas (FSVA), covering 346 rural districts in 32 provinces. This third edition of the atlas for 2015 has expanded coverage to 398 rural districts in 32 provinces to accommodate changes and developments in the food security situation and to capture progress in food security outcomes since 2009.

In this 2015 atlas, the discussion on nutrition has been expanded to reflect its importance, as Indonesia officially launched its Scaling Up Nutrition movement and has prioritized stunting in the National Medium-Term Development Strategy (RPJMN).

The 2015 FSVA, like its predecessors, serves as an important tool for policy-makers in determining vulnerable areas and formulating recommendations for improving food and nutrition security at the national, provincial and district levels.

To allow a comprehensive analysis of the multi-layered nature of food and nutrition security, nine indicators of chronic food and nutrition insecurity were analysed. The list of indicators was selected according to data availability and the indicators' capacity to reflect core elements of the three pillars of food and nutrition security: food availability, access to food and food utilization.

In addition to analysis of individual indicators, a composite indicator reflecting the overall food and nutrition security situation was constructed, and used to classify districts into six priority groups. Districts in priority groups 1 and 2 are relatively more vulnerable to food and nutrition insecurity; those in priority groups 3 and 4 are moderately vulnerable; and those in priority groups 5 and 6 are less vulnerable or food secure. It is important to note that as a result of diversity within districts, not all people in top-priority districts (groups 1 and 2) are food-insecure, while not all of those in low-priority districts (groups 5 and 6) are food-secure.

Analysis of food and nutrition security was complemented by a separate review of climatic factors that influence food and nutrition security: frequency of natural disasters that potentially impact food security, estimated losses in rice production caused by floods or droughts, rates of deforestation and the strength of El Niño/Southern Oscillation (ENSO), which drives rainfall variability.

2. Key findings

Vulnerability to food and nutrition insecurity

According to their performance in nine indicators covering food availability, food access and food utilization, districts were classified into six categories reflecting their overall food and nutrition security situation, from the least food and nutrition-secure (priority group 1) to the most food and nutrition-secure (priority group 6):

- All 14 districts in priority group 1 were in Papua province.
- The 44 districts in priority group 2 were distributed across Papua (twelve districts), Papua Barat (nine), Nusa Tenggara Timur (nine), Maluku (seven), Sumatera Utara (four), Sumatera Barat (one), Riau (one), and Maluku Utara (one).
- The 52 districts in priority group 3 were located in Aceh (two districts), Sumatera Barat (two), Jawa Barat (2), Jawa Timur (nine), Nusa Tenggara Barat (eight), Nusa Tenggara Timur (three), Kalimantan Barat (three), Kalimantan Selatan (five), Sulawesi Tengah (six), Sulawesi Tenggara (two), Banten (three), Sulawesi Barat (two), and one district each in, Sumatera Selatan, Sulawesi Selatan, Sumatera Utara, Maluku Utara, and Maluku.

Food availability

- In general, the production of cereals and tubers in Indonesia has steadily increased over the last ten years. Rice production has grown by 3.2 percent, maize by 6.1 percent, cassava by 2.4 percent and sweet potato by 2.7 percent per year. In comparison, population growth over the last decade has averaged 1.5 percent.
- Most rice production is concentrated in Java. Higher yields in Java are an important factor in enabling increased production given the limited availability of agricultural land.
- Of the 398 rural districts studied, 90 (22.6 percent) showed deficits in the production of cereals and tubers, based on the indicator of normative consumption per capita ratio. This represents a small change in self-sufficiency at the district level compared with 2009, when 72 of 346 districts (20.8 percent) had deficits.
- Most of the cereal and tuber-deficient districts were in Papua Barat, Kepulauan Riau, Kepulauan Bangka-Belitung, Papua, Riau, Jambi, Kalimantan Tengah and Maluku.

Food access

- Household access to food correlates strongly with poverty status. In Indonesia, the national poverty rate declined from 12.5 percent in 2011 to 10.96 percent in 2014, but 27.73 million people are still living in poverty¹.
- The provinces of Papua, Papua Barat, and Maluku saw particularly large declines – of 4-6 percentage points – in poverty rates between 2011 and 2014.
- Despite progress in reducing poverty, economic growth has been coupled with increasing inequality. The Gini coefficient, a common measurement of income inequality, deteriorated significantly, from 0.36 in 2007 to 0.41 in 2013, indicating a widening gap between rich and poor.

¹ According to the latest available figures from SUSENAS Sept 2014. Figures that describe provincial poverty levels use the most current sub-national figures from 2013

- There were 14 districts (3.5 percent) where at least half of all villages lacked access to roads or waterways. Nine of these 14 districts were located in Papua province.
- Between 2007 and 2013, the percentage of households with access to electricity increased from 77.1 to 94.8 percent. This improvement was driven largely by expanded coverage in Nusa Tenggara Timur (by 32.0 percent), Sulawesi Tenggara (19.8 percent), and Sulawesi Barat (16.1 percent).
- Nevertheless, large disparities in access to electricity persist among provinces: in Papua, 54.4 percent of villages lacked access, compared with Java (fewer than 1 percent).

Food utilization

- Diseases, particularly those resulting from contaminated water supplies and unsanitary facilities, prevent the body from utilizing the nutrients in food. On average, access to clean and safe drinking-water is still limited in Indonesia, with 34.4 percent of households lacking access in 2014.
- In eight provinces – Bengkulu, Papua, Kalimantan Tengah, Lampung, Gorontalo, Nusa Tenggara Timur, Sumatera Selatan, Sulawesi Tengah – more than 40 percent of households lacked access to safe and clean drinking-water.
- Approximately 95.5 percent of villages in Indonesia had access to a health facility within 5 km. However, in 6 of the 398 districts – all of which were in Papua -- more than half of villages had no health facility within 5 km.
- Women's literacy, which is linked to feeding practices and child nutrition outcomes, has improved markedly since the 2009 atlas. The number of districts in which more than 20 percent of women are illiterate decreased from 79 to 45. The three provinces with the highest percentages of illiterate women in 2013 were Papua (39.84 percent), Nusa Tenggara Barat (19.41 percent), Bali (14.26 percent).

Nutrition and health outcomes

- Life expectancy at birth in Indonesia increased from 67.5 years in 2009 to 70.7 years in 2013. Life expectancy was the shortest in Nusa Tenggara Barat (63.2 years). In 29 percent of districts life expectancy at birth was more than 70 years, up from 17.8 percent of districts in 2009.
- An estimated 37.2 percent of children under 5 years of age were stunted in 2013, an increase from 36.6 percent in 2010.
- The number of provinces with very high stunting prevalence (≥ 40 percent) increased from seven in 2010 to 15 in 2013, while the number of provinces with high prevalence (30–39 percent) decreased from 17 to 11. Higher stunting was found in Nusa Tenggara Timur, Nusa Tenggara Barat, Kalimantan Selatan, Aceh, Sumatera Selatan, Sumatera Utara, Sumatera Barat, Sulawesi Barat, Maluku, Maluku Utara, Papua and Papua Barat.

Climatic and environmental factors affecting food security

- Natural disasters, deforestation and climate change have a huge potential impact on food security across Indonesia.
- The occurrence of extreme climate events that cause significant food crop production loss are mostly associated with El Niño/Southern Oscillation (ENSO) events. A one degree increase in sea surface temperature is expected due to have significant negative impact on rainfall in Maluku,

Nusa Tenggara Barat, the western parts of Nusa Tenggara Timur, and large portions of Sulawesi Selatan, Sulawesi Utara, Sulawesi Tengah, and Jawa Tengah.

- Rainfall variation is likely to be detrimental to sustainable agriculture unless water storage and irrigation systems are improved. Analysis of climate change impacts on rice production in Java suggests that production is likely to be 1.8 million mt lower than current levels in 2025 and 3.6 million mt lower in 2050.
- Rice production losses caused by droughts were most prevalent in Jawa Barat, Sulawesi Selatan, Jawa Tengah, and Nusa Tenggara Barat.
- Rice production losses caused by floods were higher than 20,000 tonnes per year in Jawa Barat, Aceh, Sumatera Utara, Jambi, Sumatera Selatan, Lampung, and Sulawesi Selatan.
- The moratorium on deforestation helped to slow rates beginning in 2011, but the overall forest loss remains alarming, particularly in Riau, Kalimantan Tengah, Kalimantan Barat, Kalimantan Timur and Jambi.

3. Changes in vulnerability to food insecurity between 2009 and 2015

Overall, food and nutrition security in Indonesia improved between 2009 and 2015. Analysis of changes at the district level in nine selected indicators of chronic food and nutrition security reveals that:

- 67 percent of districts had improved food availability.
- 96 percent of districts had reduced poverty.
- 95 percent of districts had more access to electricity.
- 61 percent of districts had better road access.
- 44 percent of districts had improved access to clean water.
- 94 percent of districts had improved access to health facilities.
- 91 percent of districts had increased literacy among women.
- 96 percent of districts had longer life expectancy.

FSVA 2015 also describes changes in the priority status of districts between 2009 and 2015: 44 percent improved their priority status by one or more levels. Improvements occurred mainly in Banten, Papua Barat, Maluku, Kalimantan Selatan, Kepulauan Bangka Belitung, Sumatera Barat, Sumatera Utara, Kalimantan Timur, Kepulauan Riau, Ana Sulawesi Barat provinces; 48 percent experienced no change in their priority status, while 8 percent deteriorated by one or more levels. Deterioration of priority status occurred mainly in Lampung and Papua provinces.

4. Conclusions

For most Indonesians, food security improved between 2009 and 2015, largely as a result of improvements in a number of food and nutrition security-related factors. While these results are encouraging, progress may be at risk of stagnating if major challenges are not addressed. Three areas require particular attention: i) improving economic access to food including through continued investments in infrastructure; ii) accelerating the prevention and reduction of malnutrition; and iii) addressing the increasing vulnerability to climate-related hazards. While nutrition security should be addressed as a challenge on its own, it also interacts with many other areas, underlining the importance of mainstreaming a nutrition-centred approach in programmes and policies for food security. These challenges present a set of opportunities.

Comparison of Indicator Values by Priority Group (mean, range)																		
	Priority 1			Priority 2			Priority 3			Priority 4			Priority 5			Priority 6		
Number of Districts	14			44			52			84			85			119		
Total Population	1,285,987			5,476,850			29,832,846			37,820,094			41,607,666			76,668,750		
	Mean	Min	Max															
NCPR	35.38	0.70	50.00	4.07	0.08	50.00	0.55	0.11	3.28	0.64	0.07	3.37	0.68	0.09	12.40	1.86	0.09	44.05
Poverty (%)	39.55	32.25	47.52	27.62	9.16	41.81	15.05	5.02	35.88	11.70	2.84	23.67	14.01	3.41	29.84	10.69	2.46	22.08
Lack access to electricity (%)	72.35	29.72	99.60	25.85	0.00	77.23	5.71	0.00	24.38	11.74	0.00	56.78	4.72	0.00	23.59	3.68	0.00	49.58
Lack access to roads/water (%)	87.14	57.50	98.28	38.32	5.25	81.00	6.62	0.00	24.19	10.31	0.00	45.01	6.67	0.00	33.64	3.19	0.00	29.70
Lack of access to drinking water (%)	60.44	37.18	71.45	45.31	15.84	88.25	29.27	6.54	48.48	48.49	31.71	73.84	31.57	15.60	52.79	24.32	4.31	46.45
Lack access to health facility (%)	66.88	66.02	67.86	67.44	62.33	70.88	64.45	61.43	67.17	68.33	63.85	72.39	69.49	66.43	75.66	70.70	67.38	75.79
Female Illiteracy (%)	40.00	0.00	72.19	16.80	0.00	50.91	1.07	0.00	13.53	2.82	0.00	18.30	1.62	0.00	15.72	1.09	0.00	15.65
Life Expectancy (%)	70.67	32.93	89.38	13.79	0.09	61.15	12.18	0.37	37.19	5.99	0.70	17.34	6.90	0.48	21.15	10.09	0.11	31.49
Stunting (%)	44.15	10.45	68.95	46.48	29.30	70.43	45.10	32.18	65.77	39.50	23.18	50.71	47.56	38.45	62.14	33.46	11.06	44.95

Economic access

- The Government of Indonesia has reduced the prevalence of poverty over the last decade, but the pace of this reduction has decreased over recent years. The Government spends approximately 0.75 percent of gross domestic product on social assistance. Increasing the budget allocation for social assistance programmes, coupled with reforms to improve the effectiveness and nutrition sensitivity of programmes, could have important impacts on food access.
- A comprehensive approach should acknowledge the role of imports in addressing the dietary needs of the population. A review of agricultural policies could help find the right balance between supporting domestic food production while also protecting poor consumers' access to food and maintaining the agricultural sector's competitiveness.
- A review of food production incentives, including price guarantees, subsidies and trade, could help give the production of highly nutritious foods, including soy bean, vegetables and fruits the same priority as that of staple foods.

Nutrition

- Given that decreasing the rates of stunting is a national priority, reform of the country's largest social assistance programme, the Rice for Poor Households (Raskin) programme could be a cost-efficient way of improving the micronutrient intake of low-income families. Fortifying the rice distributed or introducing a nutrition component into the conditional cash transfer programme, for example in the form of a nutrition voucher, could promote good nutrition in poor households.
- In Indonesia, malnutrition affects both poor and non-poor populations. The increasing availability of low-cost, processed foods, which are often high in fats and sugars, poses a serious nutrition concern across Indonesian society. Addressing this challenge requires involvement of the private sector, and more could be done to engage with and assist the private sector in making more nutritious products available at affordable prices and promoting a healthy, diverse diet.

- The agriculture sector would benefit from an orientation towards food crop species and varieties of relatively high nutritional value. These programmes could work through established community groups to educate Indonesians about health and nutrition. Greater inclusion of women, would also contribute to improving food and nutrition security given women's primary responsibilities in food production, purchasing, preparation and in feeding and care practices.
- Given the short 1,000 day window of opportunity for intervention, improved timing and quality of data collection on nutritional status would enhance the ability of all sectors to respond.

Climate change

- Climate change remains a major threat to food and nutrition security, especially for households whose livelihoods depend on food production. As the climate becomes increasingly erratic, rainfall deviation, increased frequency and intensity of climate-related events, and increases in pest and crop disease will have negative impacts on farmers, ranging from difficulties in timing agricultural activities to effects on the yields and productivity of crops, undermining farmers' overall resilience. Adaptive strategies and appropriate water management will become increasingly necessary.
- Water management could be strengthened through improvement of spatial planning and land-use systems, management of conservation and essential ecosystem areas, rehabilitation of degraded ecosystems, and acceleration of the development and rehabilitation of infrastructure to support agricultural activities, including irrigation, dams and reservoirs, using climate-proof technology.
- Other opportunities include improving early warning systems for both slow- and sudden-onset disasters and incentives for research and development of crops resistant to new climate conditions.

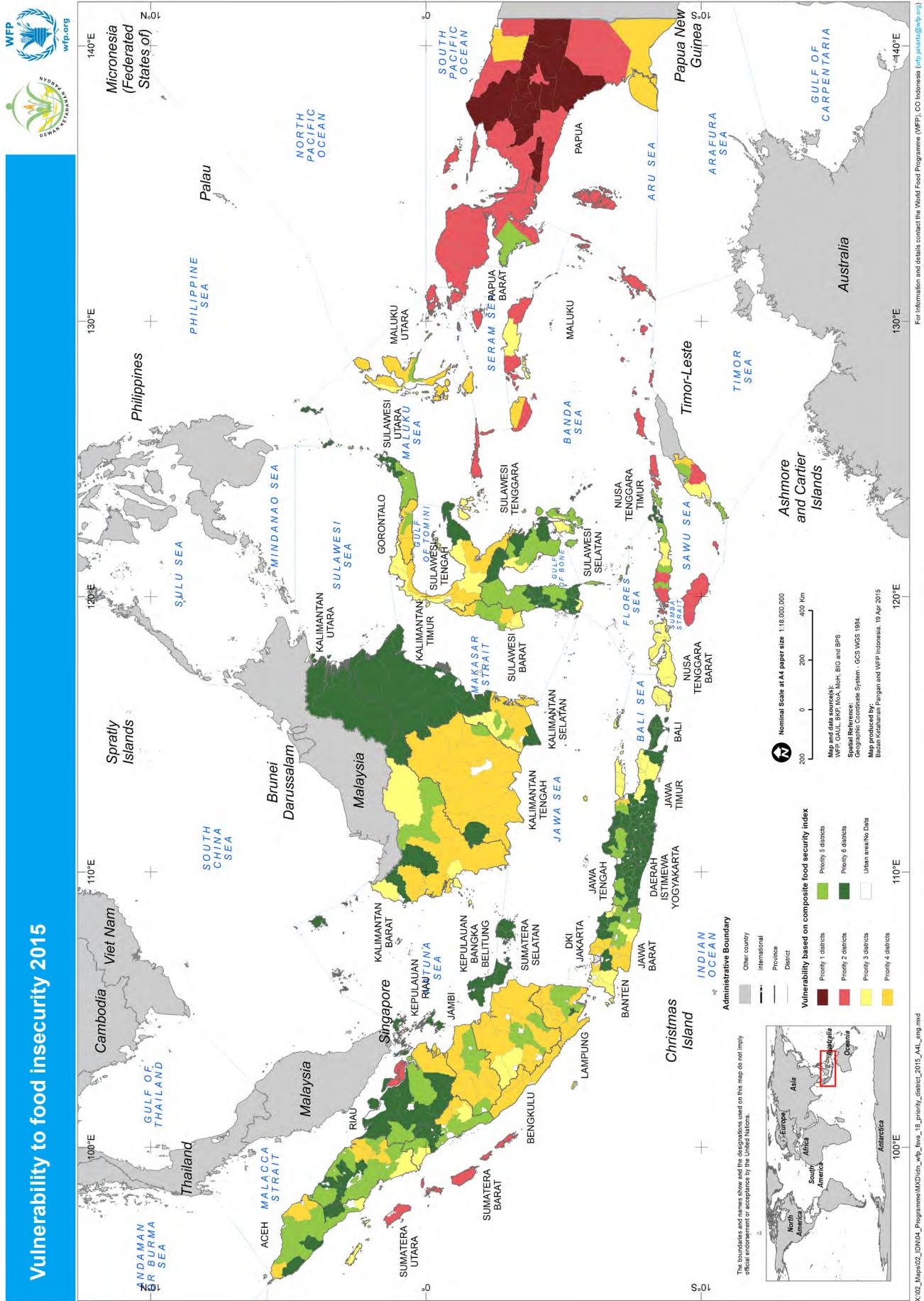
Government strategies for achieving food security

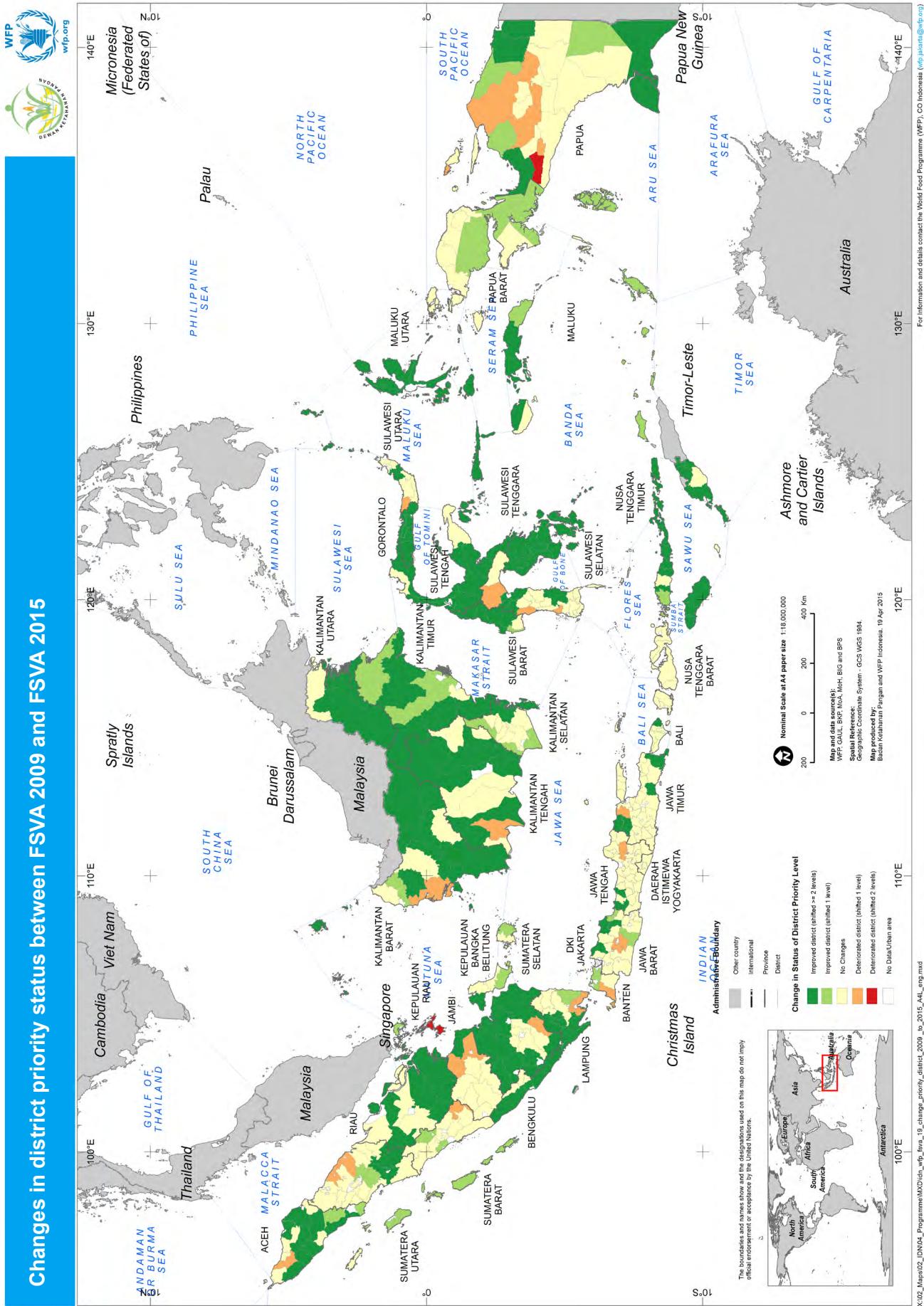
Facing the challenges above, the Indonesian government has formulated a number of development initiatives aimed at strengthening food sovereignty and achieving economic resiliency through mobilization of strategic sectors of the economy. The National Mid-Term Development Plan (RPJMN) 2015-2019 seeks to strengthen food sovereignty through five major strategies:

- a. Increase food availability by enhancing domestic production of key crops including rice, maize, soybean, meat, sugar, chili and onion.
- b. Improve the quality of food distribution and the accessibility of food.
- c. Improve the overall quality and nutritional value of the Indonesian diet.
- d. Protect food security through preparedness for natural disasters, mitigating the impact of climate change, and preventing pest infections and the spread of diseases in animals.
- e. Improve the livelihoods and welfare of farmers, fishermen and other food producers.

Given its strong economic growth and financial institution capacities, Indonesia is in a good position to make progress on food and nutrition security over the coming years. The country needs programmes that focus on poverty reduction, nutrition, and diversification of food. For those programmes to be successful, the government must maintain a balance between subsidies and social protection programs.

Vulnerability to food insecurity 2015





CHAPTER 1

INTRODUCTION



With a population of 248 million people living in an archipelago of 13,400 islands, Indonesia is the fourth most populous nation in the world (BPS, 2014). Annual population growth has averaged 1.5 percent in the past decade and the population is projected to reach 306 million by 2035, despite substantial reductions in the number of children born per woman (BPS, 2013). Indonesia also boasts the world's 16th largest economy, which – despite a slowdown in 2013 – is expected to grow by a solid 5.2 percent in 2015 (World Bank, 2014a).

Over the years, the country has made important progress in a number of areas, including reducing the number of people living in extreme poverty¹ by more than half, and substantially reducing the number of hungry people. Overall human development in Indonesia continues to improve: the country's score on the human development index increased steadily from 0.471 in 1980 to 0.684 in 2013, placing it 108th of the 187 countries in the index, in the “medium human development” category for which the average score is 0.614.

However, as the end of 2015 approaches, the achievement of some Millennium Development Goals (MDGs) remains challenging:

¹ Measured by the global poverty rate of income below US\$1.25/capita/day (at purchasing power parity)

- While the number of people living in extreme poverty has been halved over the last decade, 10.96 percent of the population continued to live below the national poverty line of Rp 326,853/capita/month in urban areas and Rp 296,681 in rural areas in 2014². Income distribution is uneven across geographic and livelihood areas and inequality remains widespread, as reflected by an increase in the Gini coefficient from 0.38 in 2010 to 0.41 in 2013.
- The maternal mortality rate is among the highest in Southeast Asia, with an estimated 190 maternal deaths per 100,000 live births for the period of 2010-2014³.
- The prevalence of HIV/AIDS increased from less than 0.1 percent in 2001 to an estimated 0.4 percent in 2012 – higher than the 2012 estimated average for South and Southeast Asia of 0.3 percent – while the coverage of antiretroviral therapy remains a concern. Indonesia is among the 30 nations that together account for 80 percent of all the people in the world who are not receiving the HIV/AIDS treatment they need (UNAIDS, 2013).
- Progress towards universal access to improved water and sanitation is slow, with large geographic and social disparities (WHO / UNICEF, 2014).

Low-quality, out-dated infrastructure, coupled with a lack of investment in infrastructure development, is a major hindrance to sustaining high levels of economic growth. In the Global Competitiveness Report for 2014–2015 Indonesia scored 4.57 out of 7 for the quality of its infrastructure, with little change noted over recent years. Inadequate supply of infrastructure was considered the third most problematic factor for doing business in Indonesia, preceded by inefficient bureaucracy and corruption (World Economic Forum, 2014). Indonesia's lack of investment in infrastructure is widely acknowledged as a significant constraint to competitiveness and economic growth (World Bank, 2013a).

In a context of sustained population growth, rising population needs and slowing economic expansion, food and nutrition security continues to be a major concern: in 2014, Indonesia ranked 72nd of 109 countries in the Global Food Security Index, which measures food availability, affordability, safety and quality (The Economist Intelligence Unit, 2014), and 22nd of 76⁴ countries in the International Food Policy Research Institute's Global Hunger Index, which measures undernourishment, child underweight and child mortality (IFPRI et al., 2014). The Food and Agriculture Organization of the United Nations (FAO) estimates that 8.7 percent of the population was undernourished in 2012–2014, while data from the National Socio-Economic Survey (SUSENAS) suggest that as much as 52.52 percent of the population failed to meet the international threshold of 2,000 kcal/capita/day in 2013 (BPS, 2014). Malnutrition rates have remained stagnant for more than five years, with national prevalence rates of 37.2 percent stunting and 12.1 percent wasting among children younger than 5 years (Ministry of Health, 2013), while a recent World Bank report documents fast-rising levels of obesity and non-communicable diseases (IFPRI, 2014 and World Bank, 2013b). As a highly disaster-prone country, Indonesia also faces escalating climate change risks with potential to cause substantial transient, and possibly also chronic, food and nutrition insecurity.

1.1 Rationale for the Food Security and Vulnerability Atlas

Successful efforts to improve food and nutrition security depend on knowing who is vulnerable to food and nutrition insecurity, the size of the food and nutrition-insecure population, where these people live and what makes them vulnerable. Since 2003, the Government of Indonesia, in collaboration with the World Food Programme (WFP), has contributed to answering these questions – including at the local

² Based on the most recent the National Socio-Economic Survey (SUSENAS) data from September 2014 - <http://bps.go.id/linkTabelStatis/view/id/1488>

³ Per World Development Indicators Database, 2015

⁴ When comparing against all 130 countries in the Global Hunger Index, Indonesia ranks 55

level – through the development of food security and vulnerability atlases (FSVAs). These atlases are valuable tools for enhancing the targeting of programmes and the design of policies that aim to improve food and nutrition security.

The first atlas, published in 2005, identified 100 of the 265 rural districts it covered as relatively more vulnerable to food and nutrition insecurity. Based on the atlas's findings, the Government of Indonesia mobilized resources and allocated approximately Rp 323 billion (US\$32 million) to food and nutrition interventions in these districts in 2006.

In 2009, the methodology of the atlas was refined and its coverage expanded to 346 rural districts in 32 provinces. The findings of this second atlas contributed to significant policy changes, including the integration of food and nutrition security activities into the Government's annual plans and budgets. Based on this positive response, the national Food Security Agency and WFP supported provincial officials in carrying out food and nutrition security analysis, resulting in the development of 32 province-level FSVAs, which were released between 2011 and 2013.

Building on the successes of the 2005 and 2009 atlases, this 2015 FSVA provides a timely update on the food and nutrition security situation from the national to the district levels, while also informing future programme design and resource allocations. The update provides an opportunity to galvanize activities for improving key MDG indicators as the 2015 deadline for achieving the MDGs draws near. The 2015 FSVA covers 398 rural districts in 32 provinces, including several new districts created in recent years. It provides decision-makers involved in programmes and policies at the national and local levels with the information required to direct investments to priority districts, where needs are highest.

The FSVA is the product of active participation from all provincial food security offices, led by the national Food Security Agency with guidance and support from WFP.

1.2 Food and Nutrition Security Conceptual Framework

Indonesia's Law No. 18/2012 defines food security as the condition in which all people, in all households, at all times have sufficient food in both quantity and quality to enable them to live healthy, active, productive and sustainable lives, and that the food is safe, diverse, nutritious, equitably distributed and affordable, and does not conflict with religion, beliefs or culture.

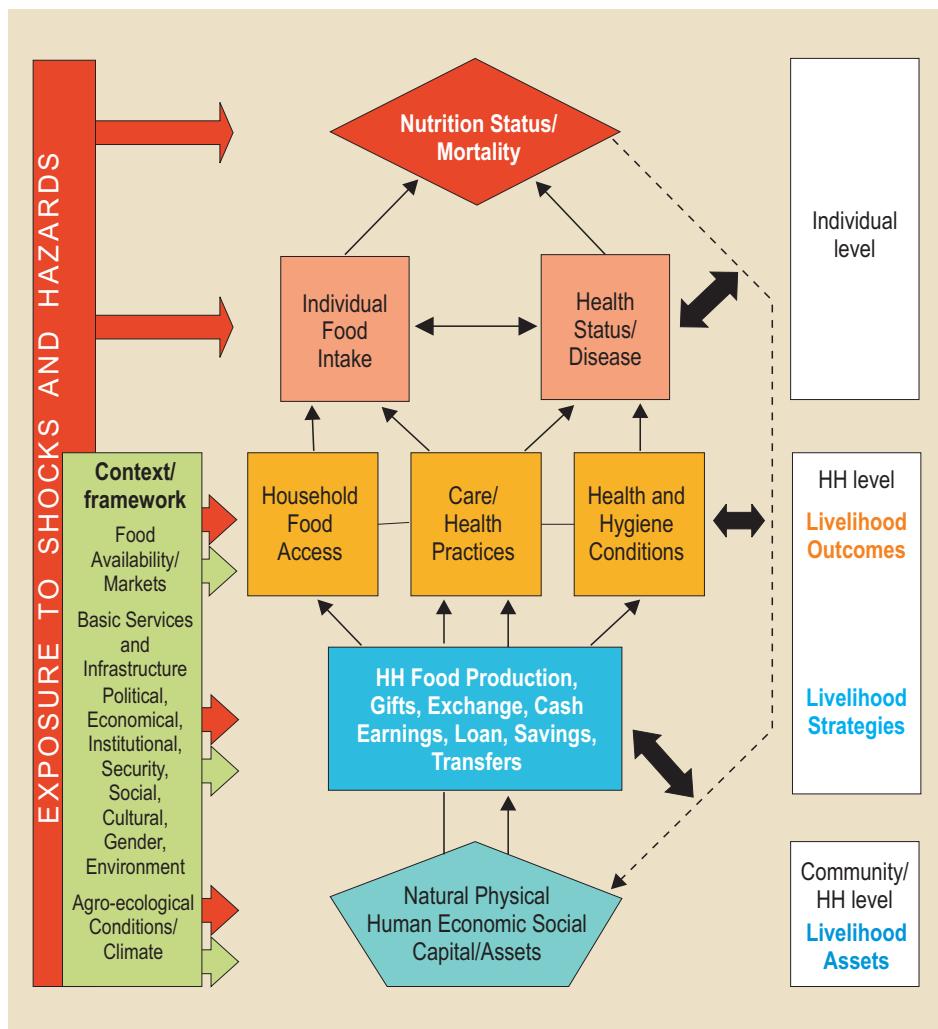
This FSVA, like the previous atlases, uses the food and nutrition security conceptual framework as the basis for analysis (Figure 1.1). The framework is based on the three pillars of food security – availability, access and utilization – and integrates important nutrition and vulnerability considerations.

Food availability is the physical presence of food in the area concerned, from all forms of domestic production, government reserves/stocks and external sources, including commercial imports and food aid. Food availability is assessed at the national, regional, district or community level.

Food access is a household's ability to acquire adequate amounts of nutritious food through one or a combination of sources, including own production and stocks, purchases, barter, gifts, borrowing and food aid. Food may be available in the area, but not accessible to certain households if physical, economic or social factors prevent them from acquiring sufficient quantity or diversity of food.

Food utilization refers to household's use of the food to which it has access and to the individual's ability to absorb and use the nutrients. Food utilization includes the ways in which food is stored, processed and prepared; the safety of drinking and cooking water; hygiene conditions; feeding practices, particularly for individuals with special food needs; intra-household distribution of food according to individual needs such as growth, pregnancy and lactation; and the health status of each household member. Given

Figure 1.1: Food and nutrition security conceptual framework



Source: WFP, January 2009

the widely acknowledged role of women in improving the nutritional profile of their families' diets, particularly for infants and young children, the mother's education level is often used as a proxy for a household's food utilization.

Nutrition and health outcomes refer to an individual's nutrition and disease status, including micronutrient deficiencies, morbidity and mortality outcomes. Food-related factors and general care practices contribute to these outcomes within the broader public health and disease environment.

In this atlas, the term “vulnerability” refers to **vulnerability to food and nutrition insecurity**. The degree of vulnerability of individuals, households or groups of people is determined by their exposure to risk factors and their ability to cope with or withstand stressful situations.

The food and nutrition security conceptual framework considers food availability, food access and food utilization as core determinants of food security and links them to the asset endowments of households, their livelihood strategies and their political, social, institutional and economic environment. The food security status of any household or individual is therefore typically determined by the interaction of a broad range of agro-environmental, socio-economic, biological and political factors.

Food and nutrition insecurity can be chronic or transitory. **Chronic food and nutrition insecurity** is the long-term or persistent inability to meet minimum food requirements and is usually associated with underlying factors that do not change quickly, such as local climate, soil type, local governance

system, public infrastructure, land tenure, income distribution, inter-ethnic relations, and education level. ***Transitory food and nutrition insecurity*** is the short-term or temporary inability to meet minimum food requirements, which is associated mainly with dynamic factors that can change quickly, such as infectious diseases, natural disasters, displacement, change of market functioning, level of indebtedness and migration. Many of these dynamic factors lead to spikes in food prices that affect the poor disproportionately because poor people spend a large part of their incomes on food. Repeated periods of transitory food insecurity can lead to depletion of a household's assets, degradation of its resilience and, ultimately, to chronic food insecurity.

1.3 Methodology

Food and nutrition security is multidimensional and requires analysis of a range of parameters. The atlas uses official statistics to measure food and nutrition security through a set of indicators that represent the three dimensions of food and nutrition security: aggregate food availability, households' access to food, and individuals' food utilization. Nutrition considerations, including the affordability and availability of nutrient-rich foods, permeate all three dimensions.

The FSVA Steering Committee and the FSVA Technical Working Group selected 13 indicators based on a review of data availability at the district level and the capacity of the indicators to reflect the three dimensions of food and nutrition security (Table 1.1). The 2015 FSVA divides these indicators into two sets. The first set covers chronic food and nutrition insecurity: food consumption to production ratio, poverty rate, transport and electricity infrastructure, access to safe water and health facilities, life expectancy, illiteracy among women, and stunting. The atlas maps these indicators at the district level, and combines them into a single composite indicator of food and nutrition security. Districts are classified into six priority groups, from the most food-insecure priority groups 1 and 2, through the moderately food-insecure priority groups 3 and 4, to the most food-secure priority groups 5 and 6, based on the composite indicator. The second set of indicators in the 2015 FSVA examine food insecurity related to climatic factors. These indicators include the frequency of natural disasters that potentially impact food security, estimated losses in rice production caused by floods or droughts, rates of deforestation and the strength of El Niño/Southern Oscillation (ENSO), which drives rainfall variability.

Balanced with the need to maintain comparability with previous editions of the atlas, this 2015 FSVA includes some improved indicators: i) lack of access to roads that are passable by four-wheel vehicle has been expanded to include lack of access to waterways that are passable by boat; ii) access to safe drinking-water excludes drinking-water sources that are within 10 m of a septic tank or latrine and therefore at high risk of contamination; and iii) stunting replaces underweight to capture long-term nutritional deficiency, in line with government programmes, post-MDG discussions and the ambitious national goals for reduced stunting.

The FSVA Technical Working Group has also improved the methodology for composite analysis, to generate more robust indicators. In addition to principal component analysis, cluster analysis and discriminant analysis were applied. As a result, districts are classified into priority groups based on the quantitative distribution of districts performance levels, rather than on the application of predetermined cut-off thresholds.

It is important to underline that in a district identified as relatively food-secure (priority groups 5–6) not all the subdistricts, villages and households will be food-secure, while not all the populations in a food-insecure district (priority groups 1–2) will be food-insecure. Province and district atlases are needed to provide closer analysis at the subdistrict and community levels.

The composite indicator of food and nutrition security depicts the current situation of chronic food and nutrition insecurity, but does not include analysis of transient food and nutrition security due to climatic and environmental factors. Chapter 6 provides further analysis of the dynamic factors associated with a household's vulnerability to transient food and nutrition insecurity, which are largely beyond the household's control. Assessing trends over time and geographical patterns in four key indicators related to the environment – frequency of natural disasters, rice production loss due to drought and floods, the rate of deforestation, and the strength of ENSO – adds an important climatic perspective to the analysis of food and nutrition security in Indonesia.

The performance of the 398 districts is mapped for each indicator as well as for the composite index.

The maps are produced using a uniform colour pattern in shades of red, yellow and green. Shades of red denote high levels of food and nutrition insecurity, yellow indicates moderate levels, and green low levels. The thresholds for mapping single indicators are the same as used in the first and second editions of the atlas, except for child stunting which uses the World Health Organization's (WHO's) thresholds for public health significance. Rounded national averages are used as cut-off points between the different colours. Index maps 1.1 to 1.7 show provinces and districts included in the analysis and mapping.

As in previous editions of the atlas, urban areas are excluded from the analysis because urban food and nutrition insecurity requires a different set of indicators. The need to develop such indicators is becoming increasingly urgent as urbanization in Indonesia continues; according to recent estimates, by 2035, 66.6 percent of the total population will be living in urban areas (BPS, 2013).

All data were collected from secondary sources by district, provincial and central food security offices and from publications of the Central Bureau of Statistics (BPS), the Ministry of Health, the National Disaster Management Agency, the Ministry of Agriculture, the University of Maryland, and the University of East Anglia. Data analysed in the FSVA cover the period 2010–2014. Some indicators are at the individual level, while others are at the household or community level.

Table 1.1: Indicators used for the Food Security and Vulnerability Atlas of Indonesia, 2015

Indicator	Definition and Computation	Data Source
VULNERABILITY TO CHRONIC FOOD AND NUTRITION INSECURITY		
Food Availability		
Ratio of per capita normative consumption to net “rice + maize + cassava + sweet potatoes” availability	<ol style="list-style-type: none"> The district-level three-year average (2011–2013) of net production of rice and maize was calculated using standard conversion factors. Cassava and sweet potato production was divided by three to derive a cereal equivalent. Total cereal production available for human consumption was then calculated. Per capita daily net cereal availability was computed by dividing total cereal availability for the district by the district's population (population data for mid-2012). Net imports and trade in cereals were not considered, as data at the district level were not available. Normative per capita daily cereal consumption was set at 300 grams. The ratio of per capita normative consumption to per capita net cereal availability was computed. Ratios of one and more show cereal-deficit areas; those of less than one indicate cereal-surplus areas. 	Provincial statistics from BPS or provincial and district food security offices (2011–2013 data)
Food Access		
Percentage of people living below the poverty line	The Indonesian rupiah value of the monthly per capita expenditure required to provide a minimum level of food and non-food basic consumption. The national poverty line was defined as Rp 308,826/capita/month in urban areas and Rp 275,779 in rural areas in 2013.	National Socio-Economic Survey (SUSENAS) 2013, BPS
Percentage of villages with inadequate transport connections	Percentage of villages lacking access to roads that are passable by four-wheeled vehicle or to waterways passable by boat.	Village Potential Survey (PODES) 2014, BPS
Percentage of households without access to electricity	Percentage of households lacking access to electricity from State and/or non-State sources such as generators.	National Socio-Economic Survey (SUSENAS) 2013, BPS
Food Utilization		
Female illiteracy	Percentage of women and girls over 15 years of age who cannot read or write.	National Socio-Economic Survey (SUSENAS) 2013, BPS
Percentage of households without access to clean and safe drinking-water	Percentage of households lacking access to improved water sources – water taps, protected wells/boreholes, or protected spring water (excluding bottled water) – at least 10 m from a septic tank or latrine.	National Socio-Economic Survey (SUSENAS) 2013, BPS
Percentage of villages located more than 5 km away from health facilities	Percentage of villages located more than five kilometres away the nearest health facility: hospital, clinic, community health centre, etc.	Village Potential Survey (PODES) 2014, BPS
Nutrition & Health Outcomes		
Child stunting	The percentage of children under 5 who are more than -2 standard deviations (-2 SD) from their age and gender-specific reference heights (2005 WHO standards)	Basic Health Research Survey (RISKESDAS) 2013, Ministry of Health
Life expectancy at birth	The average numbers of years that a newborn infant is expected to live if current mortality patterns prevail throughout her/his life.	National Socio-Economic Survey (SUSENAS) 2013, BPS
CLIMATIC AND ENVIRONMENTAL FACTORS AFFECTING FOOD SECURITY		
Climate related natural disasters	Natural disasters related to climatic factors occurring in Indonesia between 2000 and 2014 with potential impact on food security	National Disaster Management Agency (BNPB), 2000–2014

Table 1.1 (contd.): Indicators used for the Food Security and Vulnerability Atlas of Indonesia, 2015

Indicator	Definition and Computation	Data Source
Rainfall variability	Change in monthly rainfall for a one degree celsius change in sea surface temperature during 1900 to 2013	Rainfall (1900 – 2013): Climate Research Unit, University of East Anglia. Sea Surface Temperature (1900 – 2013): ERSST v3b - NCEP NOAA
Rice production loss	Annual average loss of paddy production caused by droughts and floods (1990–2013)	Directorate of Crop Protection, Ministry of Agriculture, 1990–2013
Deforestation	Annual rate at which forest land is converted to non-forest land, based on analysis of Landsat satellite imagery over time	University of Maryland analysis of Landsat data 2000-2013

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CHAPTER 2

FOOD AVAILABILITY



Food availability is the physical presence of sufficient quantities of food, including nutrient-rich food, in the area concerned, from all forms of domestic production, government stocks and external sources such as commercial imports and food aid. Food production involves growing, preparing, processing, preserving, packaging and repackaging food commodities. It includes the production of food crops – such as cereals, tubers, pulses, nuts, oil seeds, vegetables and fruits – and of livestock and fisheries. It depends on many factors: climate; soil type; rainfall; agricultural inputs, including irrigation, technologies and farming practices; and policies governing trade, production and consumption, including incentives for farmers to produce food crops.

As most domestic and imported food is supplied through markets before reaching households, market infrastructure and distribution and trade systems

determine the regional and local availability of food. As an island nation, Indonesia faces significant challenges in ensuring that infrastructure and distribution systems function properly. This aspect of food and nutrition security is addressed in greater detail in Chapter 3.

This chapter first assesses the national availability of major food products, including fruits, vegetables, livestock and fisheries. It then focuses on in-depth, district-level analysis of the production of selected cereal and tuber crops – rice, maize, cassava and sweet potatoes – in 398 rural districts. These crops were selected because they provide almost 50 percent of the daily calorie intake in the average Indonesian diet, and data on their production are reported regularly at the district level. Cereal availability is measured as the ratio of per capita cereal consumption to per capita production and is one of the nine key indicators for the composite analysis of food and nutrition insecurity.

While the cereal availability indicator measures whether a district produces sufficient quantities of calorie-rich food, it does not provide information on the local availability of nutrient-rich foods because it does not analyse foods from animal sources, pulses, fruits, vegetables and other nutritious foods produced within the district.

In conclusion, the chapter highlights the main challenges to food availability in Indonesia and provides recommendations for solving these challenges.

2.1 Agriculture Overview

Indonesia produces a wide range of foods, including 400 fruit species, 370 vegetable species, 70 tuber species and 55 spice species. In addition to rice, which is the main staple food across Indonesia, other regional staple foods include maize, sweet potatoes, cassava, taro and sago.

Under a general policy for achieving national self-sufficiency in food production – particularly in rice, maize, soybeans, sugar and beef – between 2015 and 2019, the Government of Indonesia promotes the expansion of agricultural production and has adopted measures to support local production and increase the productivity of farmers. Between 2011 and 2013, the agriculture sector, including livestock, forestry and fisheries, contributed between 14.43 and 14.71 percent of gross domestic product (Ministry of Agriculture, 2014).

In 2013, the agriculture sector contribution to GDP, was mainly through food crops (6.85 percent of total GDP), non-food crops (2.03 percent of total GDP) and livestock (1.60 percent of total GDP). The sector grew by 3.37 percent in 2011 and 3.54 percent in 2013, providing significant opportunities to improve food security, reduce poverty and achieve dynamic economic growth. Employment in agriculture has decreased over recent years, falling from 56 percent of the total workforce in 1990 to 35 percent in 2013. This decline is not surprising in a fast-growing economy, where the labour force tends to move away from the primary sector into the secondary and tertiary sectors.

Core subsectors of the agriculture sector include plantation or estate production; food crop production; horticulture, including fruits and vegetables; livestock; and fisheries. Plantation production in Indonesia is mainly of cash crops such as oil-palm, rubber, cocoa, coffee and tea, along with sugar cane and tobacco, which are seasonal crops. Oil-palm production has more than quintupled, increasing from less than 1 million ha in 1995 to an estimated 6.4 million ha in 2014, making Indonesia the world's largest palm oil producer.

As the primary staple food in most of the country, rice is the dominant food crop, planted on 13.84 million ha in 2013, when paddy production was 71.28 million mt. The average farm size is 0.89 ha, and 55.94 percent of farmers are smallholders with less than 0.5 ha of farmland each. Indonesia has been self-sufficient in rice production since 2007, and the Government aims to expand and sustain production to reach 73.4 million mt in 2015. By reaching this target the government expects that domestic rice production will be sufficient to meet domestic consumption requirements, eliminating the need for imports.

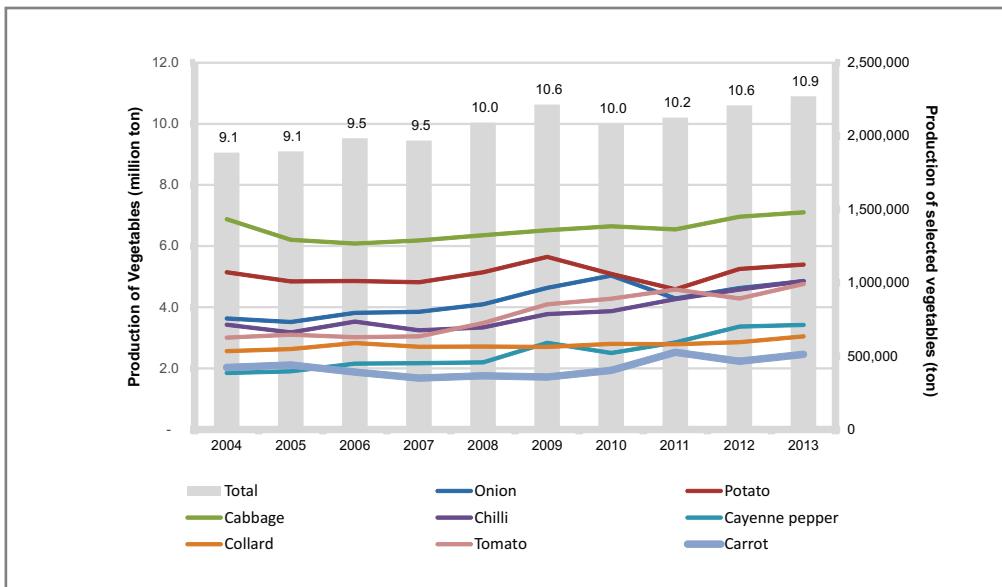
Other staple foods produced across the country include cassava, sweet potatoes and sago, the last of which is a primary staple in Papua and Papua Barat. As few data on sago production are available, its calorie contribution to the diets of people in these areas is likely to be underestimated. Rice, maize, cassava and sweet potatoes contribute 61.30 percent of total per capita daily calorie supply (FSA, 2014). Rice contributes significantly more calories than maize, cassava and sweet potatoes.

Fortified wheat is increasingly consumed in Indonesia, but is not produced domestically, resulting in total dependence on imports: in 2013, wheat imports were estimated at 6.7 million mt.

With the exception of fortified wheat, these staple foods contribute significantly to calorie intake, but provide insufficient micronutrients. Pulses such as soybeans, peanuts and mung beans are an important source of vegetable-based protein and feature widely in the Indonesian diet, particularly in the form of tofu and tempeh. However, production of these foods accounts for only 1.2 percent of agricultural output. In 2013, 779,992 mt of soybeans were produced domestically and 1.8 million mt were imported, demonstrating the high dependency on imports (FSA, 2014).

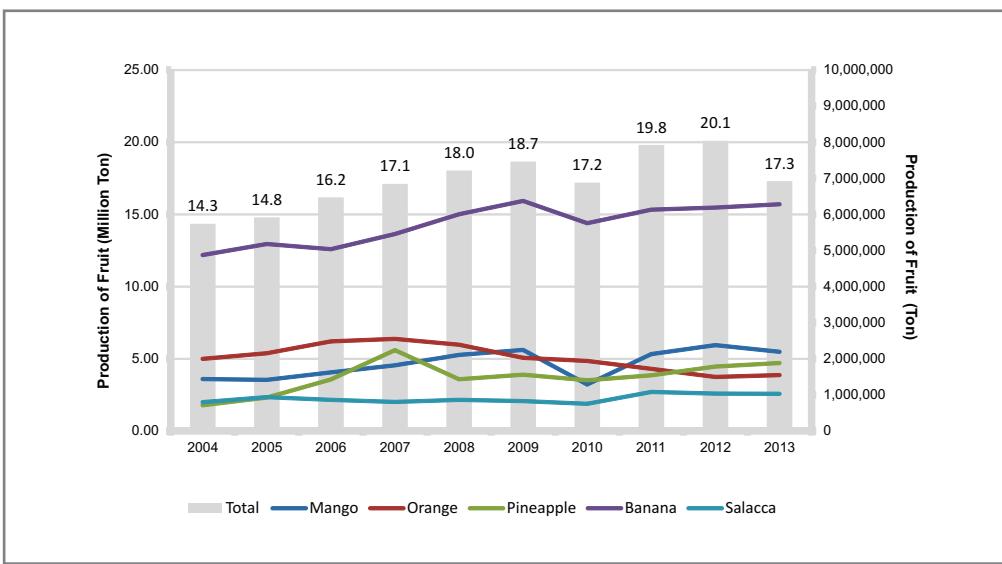
Vegetables and fruits are important sources of vital micronutrients. Between 2004 and 2013, vegetable production increased by 8.72 percent and fruit production by 7.6 percent, while imports vegetables increased by 10.28 percent and fruits increased by 21.82 percent. In 2012, the Government introduced import restrictions to protect domestic vegetable and fruit production, resulting in an estimated fall in vegetable imports of about 0.95 percent and a fall in fruit imports by 43.07 percent from 2012 levels (FSA, 2014). Production of selected fruits and vegetables is shown in Figures 2.1 and 2.2.

Figure 2.1: Production of selected vegetables, 2004-2013



Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.2: Production of selected fruits, 2004-2013

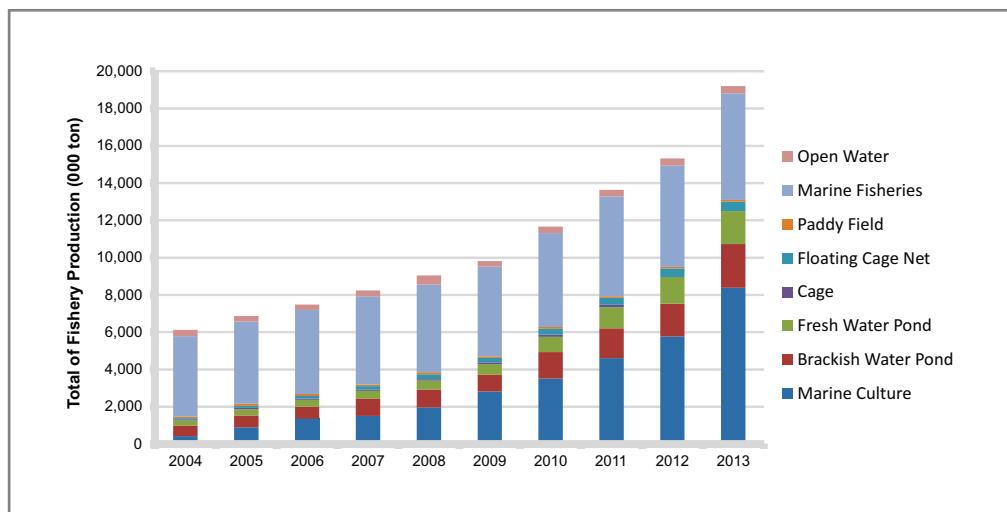


Source: Statistical Yearbook of Indonesia 2014, BPS

Increased domestic production of fruits and vegetables has not systematically translated into increased availability at the local level because of post-harvest losses, incurred mainly through poor storage and spoilage in transport. In the developing world, estimated post-harvest losses can account for up to 60 percent of total production; in Asian countries, up to 30 percent of total production is estimated to be lost through poor post-harvest practices. A survey of Indonesia by the United Nations Industrial Development Organization (UNIDO) estimated losses of grains at 10 percent for maize, 12.5 percent for rice and 15–18 percent for cassava. While data on fruits and vegetables are limited, losses of fruits and vegetables are expected to be nearly double those of grains (UNIDO, 2012). With most vegetable and fruit production concentrated in Java and Sumatra, these potential post-harvest losses could have significant consequences on the availability of fruits and vegetables across the country.

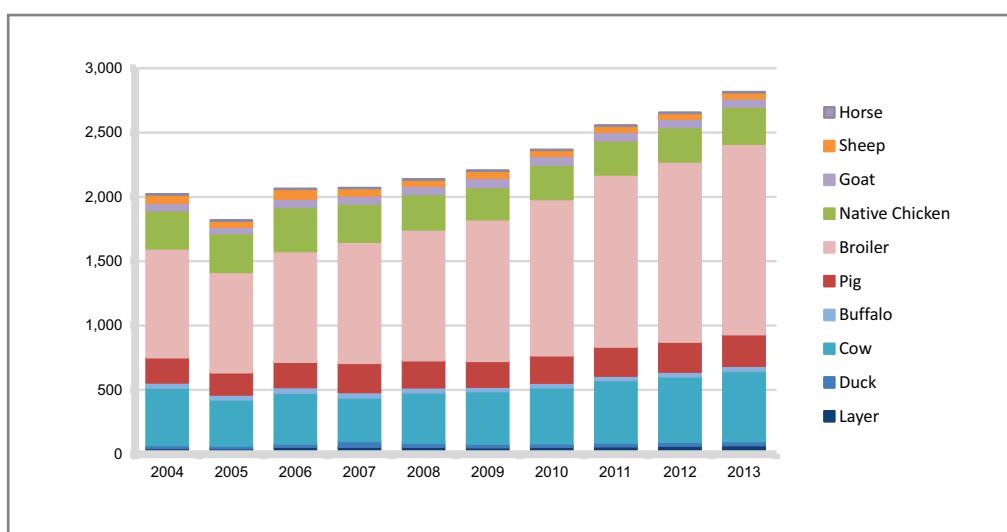
Livestock and fish are an important source of protein and other nutrients. Indonesia has one of the largest fisheries industries in the world, estimated at more than 8 million mt of fish caught in 2013 (Figure 2.3). However, productivity and innovation are stagnating, particularly in aquaculture production: fish farmers in Indonesia each produce an estimated average of 1 mt per year, compared with 187 mt per farmer in Norway (FAO, 2012). While the estimated availability of fish throughout Indonesia is a high 40.25 kg/capita/year (FSA, 2014), most fish production occurs in eastern parts of the country, where fish plays an important role in the population's diet.

Figure 2.3: Fish production, 2004-2013



Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.4: Livestock production, 2004-2013



Source: Ministry of Agriculture, 2014

In contrast to the fisheries industry, the livestock industry remains relatively small, and average consumption of livestock products, including eggs and milk, is a meagre 45.1 g/capita/day. In 2013, the industry produced an estimated 2.72 million mt of meat: 1.76 mt from poultry, 642,361 mt from ruminants, and 310,515 mt of offal. Poultry dominates the livestock industry, with broiler and layer chickens and ducks accounting for 52.88 percent of total livestock heads in the country in 2013. Average annual livestock production grew by 3.94 percent from 2004 to 2013. However, as living standards

improve and consumer preferences shift, the demand for ruminant meat (beef, buffalo, mutton, lamb, horse and pork) is increasing. In 2014, beef production of 381,323 mt fell short of national consumption and an additional 45,513 mt of beef was imported. The Government has introduced policies to support the growth and spread of beef cattle farms, including smallholder livestock systems, throughout the country. However, livestock production remains concentrated in Java followed by Sumatra, with little occurring in Maluku, Kalimantan and Sulawesi.

Box 2.1 - Wild foods

Wild foods obtained from hunting and gathering can contribute significantly to food and nutrition security. Although few data are available, anthropological research and anecdotal evidence suggest that hunting and gathering are particularly important ways of obtaining food in more remote communities, such as in Kalimantan and Papua. Gathered taro and sago are believed to contribute substantially to calorie intake, and hunted mammals, rodents and insects provide important sources of animal protein. It is recommended that additional research be conducted in these regions to evaluate in full the consumption of wild foods and their nutritional impact.

2.2 Cereal Production

Over the last ten years, cereal production has increased in Indonesia, far outpacing population growth. This growth in production is mainly attributable to improved productivity resulting from more intensive cropping patterns and the use of high-quality seeds (Table 2.1 and Figure 2.5). Maize production has the highest average growth rate per annum at 6.13 percent, and sweet potato production the lowest at 2.41 percent. Rice production is growing at an average of 3.15 percent per annum.

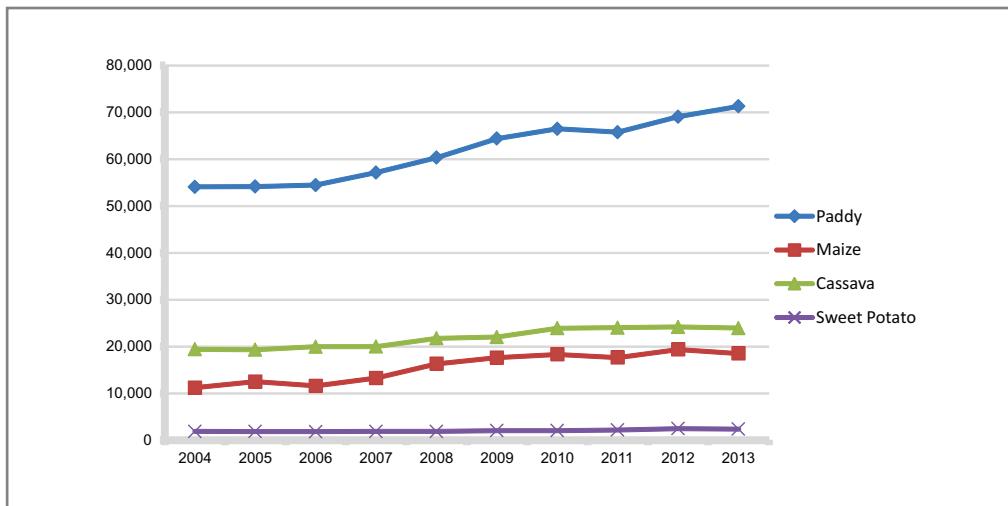
In 2013, total production amounted to 71.28 million mt of rice, 18.51 million mt of maize, 23.94 million mt of cassava and 2.39 million mt of sweet potatoes; total production of these four commodities was higher than the ten-year average (Table 2.1 and Figure 2.5). Except for DKI Jakarta, all provinces increased cereal production from 2004 – 2013. The largest increases in production were in Kepulauan Riau (11.43 percent) and Gorontalo (10.51 percent).

Table 2.1: Production of major cereals and tubers, 2004-2013 (thousand mt)

Cereals	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	10 year average	average annual growth rate (%) [*]
Paddy	54,088	54,151	54,455	57,157	60,326	64,399	66,469	65,757	69,056	71,280	61,714	3.15
Maize	11,225	12,524	11,609	13,288	16,317	17,630	18,328	17,643	19,387	18,512	15,646	6.13
Cassava	19,425	19,321	19,987	19,988	21,757	22,039	23,918	24,044	24,177	23,937	21,859	2.41
Sweet Potato	1,902	1,857	1,854	1,887	1,882	2,058	2,051	2,196	2,483	2,387	2,056	2.70

* Average annual population growth was 1.38 percent over the same period
Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.5: Production of major cereals and tubers, 2004-2013 (thousand mt)



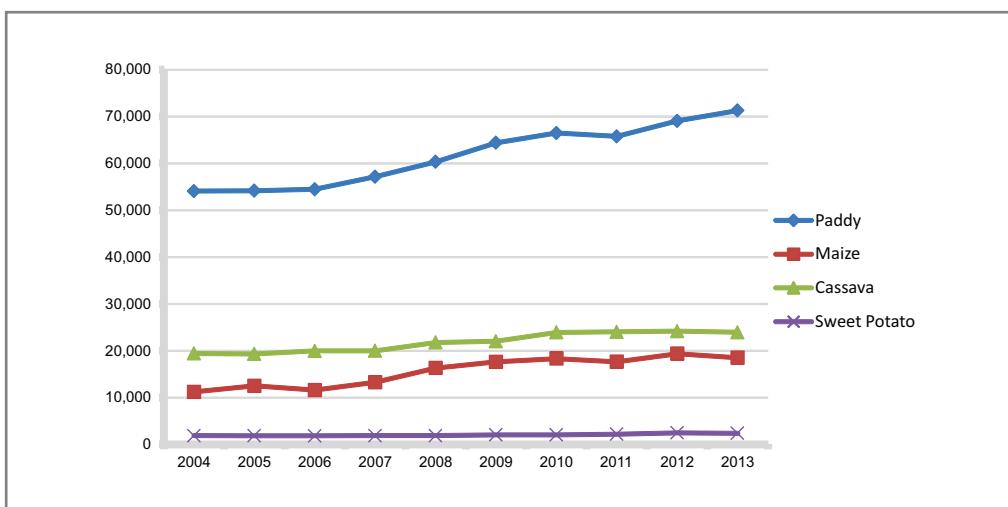
Source: Statistical Yearbook of Indonesia 2014, BPS

Paddy

Provincial-level data on production, harvested areas and productivity for 2004 to 2013, obtained from the National Statistics Agency (BPS), were analysed. As most rice production is in Java and Sumatra, the trend analyses for rice focus on these two regions (Figures 2.6 to 2.11).

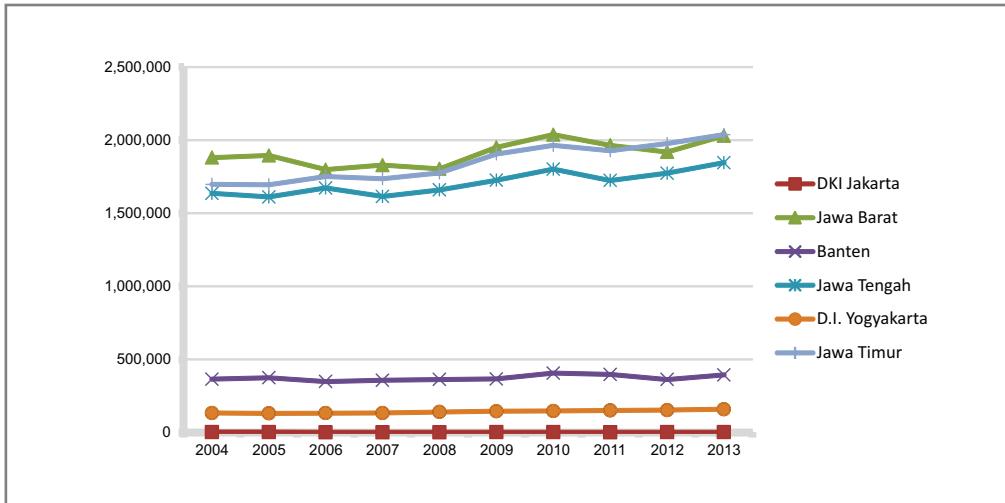
Figures 2.6 and 2.7 show total harvested paddy areas in Java and Sumatra. Total harvested area in Java increased from 5.71 million ha in 2004 to 6.47 million ha in 2013, with all provinces maintaining or increasing their harvested areas. In Sumatra, the harvested area increased from 3.16 million ha in 2004 to 3.52 million ha in 2013. The small annual fluctuations in rice harvested areas experienced in parts of the country other than Sumatra and Java resulted mainly from climate variability and rainfed farming practices. Despite the conversion of paddy area to other land uses, rice production in Java increased by 20.96 percent over the ten years of 2004–2013.

Figure 2.6: Total paddy harvested areas in Sumatra, 2004-2013 (ha)



Source: Statistical Yearbook of Indonesia 2014, BPS

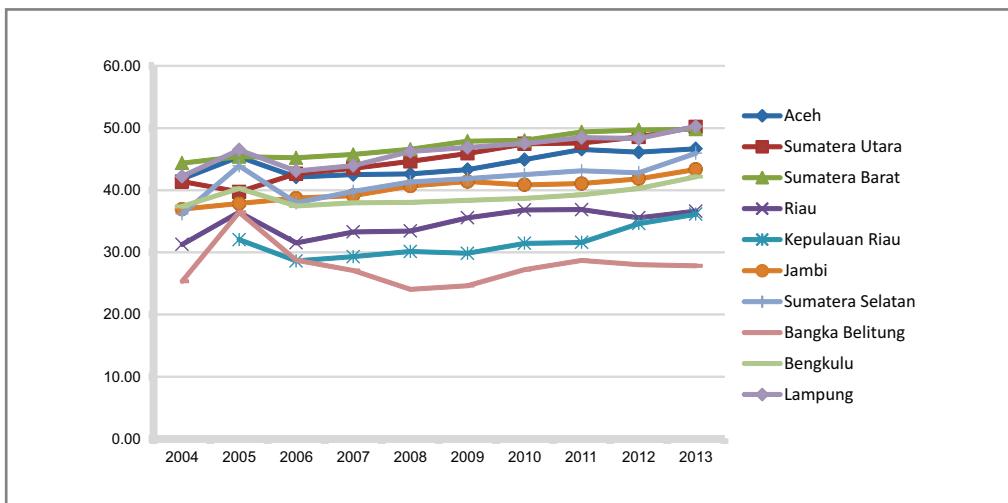
Figure 2.7: Total paddy harvested areas in Java, 2004-2013 (ha)



Source: Statistical Yearbook of Indonesia 2014, BPS

Consequently, rice yields were on average substantially higher in Java in 2013 (57.98 qu¹/ha) than in Sumatra (47.61 qu¹/ha). Rice yields also increased at a slightly faster pace between 2004 and 2013, 12 percent in provinces of Java and 19 percent in those of Sumatra (Figures 2.8 and 2.9).

Figure 2.8: Paddy yields in selected provinces of Sumatra, 2004-2013 (quintal/ha)

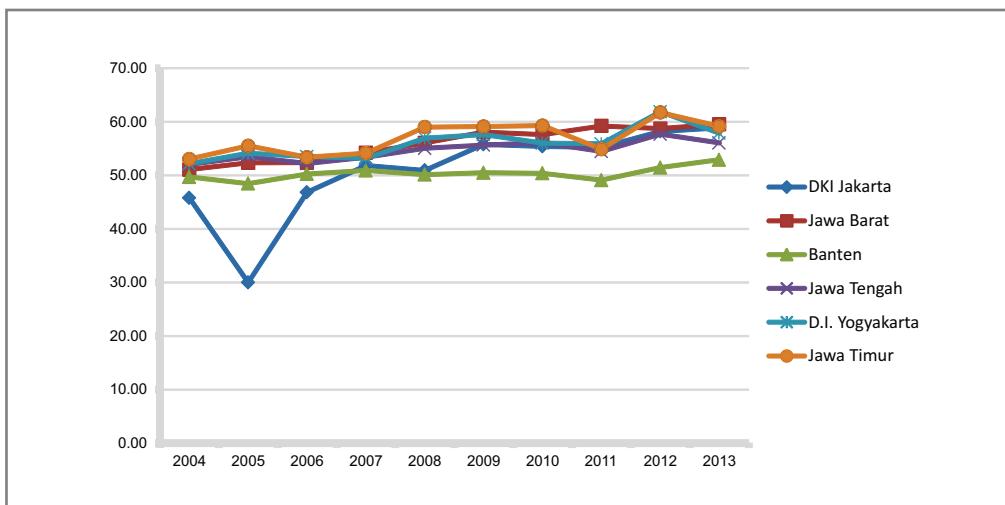


Source: Statistical Yearbook of Indonesia 2014, BPS

Nationwide rice production has increased progressively from 54.09 million mt in 2004 to 71.28 million mt in 2013. The main rice production areas are Jawa Barat, Jawa Timur, Jawa Tengah, Sumatera Utara, Sumatera Selatan, Lampung (in Sumatra), Sulawesi Selatan, Kalimantan Selatan and Nusa Tenggara Barat (Figure 2.12).

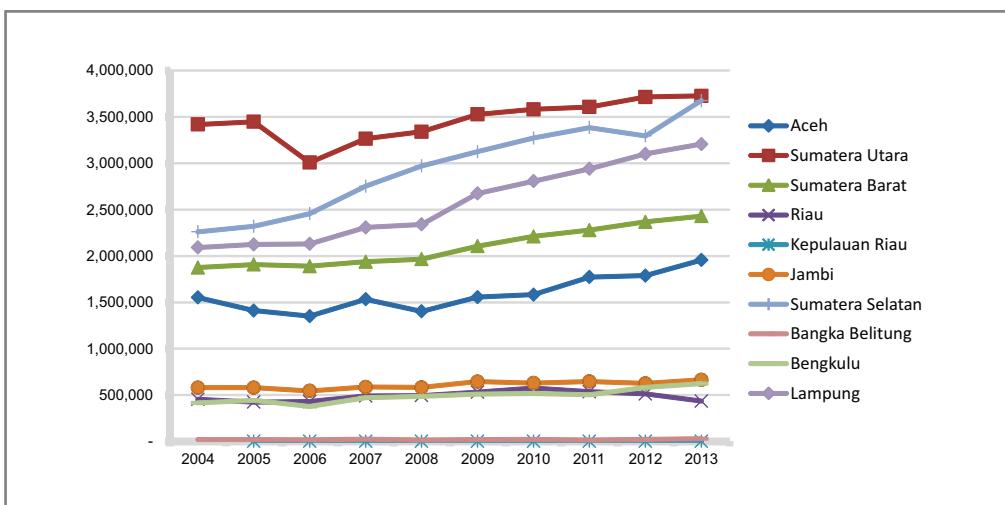
¹ 1 quintal = 100 kg

Figure 2.9: Paddy yields in selected provinces of Java, 2004-2013 (quintal/ha)



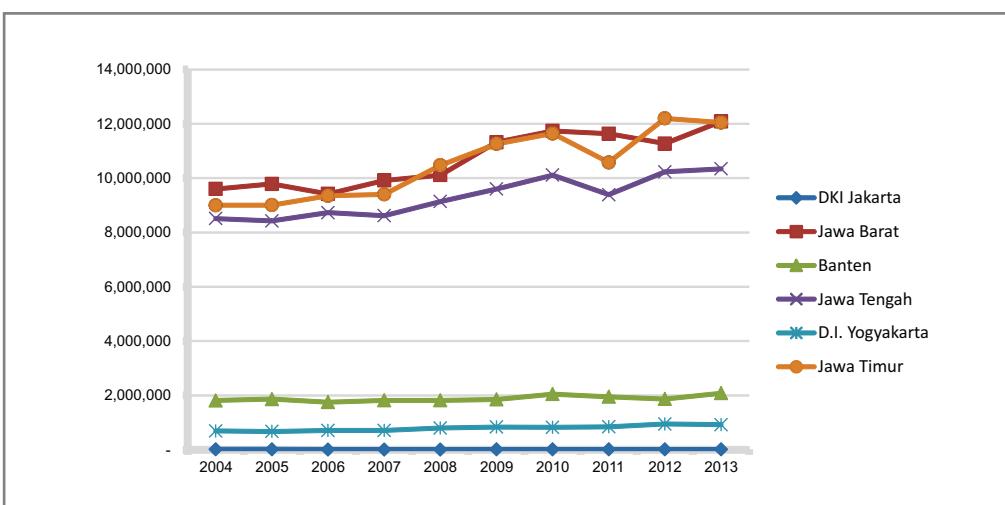
Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.10: Paddy production in Sumatra, 2004-2013 (mt)



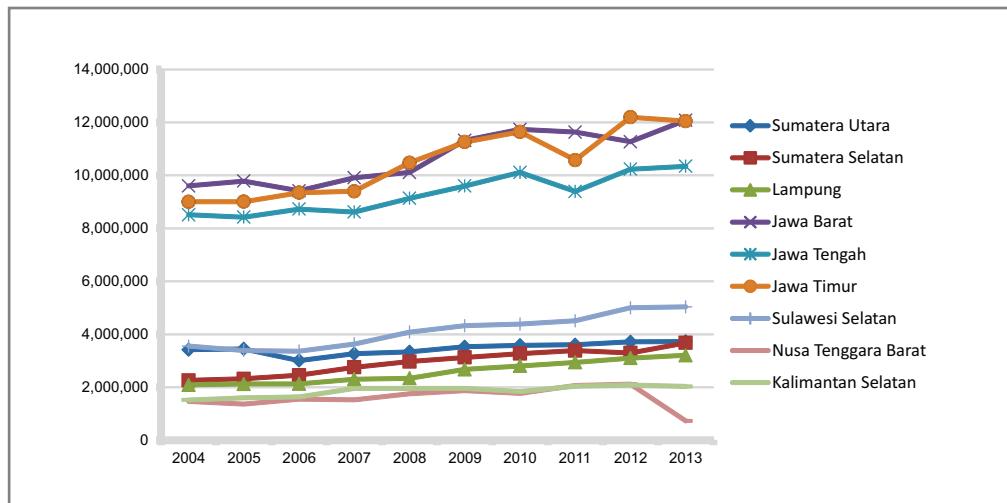
Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.11: Paddy production in Java, 2004-2013 (mt)



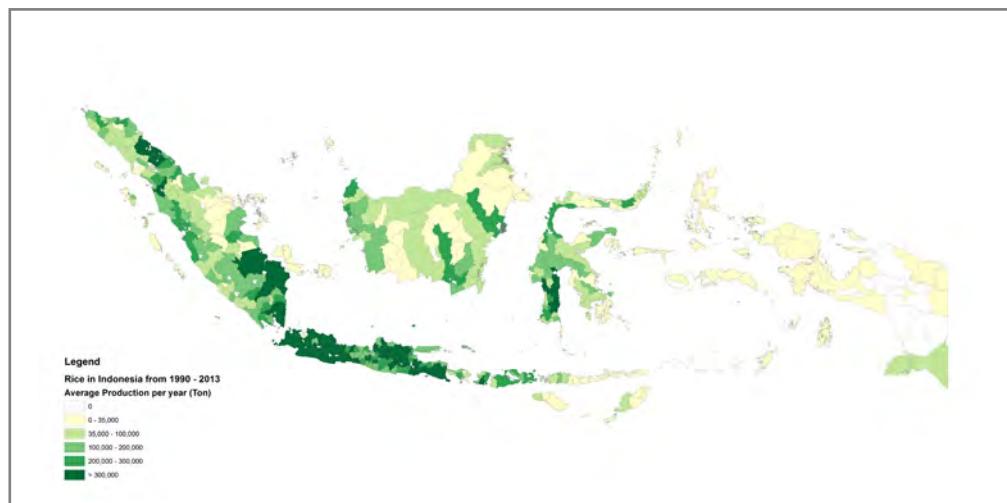
Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.12: Rice production in major rice-producing provinces, 2004-2013 (mt)



Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.13: Average annual rice production 1990-2013



Source: Statistical Yearbook of Indonesia 2013, BPS

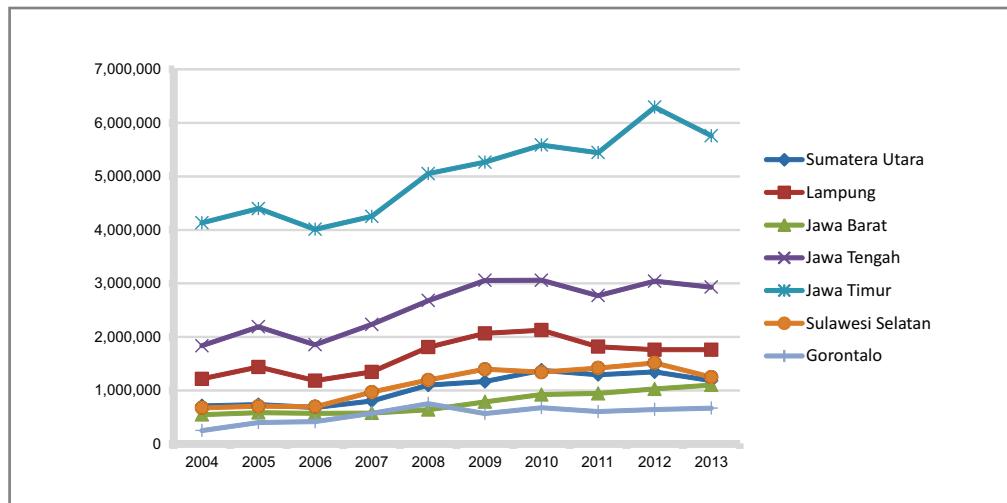
Maize

In 2013, maize production reached 18.51 million mt, 7.29 million mt more than in 2004. This increase in output was the result of both increased productivity and the expansion of cultivated land: yields increased by 45 percent, from 33.44 qu/ha to 48.44 qu/ha, and harvested area by 14 percent, from 3.36 million ha to 3.82 million ha. In 2013, Java produced 54.54 percent of total national maize output, Sumatra 21.53 percent and Sulawesi 14.60 percent. At the provincial level, Jawa Timur, Jawa Tengah and Jawa Barat produced the highest volumes of maize in Java, while Lampung and Sumatera Utara produced the most in Sumatra (Figure 2.14).

Cassava

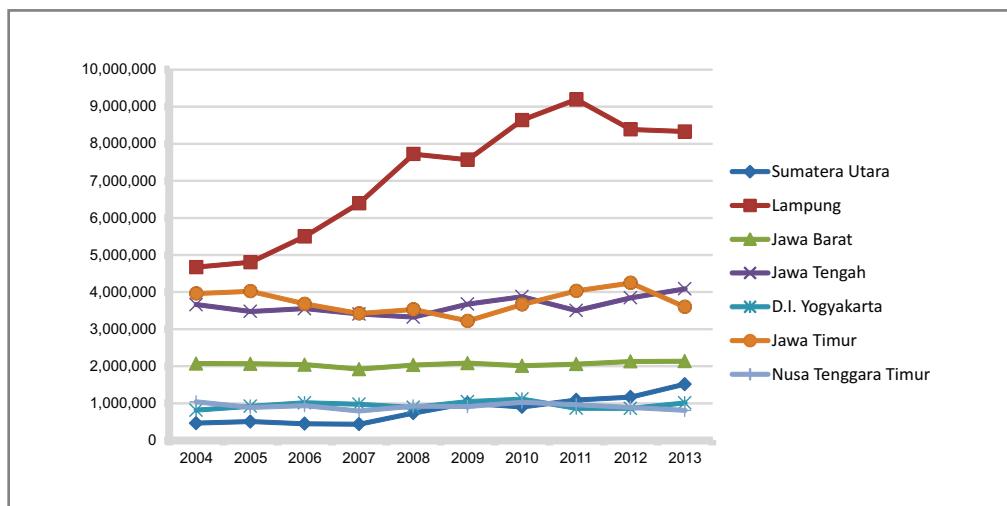
In 2013, cassava production reached 23.94 million mt, 4.51 million mt more than in 2004, largely because yields increased by 69.92 qu/ha, from an average of 154.68 qu/ha to 224.60 qu/ha. Lampung province is the largest producer of cassava in Indonesia, producing 35.88 percent of national output. Jawa Timur, Jawa Tengah, Jawa Barat, DI Yogyakarta (in Java), Sumatera Utara and Nusa Tenggara Timur are the other main cassava-producing provinces (Figure 2.15).

Figure 2.14: Maize production in major maize-producing provinces, 2004-2013 (mt)



Source: Statistical Yearbook of Indonesia 2014, BPS

Figure 2.15: Cassava production in major cassava-producing provinces, 2004-2013 (mt)



Source: Statistical Yearbook of Indonesia 2014, BPS

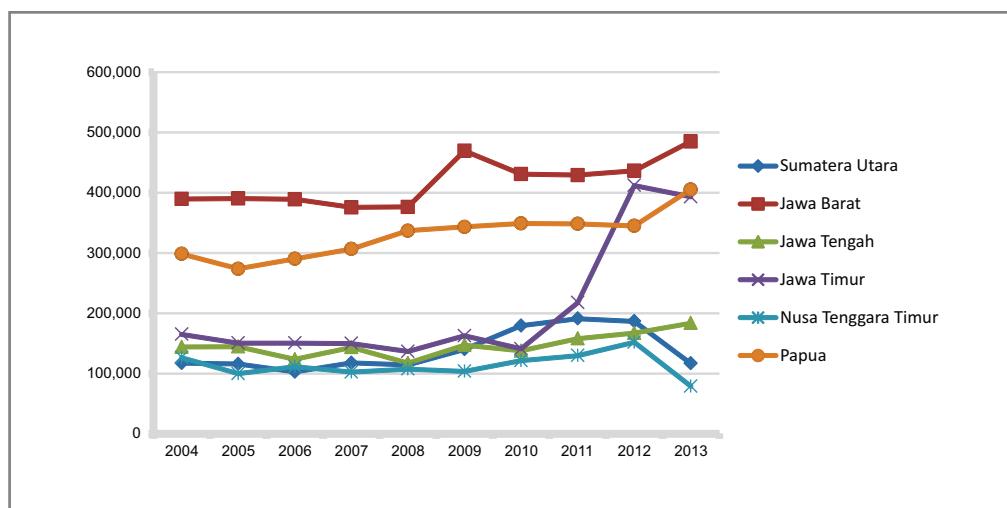
Sweet potatoes

Total sweet potato production increased from 1.90 million mt in 2004 to 2.39 million mt in 2013. Similar to the increase in maize, the sweet potato increase resulted mainly from an increase in yields, from 103.05 qu/ha in 2004 to 147.47 qu/ha in 2013. As well as Java and Sumatra, Papua is also a major producer of sweet potatoes, accounting for 17.02 percent of national output, just behind Jawa Barat with 20 percent (Figure 2.16).

2.3 Per Capita Normative Consumption to Production Ratio

As discussed in chapter 1, the indicator of food availability included in the composite indicator of overall food security is the ratio of per capita normative food consumption to food production. This ratio indicates the degree to which an area is self-sufficient in cereal and tuber production.

Figure 2.16: Sweet potato production in major sweet potato-producing provinces, 2004-2013 (mt)



Source: Statistical Yearbook of Indonesia 2014, BPS

Cereal production in the 398 districts was calculated by computing the average production of rice, maize, cassava and sweet potatoes over the three production years of 2011–2013. Net average production in cereal equivalents was calculated for each crop using standard conversion factors of one-to-one for rice and maize and three-to-one for cassava and sweet potatoes – 3 kg of cassava or sweet potatoes is equivalent to 1 kg of rice or maize in terms of calorific value (FSA, 2014). The four components were then added together to calculate total production in cereal equivalent. Net cereal availability per capita was calculated at the district level by dividing the district's total production in cereal equivalent by its estimated population for the middle year of the three-year period, i.e. 2012. Data on trade and imports were not considered because they were not available for the district level. Based on the Indonesian consumption profile, the normative recommended per capita cereal consumption is 300 g per day, which was used to compute the per capita normative consumption to production ratio.

Map 2.1 shows that most rural districts are self-sufficient in cereal production, illustrated as green areas; deficit areas are marked in red. Self-sufficiency in deficit areas may be constrained by climate conditions, land suitability and recurrent disasters such as droughts and floods. However, it is important to note that a lack of self-sufficiency is not always a cause for concern: areas with a deficit in cereal production may produce other products or services that generate sufficient income to procure cereals from surplus areas; and in some deficit areas, especially Papua and Papua Barat, important sources of carbohydrates such as sago and taro are not accounted for because of the lack of reliable production data. Nonetheless, the implications of cereal deficits should be studied carefully, particularly as Indonesia faces severe logistical challenges, and a relatively large percentage of its population is heavily reliant on their own production to satisfy household food needs, with 55.94 percent of farmers are smallholders cultivating less than 0.5 ha each.

Based on the ratio of normative consumption to production, 77 percent of the 398 districts were self-sufficient in cereals and 23 percent were not. Districts in the provinces of Papua Barat, Kepulauan Riau, Bangka Belitung, Papua, Riau, Jambi, Kalimantan Tengah, and Maluku were not self-sufficient. The causes of these deficits vary across districts but include: i) expansion of cash crop plantations, including oil-palm, black pepper, rubber, cashew and cocoa; ii) expansion of open-pit mining areas; iii) presence of swamps; iv) low productivity in upland rice production systems; and v) insufficient arable land to support local population density. For all districts, including those with surplus cereal production, climate change is a major concern, and deforestation, droughts and/or flooding pose serious threats to the sustainability of current production levels. While production of many food crops has increased in

recent years, agriculture has been negatively affected by phenomena related to climate change – such as unpredictable weather patterns and increased incidence of pests, diseases and natural disasters – jeopardizing achievements so far and threatening further progress towards full food and nutrition security.

2.4 Challenges to Food Availability

For several decades, Indonesia has been a net exporter of many agricultural commodities, particularly perennial crops such as palm oil, natural rubber, cocoa beans, coffee, coconuts and fish. However, the country remains a net importer of cereals, meat products, pulses, fruits, vegetables and dairy products. While Indonesia has achieved self-sufficiency in rice, the demand for these other products – particularly meat, wheat, dairy products and soya – is increasing more rapidly than the growth of national production, threatening to increase dependence on international imports.

Shifting food preferences are a central factor in the increased demand for these products: as seen in other middle-income countries, consumption patterns and demand trends alter quickly as the urban and middle-income population groups expand, surpassing national capacity to produce and thereby increasing the already high dependence on imports. The total population of Indonesia is projected to reach 305.6 million people by 2035, with the urban population accounting for 66.6 percent of this total.

Improving productivity in agriculture is a major priority requiring concrete action to keep up with growing demand in the face of decreasing availability of inputs and resources, especially arable land. National food production continues to suffer from: i) conversion of agricultural land to non-agricultural uses and to plantations for cash crop production, particularly in Java; ii) decreased land quality and fertility resulting from environmental damage; iii) increasingly limited and uncertain availability of water for food production, partly because of forest destruction; iv) degraded irrigation infrastructure, of which approximately 30 percent has already been rehabilitated twice over the last 25 years; v) competition for water resources with the industrial and residential sectors; vi) increased droughts and floods caused by ecosystems' decreased ability to self-regulate; vii) low yields, particularly in smallholder farming systems, mainly because of limited access to markets for input purchases and product sales, inadequate extension services, and declining investments in rural infrastructure; viii) high post-harvest losses during production, handling, processing and transport; ix) lack of access to capital in rural areas; x) crop and livestock pests and diseases that reduce productivity; and xi) competition between food crops and biofuel production.

2.5 Milestones in Improving Food Availability

- In 2007/2008, Indonesia achieved self-sufficiency in paddy production. In 2013, rice production reached 71.28 million mt, providing a surplus of 8 million mt.
- In 2013, production provided 3,849 kilocalories per capita per day and 89.26 grams of protein per capita per day, surpassing the Recommended Dietary Allowance (RDA) targets.
- The Indonesian Government received an award at the Thirty-Eighth FAO Conference in Rome, Italy on 16 June 2013, in recognition of its persistent work to reduce hunger and malnourishment and achieve the MDG target to halve the percentage of the population which was undernourished.

2.6 Policies and Strategies for Improving Availability

On 18 October 2012, the Indonesian Parliament passed the Food Law (No. 18/2012), which deals with food sovereignty, food self-sufficiency, food security and food safety. The Indonesia Programme for

International Food Security Cooperation was established on 29 December 2011 by a decree of the Coordinating Ministry for Economic Affairs to facilitate support from international development partners in achieving food security.

The Food Law states that “Food is the most essential human need and its fulfilment is part of human rights guaranteed in the 1945 Constitution of the Republic of Indonesia as a basic component in creating quality human resources”. The broad legislation addresses multiple aspects of food security, including availability, affordability, food consumption and nutrition. It also directs the institutional bodies addressing food security.

The Food Law defines food sovereignty as the right and responsibility of a state or nation to determine its own food policies, ensure the right to food of its people, and provide its people with the right to select food systems that are appropriate to the potential of local resources. Food self-sufficiency is defined as a nation’s ability to produce domestically a wide variety of foods that fulfil the needs of its population by exploiting available resources while using local knowledge and preserving dignity. In addition to defining the main principles of food security in Indonesia, the Food Law also mandates the Government to intervene in the food sector to facilitate food self-sufficiency and food security. To accomplish this, the Government manages national food reserves, regulates trade to stabilize supplies and prices of major food commodities, and seeks to maintain stable prices and supplies of staple foods at the producer and consumer levels.

President Widodo laid forward his Nine Priority Agenda (Nawa Cita) in October 2014 which further emphasized food sovereignty as a guiding principle to achieve food security. This was then set forth into policy in the National Medium Term Development Plan (RPJMN) 2015-2019. The policies and goals relating to food sovereignty fall under five key strategies:

- a. Increase food availability by enhancing domestic production of key crops including rice, maize, soybean, meat, sugar, chili and onion.
- b. Improve the quality of food distribution and the accessibility of food.
- c. Improve the overall quality and nutritional value of the Indonesian diet.
- d. Protect food security through preparedness for natural disasters, mitigating the impact of climate change, and preventing pest infections and the spread of diseases in animals.
- e. Improve the livelihoods and welfare of farmers, fishermen and other food producers.

The RPJMN sets a series of goals and targets for 2015-2019. The main goals relating to food security in the RPJMN are specifically to:

- a. Increase domestic production of key food commodities: rice, soybean, maize, meat, and sugar. Self-sufficiency in rice is a key objective of the policy.
- b. Increase food accessibility by monitoring food distribution and preventing price speculation; increase the Government’s rice reserves in order to maintain price stability.
- c. Improve the overall quality of the diet – raising the national PPH score (Pola Pangan Harapan – Desirable Dietary Pattern) to 92.5 by 2019.
- d. Develop and improve irrigation, and reduce land conversion by 600 thousand hectares.
- e. Rehabilitate 1.75 million hectares of deteriorating irrigation infrastructure.
- f. Effectively manage and maintain the irrigation network of 2.95 million hectares.

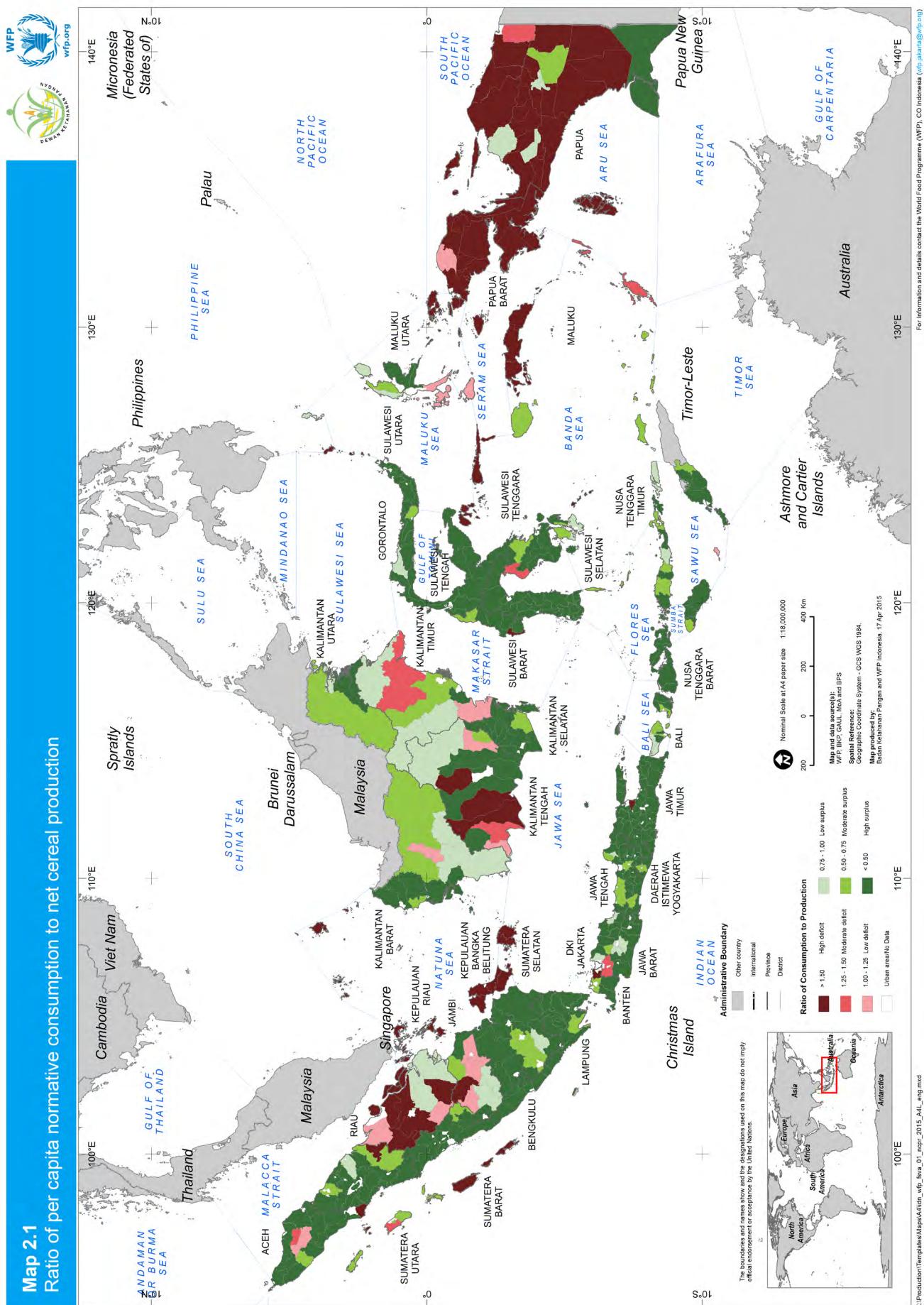
- g. Establish 132,000 hectares of swamp irrigation networks in order to balance economic, environmental and sustainability concerns.

Indonesia's diverse natural resources and technological advances give it a major opportunity to increase its food production capacity, improve productivity and business efficiency, and promote agribusiness and food safety. Agricultural science and innovative technologies have an essential role, not only in developing agricultural industrial technology, but also in improving post-harvest processing and storage techniques and the transport of food to remote areas.

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Map 2.1
Ratio of per capita normative consumption to net cereal production



CHAPTER 3

FOOD ACCESS



Access to food is one of the three pillars of food and nutrition security. It relates to a household's ability to obtain sufficient, safe and nutritious food from a combination of sources including own production, stocks, purchases, bartering, gifts, borrowing and food aid. Food may be physically present in a region, but not accessible to certain households because of limited: i) *physical access* – market infrastructure, ways of reaching markets, and the functionality of markets; ii) *economic access* – the financial capacity to purchase adequate and nutritious food; and/or iii) *social access* – the social capital needed to engage in informal support mechanisms such as bartering or borrowing, or the presence of social support programmes.

This chapter is divided into three sections, each of which addresses one of the forms of access. Wherever possible, national- and provincial-level data on relevant indicators are presented to provide the context for each section. District-level differences are then explored using proxy indicators for the 398 rural districts:

- Physical access: The key proxy indicator is access to roads and/or waterways.
- Economic access: Two proxy indicators are explored – access to electricity and poverty.
- Social access: Social assistance programmes are discussed, although district-level data are not available.

3.1 Physical Access

Transport and storage infrastructure is crucial for food and nutrition security: the food supply chain requires well-developed air, water and land infrastructure for the timely and cost-efficient transport of food. As an archipelago spread over 13,400 islands, Indonesia faces significant challenges to ensuring smooth and inexpensive supply chains for its products. The country is working to improve the integration and efficiency of air, land and sea facilities, to ease the movement and trade of a wider range of food items among islands, with minimal losses to spoilage.

Indonesia is investing in a high-quality road network and transport infrastructure to decrease the costs of trade and improve market access. Improved transport and storage infrastructure is likely to reduce food prices while increasing farmers' income by decreasing costs related to spoilage, transport and supply chain imperfections. In the meantime, consumers continue to face higher prices caused by inefficiencies, especially in the east of the country.

As well as improving market supply chains, road connectivity also increases investments in other sectors and enhances access to services, contributing to better living standards, especially in rural areas. Reliable, high-quality infrastructure contributes to economic growth through its positive impact on productivity and by facilitating employment and income-generating opportunities in both the agriculture and non-agricultural sectors. Agricultural extension workers can reach remote farmers and provide them with technical support and advice to increase their productivity. Access to education can improve as students are able to travel longer distances to reach schools, and teachers may be more willing to work in poor rural schools, thereby increasing human capital in poor rural regions. It is also easier for rural residents to attend health facilities.

As rapid urbanization continues – from about 15 percent of the population living in urban areas in 1950, to 49.8 percent in 2010 and a projected 66.6 percent by 2035 – investment in urban transport infrastructure also becomes critical. However, as this atlas focuses on rural populations, it analyses district-level access to roads and waterways in rural districts only.



State of transport infrastructure

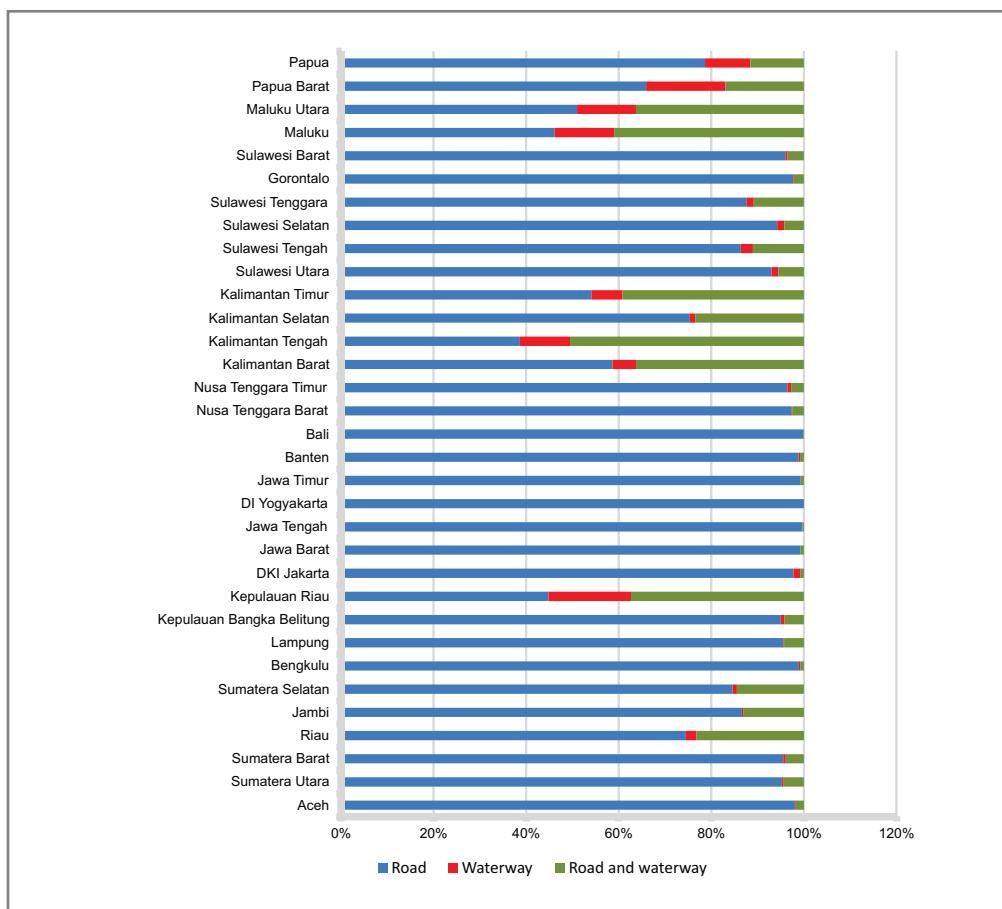
At the Indonesia Infrastructure Summit held in 2005, the Government committed to investing additional resources in roads, water supply, energy, telecommunications and other basic infrastructure services that are vital to sustaining economic growth, reducing poverty and improving living standards. Though investments in infrastructure have increased in recent years – from 114.2 trillion Rupiah in 2011 to 184.3 trillion in 2013 – significant challenges remain (Ministry of Finance, 2014). Several international reports identify infrastructure gaps as one of the main challenges to Indonesia's economic growth, including the 2013–2014 Global Competitiveness Report (World Economic Forum, 2013) and the World Bank's Indonesia Economic Quarterly report for October 2013 (World Bank, 2013).

Poor port infrastructure results in long delays and high costs in the inter-island movement of goods, including food. Although road infrastructure expanded from 492,398 km in 2011 to 502,724 km in 2013 (BPS 2014), and more than 60 percent of roads are paved, frequent flooding, road deterioration and lack of investment in repairs result in major congestion and delays. Long delays in both water and road transport contribute to excessive spoilage rates and high food prices.

District-level connectivity

The atlas measures district-level connectivity in terms of the proportion of villages in each district that have access to roads passable by four-wheeled vehicle or to waterways passable by boat throughout the year (BPS, 2013b) (Annex 1).

Figure 3.1: Modes of access to villages, 2014



Source: PODES 2014, BPS

In 2013, approximately 5.98 percent of villages in rural districts were not accessible by four-wheeled vehicle or boat at certain times of year, usually during the rainy season while 3.6 percent of villages were not accessible year-round of the remaining 90.42 percent with year-round connectivity, 89.04 percent used mainly roads, 2.25 percent water transport and 8.70 percent both roads and water (Figure 3.1). It is worth noting that the poor quality of roads remains a serious challenge in some rural areas.

Map 3.1 shows that accessibility by four-wheeled vehicle and boat was particularly inadequate in most parts of Kalimantan Tengah, Maluku, Kalimantan Timur, Kepulauan Riau, Maluku Utara, Kalimantan Barat, Kalimantan Selatan, Riau, Papua Barat and Sumatera Selatan.

3.2 Economic Access

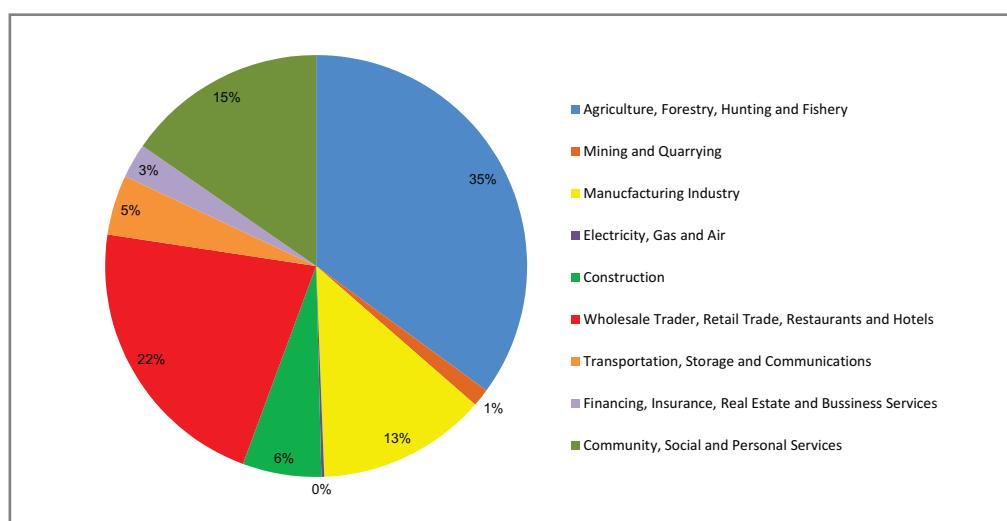
Economic access to nutritious food is a major determinant of food and nutrition security in Indonesia. While sufficient food may be available in nearby markets, a household's access to food depends on its income and the level and stability of local prices. Nutrient-rich foods tend to be relatively expensive, and poor households often minimize hunger by first "filling their bellies" with relatively cheap staple foods that are poor sources of micronutrients, protein and fat which are essential for healthy growth.

Livelihoods

A household's vulnerability to poverty is determined in large part by the resiliency of its livelihood strategies and by regional and local employment opportunities. Livelihood strategies are defined as the capabilities, capital/assets – natural, physical, human, economic and social – and activities that a household uses to secure basic needs such as food, shelter, health and education.

Household livelihood strategies vary widely and can include employment in the formal and/or informal sectors. While quarterly data on formal employment are provided through the National Labour Force Survey, data on informal employment are not regularly monitored despite the important contribution that informal labour makes to household livelihood strategies; the Central Bureau of Statistics (BPS) estimated that 69.75 million Indonesians (60.17 percent) were employed in the informal sector in February 2013 – a drop of 2.51 percentage points, or 1.7 million people, compared with February 2012 (62.68 percent). Most jobs in the informal sector provide below-average salaries and little job security, and some entail hazardous conditions.

Figure 3.2: Total employment, by sector, February 2013



Source: National Labour Force Survey (SAKERNAS) 2013, BPS

In line with the standards of the International Labour Organization (ILO), Indonesia has reported on both employment status and “open unemployment” in its labour force statistics since 2001. The total labour force includes all the people aged 15 to 64 years who were working, who had jobs but were temporarily absent from work, or who did not have jobs but were actively looking for work in the week preceding the survey. Employment status is classified into seven categories: i) self-employed; ii) self-employed with assistance from family labour/temporary help; iii) employer with permanent workers; iv) employee; v) casual employee in agriculture; vi) casual employee in non-agriculture; and vii) unpaid worker.

Table 3.1: Open unemployment rate (OUR), by province, 2011-2013

No	Province	2011	2012	2013
1	Aceh	8.27	7.88	8.38
2	Sumatera Utara	7.18	6.31	6.01
3	Sumatera Barat	7.14	6.25	6.33
4	Riau	7.17	5.17	4.13
5	Jambi	3.85	3.65	2.90
6	Sumatera Selatan	6.07	5.59	5.49
7	Bengkulu	3.41	2.14	2.12
8	Lampung	5.24	5.12	5.09
9	Kepulauan Bangka Belitung	3.25	2.78	3.30
10	Kepulauan Riau	7.04	5.87	6.39
11	DKI Jakarta	10.83	10.72	9.94
12	Jawa Barat	9.84	9.78	8.90
13	Jawa Tengah	6.07	5.88	5.57
14	D.I. Yogyakarta	5.47	4.09	3.80
15	Jawa Timur	4.18	4.13	4.00
16	Banten	13.50	10.74	10.10
17	Bali	2.86	2.11	1.89
18	Nusa Tenggara Barat	5.35	5.21	5.37
19	Nusa Tenggara Timur	2.67	2.39	2.01
20	Kalimantan Barat	4.99	3.36	3.09
21	Kalimantan Tengah	3.66	2.71	1.82
22	Kalimantan Selatan	5.62	4.32	3.91
23	Kalimantan Timur	10.21	9.29	8.87
24	Sulawesi Utara	9.19	8.32	7.19
25	Sulawesi Tengah	4.27	3.73	2.65
26	Sulawesi Selatan	6.69	6.46	5.83
27	Sulawesi Tenggara	4.34	3.10	3.47
28	Gorontalo	4.61	4.81	4.31
29	Sulawesi Barat	2.70	2.07	2.00
30	Maluku	7.72	7.11	6.73
31	Maluku Utara	5.62	5.31	5.51
32	Papua Barat	8.28	6.57	4.47
33	Papua	3.72	2.90	2.81
	INDONESIA	6.80	6.32	

Source: Statistical Yearbook of Indonesia 2013, BPS

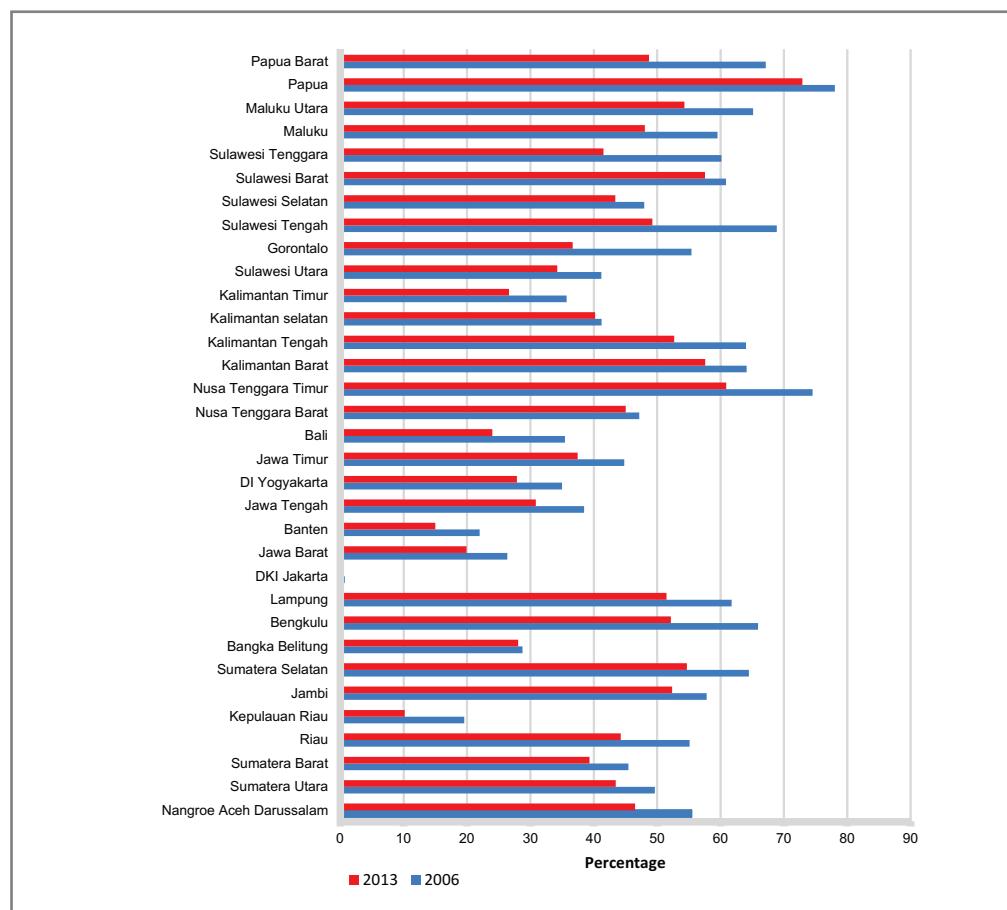
Open unemployment applies to people who are actively looking for work, are establishing a new business or firm, have no hope of obtaining work, or have obtained work that has not yet started. The open unemployment rate (OUR) is total open unemployment as a percentage of the total labour force.

In February 2013, the labour force participation rate was 69.21 percent and the OUR was 5.92 percent, having decreased by 0.88 percentage points since February 2011, from 6.80 percent.

However, there are high disparities in unemployment among regions (Table 3.1). While all provinces had reduced their OURs since 2011, in 2013 Banten recorded the highest OUR at 10.710 percent, followed by DKI Jakarta with 9.94 percent, and Jawa Barat with 8.90 percent; the lowest OUR was 1.82 percent in Kalimantan Tengah. Although Banten has the highest OUR, it is also the province with the greatest decline in unemployment between 2011 and 2013, reducing the OUR by 3.40 percentage points.

Of those employed in the formal and informal sectors in 2013, the largest proportion – 34.55 percent – worked in the agriculture, forestry, hunting and fishery sectors, followed by the trade and tourism sectors with 21.66 percent. Compared with 2006, the most significant shifts in employment by sector were in agriculture, down by 7.49 percentage points, and public services, up by 4.53 percentage points. Regionally, the proportion of the labour force working in agriculture ranged from a high of 60.8 percent in Papua to 21.9 percent in Java (Figure 3.3). In 14 provinces (DKI Jakarta, Kepulauan Riau, Banten, Jawa Barat, Bali, Kalimantan Timur, DI Yogyakarta, Kepulauan Bangka Belitung, Jawa Tengah,

Figure 3.3: Proportion of the labour force employed in the formal and informal agriculture sector, by province, 2006 and 2013



Source: Statistical Yearbook of Indonesia 2006 and 2013, BPS

Sulawesi Utara, Gorontalo, Jawa Timur, Sumatera Barat and Kalimantan Selatan), the proportion of the population working in agriculture was lower than the national average of 40.8 percent (Figure 3.3). For households identifying agriculture as their primary source of income, plantation crops are the second most significant sources of income, after food crops and followed by seawater fisheries. However, as a result of stagnating agricultural productivity, widespread land fragmentation in densely populated regions, and erratic rainfall in eastern parts of the country, households that depend on crop production as their main source of income are increasingly vulnerable, falling below or hovering around the poverty line (see the section on Poverty, page 36).

Access to electricity

Households' access to electricity serves as a proxy indicator of economic welfare and increased livelihood opportunities within the region, and improved living conditions at the household level. According to the National Socio-Economic Survey (BPS, 2013a), 96.54 percent of households in Indonesia had access to electricity in 2013, up from 91.47 percent in 2007 representing a 5.54 percent increase.

However, strong regional disparities persist, with only 0.09 percent of households in DKI Jakarta lacking access to electricity, compared with 54.38 percent in Papua.

At the district level, 98.28 percent of households in Intan Jaya district (Papua) lacked access to electricity, while in 15 districts across Java and Bali, every household had access to electricity (Annex 1 and Map 3.2).

Table 3.2: Percent of households without access to electricity, by province, 2013

No	Province	% Without Access to Electricity
1	Aceh	2.75
2	Sumatera Utara	4.45
3	Sumatera Barat	5.85
4	Riau	5.82
5	Jambi	4.74
6	Sumatera Selatan	5.39
7	Bengkulu	4.85
8	Lampung	3.90
9	Kep Bangka Belitung	2.60
10	Kep Riau	1.77
11	DKI Jakarta	0.09
12	Jawa Barat	0.28
13	Jawa Tengah	0.25
14	DI Yogyakarta	0.33
15	Jawa Timur	0.30
16	Banten	0.52
17	Bali	0.57
18	Nusa Tenggara Barat	3.03
19	Nusa Tenggara Timur	29.33
20	Kalimantan Barat	15.06
21	Kalimantan Tengah	12.52
22	Kalimantan Selatan	2.24
23	Kalimantan Timur	4.02
24	Sulawesi Utara	2.06

Table 3.2 (cont.): Percent of households without access to electricity, by province, 2013

No	Province	% Without Access to Electricity
25	Sulawesi Tengah	11.90
26	Sulawesi Selatan	4.82
27	Sulawesi Tenggara	8.88
28	Gorontalo	10.28
29	Sulawesi Barat	14.92
30	Maluku	18.88
31	Maluku Utara	14.04
32	Papua Barat	54.38
33	Papua	18.83
INDONESIA		3.46

Source: SUSENAS 2013, BPS

Poverty

Globally, individuals who live below the World Bank threshold of US\$1.25/capita/day (in purchasing power parity) are categorized as poor. In Indonesia, the Government uses the national poverty line of Rp 326,853/capita/month in urban areas and Rp 296,681 in rural areas (in September 2014) for planning and targeting purposes.

Over the past decade, the Government has made substantial efforts to reduce poverty. By 2008, 5.9 percent of Indonesians were living on less than 1 US\$ per day, surpassing the MDG IA target of reducing by half the proportion of people living in extreme poverty between 1990 and 2015 - from 20.6 percent to 10.3 percent. Between 2011 and 2014, the proportion of the population living below the national poverty line declined from 12.49 to 10.96 percent. However, the poverty headcount in absolute numbers still stood at 27.73 million people in 2014.

Of the poor people in Indonesia, 62.65 percent lived in rural areas and more than 47.02 percent – 8,167,890 people – in densely populated Java. The six provinces with the highest poverty rates¹ – Papua, Papua Barat, Nusa Tenggara Timur, Maluku, Gorontalo and Bengkulu – accounted for only 10.46 percent of the nation's poor, with a combined population of 2,900,070 poor people. The poverty rates in these six provinces ranged from 17.09 percent in Bengkulu to 27.80 per cent in Papua in 2014 (Table 3.3).

Since 2011, 31 of Indonesia's 33 provinces have reduced the prevalence of poverty; the exceptions are DKI Jakarta, and Bali where poverty rates were already low at 4.09 percent and 4.76 percent respectively.

District-level data reveal more pronounced differences across areas (Map 3.3). Of the 398 districts analysed, 30 had more than 30 percent of their populations living below the national poverty line (Table 3.3).

Despite the decline in poverty, inequality has been increasing in Indonesia. The Gini coefficient, a common measurement of income inequality, deteriorated from 0.36 in 1996 to 0.41 in 2013, reflecting a widening gap between the rich and the poor (Figure 3.4). In 2013, Papua, DI Yogyakarta and Gorontalo provinces recorded the highest Gini coefficient at 0.44, followed by Papua Barat, Sulawesi Utara, Sulawesi Tenggara and DKI Jakarta with 0.43; the lowest Gini coefficients were in Kepulauan Bangka-Belitung with 0.31, and Maluku Utara with 0.32 (Table 3.4).

¹ Proportion of the population living below the poverty line

Table 3.3: Number and percent of population below national poverty line, by province, 2011-2014

No	Province	2011		2012		2013		2014	
		Number (000)	%						
1	Aceh	894.81	19.57	876.60	18.58	855.71	17.72	837.42	16.98
2	Sumatera Utara	1,481.31	11.33	1,378.40	10.41	1,390.80	10.39	1,360.60	9.85
3	Sumatera Barat	442.09	9.04	397.90	8.00	380.63	7.56	354.74	6.89
4	Riau	482.05	8.47	481.30	8.05	522.53	8.42	498.28	7.99
5	Jambi	272.67	8.65	270.10	8.28	281.57	8.41	281.75	8.39
6	Sumatera Selatan	1,074.81	14.24	1,042.00	13.48	1,108.21	14.06	1,085.80	13.62
7	Bengkulu	303.60	17.50	310.50	17.51	320.41	17.75	316.50	17.09
8	Lampung	1,298.71	16.93	1,219.00	15.65	1,134.28	14.39	1,143.93	14.21
9	Bangka Belitung	72.06	5.75	70.20	5.37	70.90	5.25	67.23	4.97
10	Kepulauan Riau	129.56	7.40	131.20	6.83	125.02	6.35	124.17	6.40
11	DKI Jakarta	363.42	3.75	366.80	3.70	375.70	3.72	412.79	4.09
12	Jawa Barat	4,648.63	10.65	4,421.50	9.89	4,382.65	9.61	4,238.96	9.18
13	Jawa Tengah	5,107.36	15.76	4,863.40	14.98	4,704.87	14.44	4,561.83	13.58
14	DI Yogyakarta	560.88	16.08	562.10	15.88	535.18	15.03	532.59	14.55
15	Jawa Timur	5,356.21	14.23	4,960.50	13.08	4,865.82	12.73	4,748.42	12.28
16	Banten	690.49	6.32	648.30	5.71	682.71	5.89	649.19	5.51
17	Bali	166.23	4.20	161.00	3.95	186.53	4.49	195.95	4.76
18	Nusa Tenggara Barat	894.77	19.73	828.30	18.02	802.45	17.25	816.62	17.05
19	Nusa Tenggara Timur	1,012.90	21.23	1,000.30	20.41	1,009.15	20.24	991.88	19.60
20	Kalimantan Barat	380.11	8.60	355.70	7.96	394.17	8.74	381.92	8.07
21	Kalimantan Tengah	146.91	6.56	141.90	6.19	145.36	6.23	148.83	6.07
22	Kalimantan selatan	194.62	5.29	189.20	5.01	183.27	4.76	189.50	4.81
23	Kalimantan Timur	247.90	6.77	246.10	6.38	255.91	6.38	252.68	6.31
24	Sulawesi Utara	194.90	8.51	177.50	7.64	200.16	8.50	197.56	8.26
25	Sulawesi Tengah	423.63	15.83	409.60	14.94	400.09	14.32	387.06	13.61
26	Sulawesi Selatan	832.91	10.29	805.90	9.82	857.45	10.32	806.35	9.54
27	Sulawesi Tenggara	330.00	14.56	304.30	13.06	326.71	13.73	314.09	12.77
28	Gorontalo	198.27	18.75	187.70	17.22	200.97	18.00	195.10	17.41
29	Sulawesi Barat	164.86	13.89	160.60	13.01	154.20	12.23	154.69	12.05
30	Maluku	360.32	23.00	338.90	20.76	322.51	19.27	307.02	18.44
31	Maluku Utara	97.31	9.18	88.30	8.06	85.82	7.64	84.79	7.41
32	Papua Barat	249.84	31.92	223.20	27.04	234.23	27.14	225.46	26.26
33	Papua	944.79	31.98	976.40	30.66	1,057.98	31.52	864.11	27.80
INDONESIA		30,018.93	12.49	28,594.60	11.66	28,553.93	11.46	27,727.78	10.96

Source: SUSENAS module of Consumption 2011-2014, BPS

As described in the previous section, livelihoods in eastern Indonesia rely heavily on agriculture, implying a high dependency on crop yields. However, large parts of this region are not well suited to high-yield crop production and farmers struggle to increase their output, achieving only limited improvements in their welfare. The data in Table 3.3 show that high poverty rates persist in many districts, despite progress at the national level. Concerted efforts are urgently needed to tackle the root causes of poverty, particularly in rural agricultural areas.

Table 3.4: Gini coefficient, by province, 2005-2013

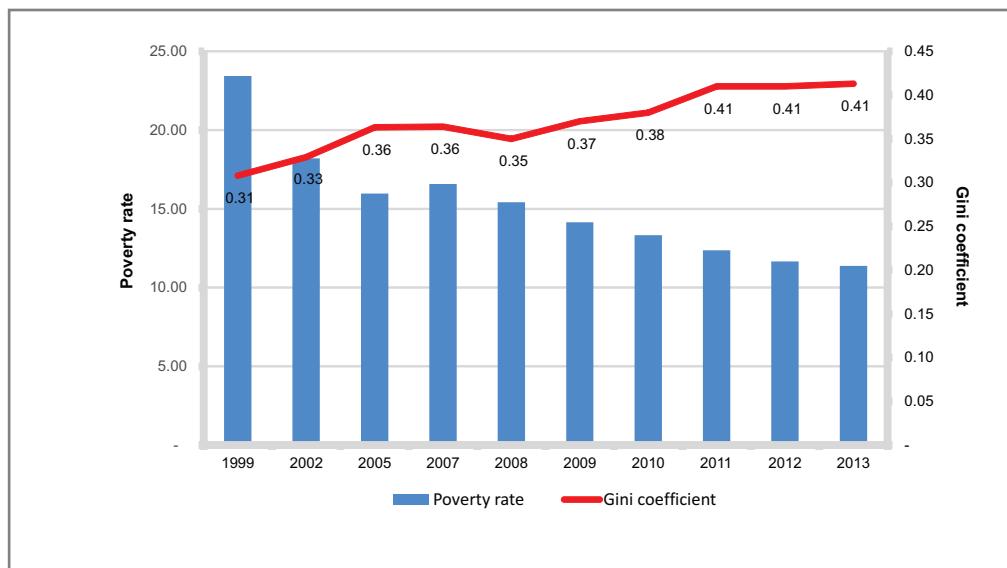
No	Province	2005	2007	2008	2009	2010	2011	2012	2013
1	Aceh	0.30	0.27	0.27	0.29	0.30	0.33	0.32	0.34
2	Sumatera Utara	0.33	0.31	0.31	0.32	0.35	0.35	0.33	0.35
3	Sumatera Barat	0.30	0.31	0.29	0.30	0.33	0.35	0.36	0.36
4	Riau	0.28	0.32	0.31	0.33	0.33	0.36	0.40	0.37
5	Jambi	0.31	0.31	0.28	0.27	0.30	0.34	0.34	0.35
6	Sumatera Selatan	0.31	0.32	0.30	0.31	0.34	0.34	0.40	0.38
7	Bengkulu	0.35	0.34	0.33	0.30	0.37	0.36	0.35	0.39
8	Lampung	0.38	0.39	0.35	0.35	0.36	0.37	0.36	0.36
9	Kepulauan Bangka Belitung	0.28	0.26	0.26	0.29	0.30	0.30	0.29	0.31
10	Kepulauan Riau	0.27	0.30	0.30	0.29	0.29	0.32	0.35	0.36
11	DKI Jakarta	0.27	0.34	0.33	0.36	0.36	0.44	0.42	0.43
12	Jawa Barat	0.34	0.34	0.35	0.36	0.36	0.41	0.41	0.41
13	Jawa Tengah	0.31	0.33	0.31	0.32	0.34	0.38	0.38	0.39
14	DI Yogyakarta	0.42	0.37	0.36	0.38	0.41	0.40	0.43	0.44
15	Jawa Timur	0.36	0.34	0.33	0.33	0.34	0.37	0.36	0.36
16	Banten	0.36	0.37	0.34	0.37	0.42	0.40	0.39	0.40
17	Bali	0.33	0.33	0.30	0.31	0.37	0.41	0.43	0.40
18	Nusa Tenggara Barat	0.32	0.33	0.33	0.35	0.40	0.36	0.35	0.36
19	Nusa Tenggara Timur	0.35	0.35	0.34	0.36	0.38	0.36	0.36	0.35
20	Kalimantan Barat	0.31	0.31	0.31	0.32	0.37	0.40	0.38	0.40
21	Kalimantan Tengah	0.28	0.30	0.29	0.29	0.30	0.34	0.33	0.35
22	Kalimantan Selatan	0.28	0.34	0.33	0.35	0.37	0.37	0.38	0.36
23	Kalimantan Timur	0.32	0.33	0.34	0.38	0.37	0.38	0.36	0.37
24	Sulawesi Utara	0.32	0.32	0.28	0.31	0.37	0.39	0.43	0.42
25	Sulawesi Tengah	0.30	0.32	0.33	0.34	0.37	0.38	0.40	0.41
26	Sulawesi Selatan	0.35	0.37	0.36	0.39	0.40	0.41	0.41	0.43
27	Sulawesi Tenggara	0.36	0.35	0.33	0.36	0.42	0.41	0.40	0.43
28	Gorontalo	0.36	0.39	0.34	0.35	0.43	0.46	0.44	0.44
29	Sulawesi Barat	n.a	0.31	0.31	0.30	0.36	0.34	0.31	0.35
30	Maluku	0.26	0.33	0.31	0.31	0.33	0.41	0.38	0.37
31	Maluku Utara	0.26	0.33	0.33	0.33	0.34	0.33	0.34	0.32
32	Papua Barat	n.a	0.30	0.31	0.35	0.38	0.40	0.43	0.43
33	Papua	0.39	0.41	0.40	0.38	0.41	0.42	0.44	0.44
	INDONESIA	0.36	0.36	0.35	0.37	0.38	0.41	0.41	0.41

Source: Welfare Indicators 2014, BPS

Purchasing power and the cost of a nutritious diet

Poverty reduces the purchasing power of households and forces them to adopt negative coping strategies that could harm their food security and nutrition status. Purchasing power is defined by income and prices. Limited purchasing power is one of the many underlying causes of malnutrition and leads to inadequate diets, poor health and hygiene, limited education, etc., increasing households' vulnerability to malnutrition. Assessment of the cost of a nutritious diet can help policy-makers identify the populations most at risk of malnutrition because of limited economic access, enabling the design of responses to assist these people.

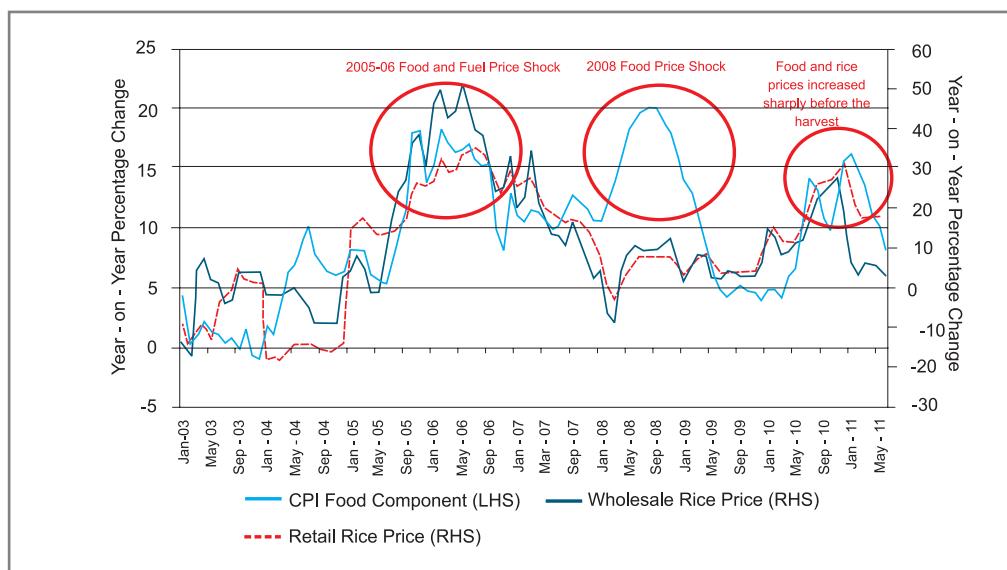
Figure 3.4: Gini coefficient and poverty rate, 1996–2013



Source: BPS welfare indicators 2013

An increase in the price of food commodities, particularly staple foods such as rice and soybeans, seriously limits the purchasing power of a large part of the Indonesian population. The country is vulnerable to food price shocks such as those that occurred in 2005–2006 following the Government's efforts to reduce fuel subsidies, and in 2008 when global food prices peaked, especially for rice, soybeans and wheat commodities (Figure 3.5).

Figure 3.5: Food price trends, 2003–2011



Source: BPS and SMERU Research Institute, 2014

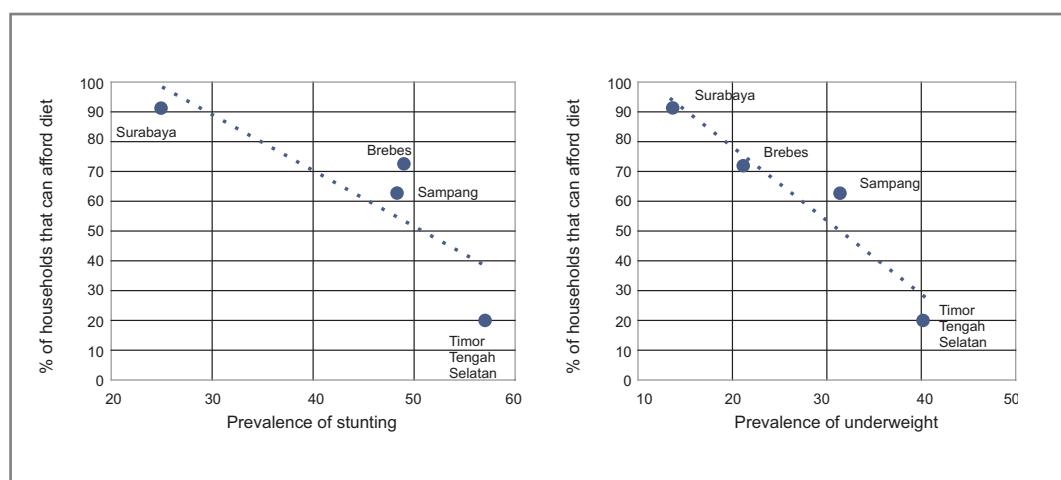
The minimum cost of diet (CoD) method provides a means of evaluating the economic accessibility of a nutritious diet. The CoD models the cost of a theoretical diet made up of a basket of food that satisfies all the nutritional requirements of a family at the minimal cost possible, based on the availability, prices and nutrient contents of local foods. Any other food basket of the same price will be less nutritious, while any other of the same nutrient value will be more expensive. When combined with household income

and expenditure data, the CoD can be used to estimate the proportion of households that can afford an adequately nutritious diet in a particular area. While nutrition outcomes also depend on improvements in health, hygiene and education, it can be assumed that a household that earns less than it costs to buy an adequately nutritious diet at current market prices is exposed to a higher risk of malnutrition. The CoD is therefore an important tool in illustrating the links between nutrient availability, affordability and nutrition outcomes.

In 2011 and 2012, the Ministry of Health, in collaboration with WFP, the Food Security Office and other researchers, conducted an exercise to calculate the minimum cost of a nutritious diet (MCNUT) and the cost of a locally adapted, cost-optimized nutritious diet (LACON), which was designed to make the methodology more sensitive to the local context. As both income and prices vary regionally and seasonally, the exercise was carried out at different times of year in four provinces, with one district per province – Timor Tengah Selatan, Sampang, Surabaya and Brebes (Baldi et al., 2013).

The results revealed stark differences among the four districts: in Timor Tengah Selatan, a mainly rural district, only one in four households could afford to meet 100 percent of their nutrient requirements through locally available foods, while in urban Surabaya, eight out of ten households could (Table 3.5). Although limited in coverage, the survey results also suggest an inverse correlation between affordability of a nutritious diet and prevalence of malnutrition: affordability was lowest in Timor Tengah Selatan, where stunting rates were high, while Surabaya had a low prevalence of malnutrition coupled with higher purchasing power, making a nutritious diet affordable for a larger proportion of the population (Figure 3.6). This means that economic access to nutritious food is likely to be a determining factor of malnutrition in Indonesia.

Figure 3.6: Correlation between proportion of households that can afford the Locally Adapted Cost Optimized Nutritious Diet and prevalence of stunting and underweight



Source: CoD exercises 2011–2012, WFP

3.3 Social Assistance to Support Economic Access

Social safety nets and poverty reduction programmes contribute significantly to improving the access of poor households to basic goods and services in Indonesia. The Government spent approximately Rp 96.66 trillion on social assistance programmes for poverty alleviation in 2014 (Ministry of Finance, 2014b).

The most far-reaching of these social assistance schemes is the Rice for Poor Households (Raskin) programme, which provides rice at subsidized prices to low-income households and is the only food-

Table 3.5: Results of the Cost of Diet (in Rupiah)*

	Timor Tengah Selatan Jun 2012	Sampang Dec 2011	Surabaya Apr 2012	Brebes May 2012
MCNUT	172,866	102,114	127,169	132,602
LACON	212,812	136,518	155,017	142,814
% that can afford LACON	25	63	80	73

*US\$1 = 9,500 rupiah

Source: COD Exercises 2011-2012, WFP

based safety net programme in Indonesia. It was conceived in the immediate aftermath of the Asian financial crisis, when many vulnerable households were sliding back into poverty. In 2013, 15.5 million households across all provinces were eligible to purchase 15 kg of subsidized rice each month. The Bureau of Logistics, a State-owned company, distributes the rice to district delivery points where village heads ensure that households receive their entitlements. However, although Raskin has developed impressive logistics infrastructure and is widely popular, it does not address many of the nutrition challenges that Indonesia faces, including limited dietary diversity and the overall poor quality of diets. Even though the nutritional status of Indonesians has changed and knowledge about the causes and impact of stunting has improved, the programme still only delivers rice and does not provide any support to vulnerable groups such as pregnant and lactating women as well as young children.

Raskin is a useful tool for increasing poor households' access to rice, but its impact on food and nutrition security is likely to be limited for several reasons, including the lack of nutrients naturally found in rice. There is evidence from around the world that fortifying foods with essential vitamins and minerals is an effective way of meeting nutrition requirements, and the introduction of fortified rice into the Raskin programme would be a highly cost-effective means of improving nutrient affordability for households.

Box 3.1 – Raskin: challenges in targeting

Raskin was launched in July 1998 to reduce the impact of the economic crisis by distributing subsidized rice to vulnerable households. In January 2002, the programme expanded its functions from an emergency safety net to a standing social protection program. Eligible households are entitled to purchase 15 kg of rice per month for Rp 1,600/kg at distribution points compared with the market price of about Rp 9,000/kg.

However, eligible households do not always receive these entitlements because of implementation constraints, such as distribution issues, poor targeting, ration miscalculation, and reduced subsidies when purchase prices are higher than planned. At the same time, a significant number of ineligible households receive rice from the programme. These inclusion errors increase the number of households receiving rice, but each household receives a lower ration than planned because the quantity of rice made available is fixed. According to SUSENAS data, in 2013, 80 percent of households in the lowest expenditure decile bought Raskin rice, but so did 20 percent of households in the highest expenditure decile. Because of targeting errors, the average Raskin ration purchased by households was between 30 and 60 percent of the planned 15 kg/month. Households also paid more than the rate fixed by the Government: in 2013, Raskin rice cost an average of Rp 2,262/kg instead of the prescribed Rp 1,600/kg.

According to modelling conducted during the CoD exercise, if the subsidized rice available through Raskin were fortified with essential nutrients, the percentage of households in Timor Tengah Selatan able to afford the LACON diet would improve from 25 to 65 percent. The Raskin programme could also be used to provide age-appropriate food for young children in poor households.

3.4 Milestones in Improving Food Access

- The Master Plan for the Acceleration and Expansion of Poverty Reduction in Indonesia 2012–2025 was launched in January 2012. It provides long-term guidelines for the Government to reduce the prevalence of poverty by 3–4 percent nationwide by 2025.
- A National Connectivity Framework is one of three main elements in the Master Plan for the Acceleration and Expansion of Indonesia’s Economic Development 2011–2025, which was issued through Presidential Regulation No. 32/2011 in May 2011. This demonstrates the Government’s commitment to investing in the improvement of infrastructure, focusing not only on hard infrastructure, but also on “soft infrastructure” such as regulations that facilitate trade and transport. In March 2012, the Blueprint for Development of the National Logistics System was approved by Presidential Regulation No. 26/2012. The blueprint’s vision for the period until 2025 is “Locally Integrated, Globally Connected for National Competitiveness and Social Welfare”, with the aim of integrating all logistics activities in Indonesia at the rural, urban, interregional and inter-island levels by 2025.

3.5 Strategies for Improving Access

Most Indonesians – 82 percent – are net rice consumers, meaning that their primary source of rice is the market rather than home production (OECD, 2012). Among the rural poor, the equivalent figure is 72 percent. Given this reliance on the market to meet food and nutrition needs, improving and maintaining household purchasing power is a central focus of strategies for improving access and achieving broader food and nutrition security outcomes.

Improving purchasing power is a multifaceted effort. Maintaining low and stable food prices and controlling inflation – especially for food products – are important components. However, a comprehensive review of agricultural policies found that an emphasis on domestic food production and the provision of various kinds of support to food producers have had a detrimental impact on the general population’s access to food, not least by maintaining relatively high food prices (OECD, 2012). A review of agricultural policies may help to identify imbalances between strengthening domestic food production and protecting poor consumers, but correcting these imbalances is more challenging, as food prices are influenced by a variety of global factors that are beyond the control of the Government.

Improving livelihoods and income-earning capacity is another essential element in enhancing household purchasing power. Well-designed and targeted poverty reduction/alleviation programmes can have a core role in achieving this objective. As most of the livelihoods of the rural poor are based on agricultural activities, revitalizing the agriculture sector is a main priority. Such revitalization is a complex task requiring a broad range of strategies, including greater investments in infrastructure such as rural roads and markets to increase spatial integration, and encouraging increased participation in agroprocessing, research and extension services by the private sector.

Additional poverty alleviation strategies at the household and community levels include, but are not limited to: i) providing assistance to livelihood diversification for rural farmers, to enhance the resilience to shocks of vulnerable households, which is a serious concern in a disaster-prone country such as

Indonesia; ii) increasing access to microcredit, especially for women and the owners of small and medium enterprises; iii) improving access to basic services such as education, health care and nutrition services, including family planning, and to basic infrastructure such as sanitation, clean water, roads, markets and electricity in poor rural areas; and iv) strengthening social safety net programmes. Adaptation to climate change and sustainable diversification of livelihoods that respect the environment are cross-cutting themes in poverty alleviation approaches.

As an important step in reducing poverty, the Government has prepared a long-term National Poverty Reduction Strategy for 2005–2025, which is implemented through poverty alleviation programmes under the Government's plan of work. Based on this national strategy, regional governments have developed their own regional poverty reduction strategies.

Reducing absolute poverty from 10.96 percent in 2014 to 7–8 percent by 2015, and lowering economic inequality as measured by the gini ratio, from 0.41 in 2013 to 0.36 in 2019, are major challenges for Indonesia. To achieve these objectives, the Government focuses on (Ministry of National Development Planning, 2014):

- Creation of decent jobs;
- Implementing comprehensive social protection programme;
- Extending and improving basic services; and
- Developing sustainable livelihoods.

In recent years, Indonesia has expanded its social safety nets through mechanisms that include conditional and unconditional cash transfers, free health care, student loans, subsidized rice, community grants and microcredit. Major efforts to expand the availability of free health care started in 2014, including by merging the Joint Learning Network for Universal Health Coverage with Health Insurance for Civil Servants and Retired Armed Forces Personnel (Askes) – two important health care assistance programmes – to form the Social Security Agency (JKN), which will target approximately 113 million private sector and government employees and retired civil servants in 2014. Expansion of this initiative is planned for 2015, to achieve universal free health care. In November 2014, the government fully removed the subsidy on premium fuel while lowering and fixing the price of the subsidy on diesel to 1,000 Rp per liter. By reducing the fuel subsidy, the government saved an estimated 194 trillion Rp. The newly freed resources have been re-allocated to multiple development projects including infrastructure, social assistance, irrigation, water and sanitation access. Experts have recommended that Indonesia continue this shift away from subsidies and investing more in safety net programmes noting that well-targeted and monitored safety net programmes largely benefit the poor, while the benefits of subsidies are captured mainly by wealthier population quintiles, and often exclude the poorest.

As part of the Government's efforts to revitalize social protection programmes, TNP2K² was established in the Office of the Vice President in 2011. The team is charged with coordinating social protection programmes and enhancing their quality, including through improved monitoring and evaluation and the development of a single database for targeting of programme beneficiaries.

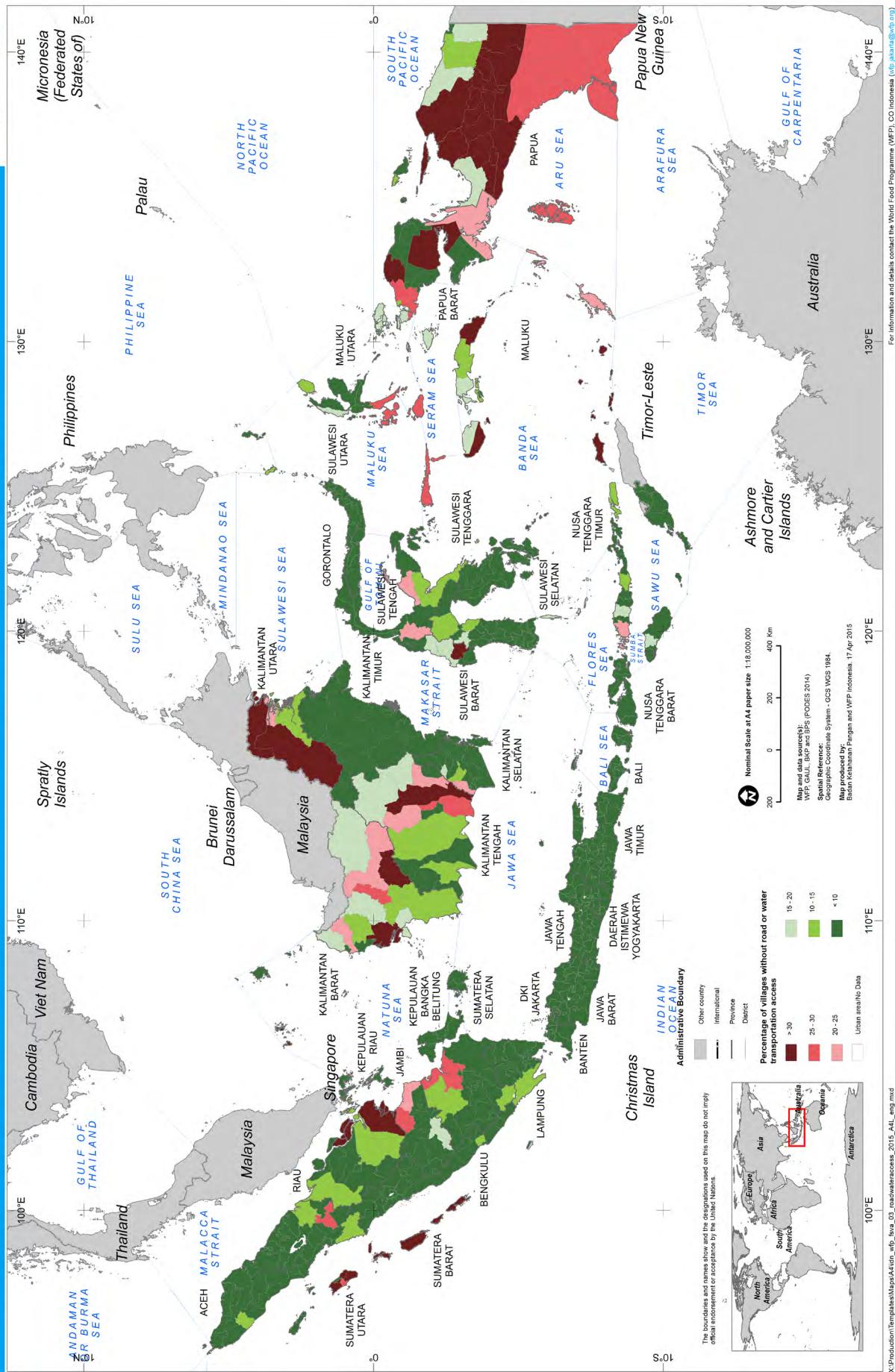
² Tim Nasional Percepatan Penanggulangan Kemiskinan is the full name of this initiative in Bahasa Indonesia but it is referred to simply by its acronym. In English it translates to the National Team for the Acceleration of Poverty Reduction

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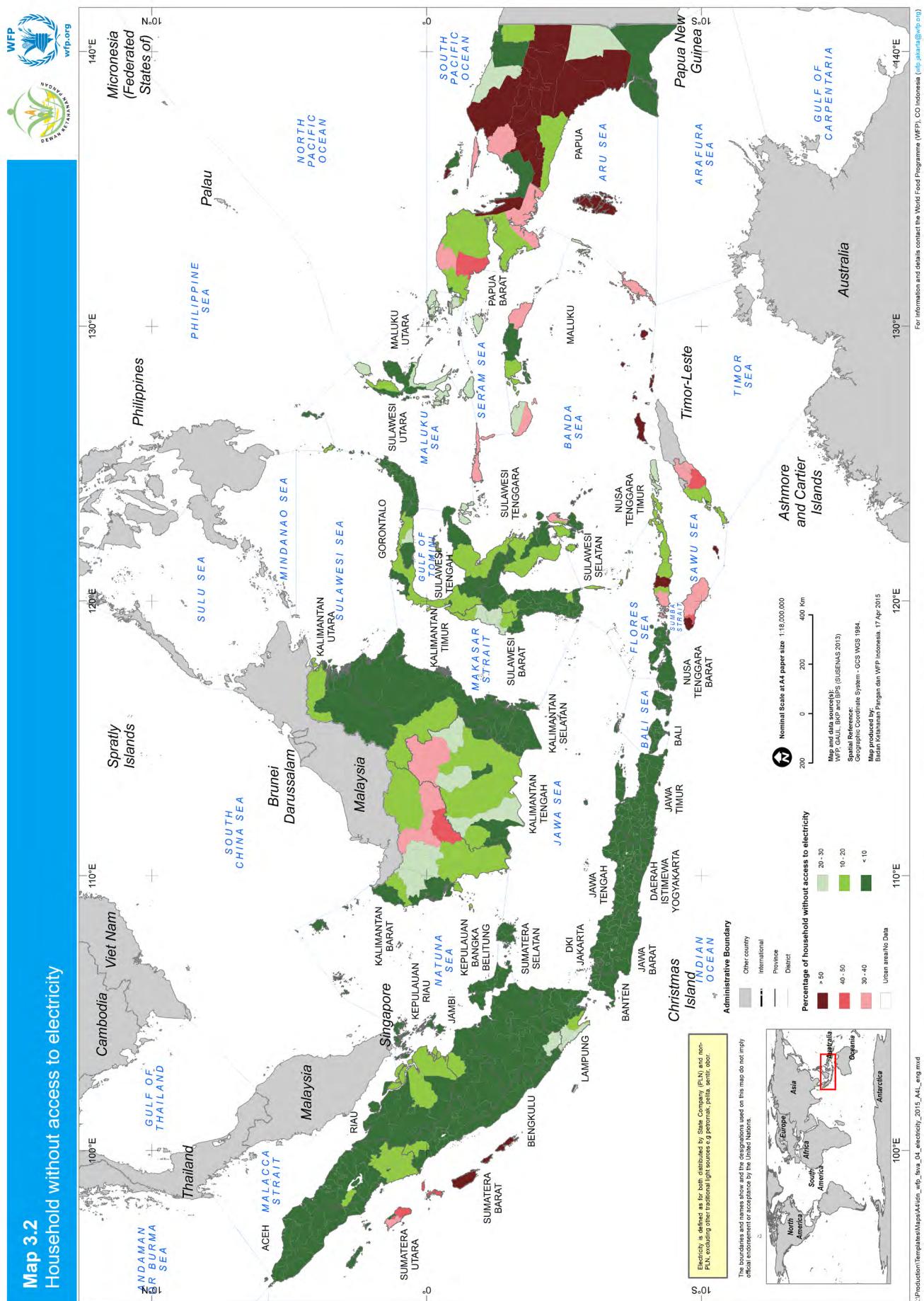
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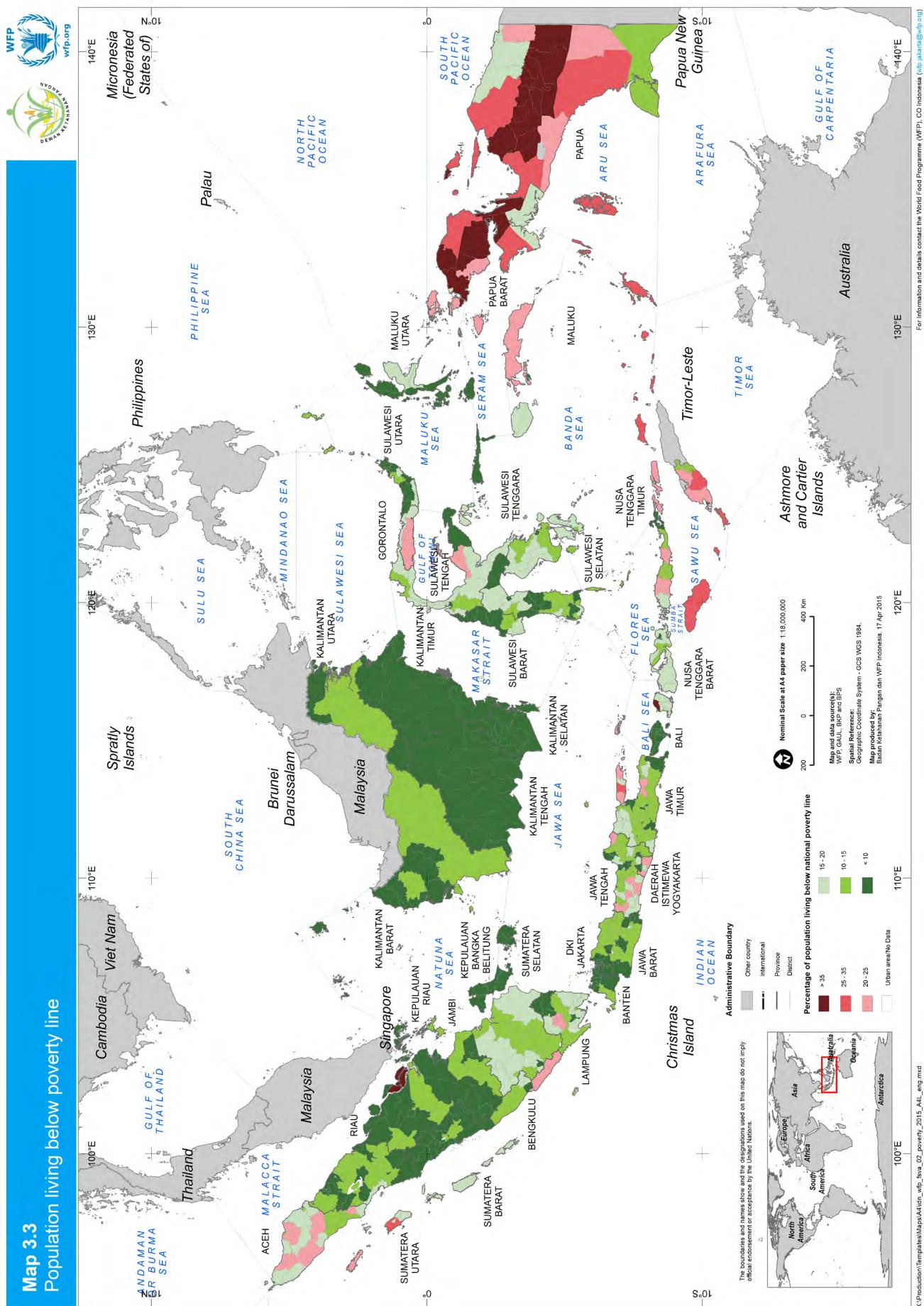
Map 3.1 Villages without inter-village roads accessible by four-wheeled vehicles or without accessible waterways by boat



Map 3.2
Household without access to electricity



Map 3.3
Population living below poverty line



CHAPTER 4

FOOD UTILIZATION



Food utilization is the third pillar of food and nutrition security. Food utilization refers to: i) a household's use of the food to which it has access; and ii) an individual's ability to absorb nutrients – the conversion efficiency of food by the body.

Food utilization depends on: i) the facilities available for food storage and processing; ii) knowledge and practices in food preparation and the feeding of young children and other dependent individuals – including sick and elderly people – which may be impaired by the low education of mothers and other caregivers, cultural beliefs and taboos; iii) food-sharing practices within the household; and iv) the health status of the individual, which may be impaired by disease, poor hygiene, water and sanitation and lack of access to health facilities and health care.

This chapter comprises four sections. The first section discusses food consumption and analyses national and provincial-level data on calorie, protein and fat intake. The following two sections assess access to health facilities and safe drinking-water at the national and provincial levels and then at the district level for the 398 rural districts analysed. These proxy indicators were selected due to their impact on the utilization of nutrients and, ultimately, on the health and nutrition outcomes of individuals, and because of data availability. The final section focuses on women's illiteracy, as education of women has an important role in improving the nutrition profile and diet of households, particularly for infants and young children.

4.1 Food Consumption

In 2014, the average dietary energy intake at the national level was calculated at 1,869 kcal/person/day, lower than the nationally recommended intake of 2,000 kcal (Table 4.1). The average national intake of protein was 54.16 grams/person/day, surpassing the national recommended daily allowance (RDA) of 52 grams¹.

Only the province of Bali² had an average dietary energy intake above the national RDA of 2,000 kcal/person/day.

Protein intake was above the RDA of 52 grams/person/day in more than half of the provinces (19 of 33). Among the 14 provinces with average protein consumption below the RDA, the lowest were Papua (39.6), Maluku Utara (43.2), Maluku (46.5) and Papua Barat (46.7)³. However, it is important to bear in mind that calorie and protein intakes estimates in household surveys, such as the SUSENAS in Indonesia, do not capture the nutritional value of foods obtained from wild sources. In areas where wild foods are an important part of local diets, including Papua and Papua Barat, the protein and calorie intake may be underestimated.

In 2014, the average national diet, cereals and tubers provided 48 percent of daily calorie intake, which is lower than the Ministry of Agriculture standard of 56 percent. This shortfall may be partially explained by the increased use of prepared foods – which are often high in fat and carbohydrates and low in protein and micronutrients – in the average Indonesian diet. Processed foods accounted for 16 percent of calorie intake in 2014, up from 11 percent in 2004, a 45 percent increase. Oil and fat provided 13 percent of daily calorie intake, which is lower than the WHO recommended level of 15–30 percent, although when the fat content of prepared/processed foods is taken into account, the actual value may be above the lower end of that range. Protein provided 11 percent of total dietary energy intake, in line with the WHO recommended level of 10–12 percent but lower than the Ministry of Agriculture standard of 17 percent. Most of this protein comes from processed food and fish rather than from meat, milk or eggs. Processed food increases protein intake, but can also contain ingredients that may have negative impacts on health outcomes. Vegetables and fruits, which supply a lot of vitamins, provided only 4 percent of calorie intake, lower than the Ministry of Agriculture standard of 6 percent.

Trends in the Indonesian diet follow the path of many rapidly developing economies where consumption of cereals decreases while animal-derived protein and processed foods increase. Over a ten year period, the average share of kilocalories derived from cereals and tubers decreased by nearly 10 percent from 53.1 percent in 2005 to 48.1 percent in 2014. In the same period, the average total kcals/capita/day also decreased by about 7 percent, from 2,007 kcal/capita/day in 2005 to 1,869 kcal/capita/day in 2014. While the decrease in cereals and tubers is significant, there has been a much more dramatic shift in the consumption of processed foods. In 2005, processed foods accounted for approximately 11.6 percent of the average kilocalorie consumption. In 2014, this figure increased to 16.4 percent, a 41 percent increase over ten years.

As food consumption patterns are closely related to the affordability of nutritious foods and the purchasing power of households, analysis by expenditure group is particularly useful in highlighting disparities in food consumption across the country. Households are categorized into expenditure quintiles, called monthly per capita expenditure (MCPE) classes. MCPE is calculated by dividing the household's total consumption expenditure (in Rupiah), obtained from the National Socio-Economic Survey (BPS, 2011b) consumption/expenditure module, by the number of household members. While

¹ 2014 kilocalorie and protein estimates based on September 2014 data from BPS

² Provincial level estimates kilocalorie and protein consumption in 2014 were not yet available at the time of writing, therefore the most current data from Q1 2013 is utilized for provincial analysis

³ Again referring to latest provincial estimates – Q1 2013

other figures in this chapter refer to newer data from 2013 and 2014, the most recently available data for MPCE analysis is from 2011.

Between 2007 and 2011, food consumption, in terms of kilocalories and protein intake, improved for all MPCE classes, including the three lowest (Table 4.1). Among these three classes, the increases varied from 14 to 18 percent for energy, and from 18 to 22 percent for protein.

Table 4.1: Per capita daily calorie and protein consumption in the three lowest MPCE classes, 2011

Food Groups	Monthly Per Capita Expenditure Class (MPCE)							
	MPCE 1 (< Rp 100,000)		MPCE 2 (Rp 100,000 - 149,999)		MPCE 3 (Rp 150,000 - 199,999)		National Average	
	Calorie	Protein (g)	Calorie	Protein (g)	Calorie	Protein (g)	Calorie	Protein (g)
Cereals	766.71	18.15	863.57	20.36	921.76	21.67	919.10	21.57
Tubers	194.66	0.94	87.66	0.54	66.60	0.45	43.49	0.36
Fish	16.49	2.64	25.15	4.13	28.33	4.67	47.83	8.02
Meat	4.73	0.23	6.24	0.33	7.41	0.42	44.71	2.75
Eggs and milk	4.32	0.32	9.72	0.69	18.00	1.18	55.97	3.25
Vegetables	28.63	2.32	29.44	2.23	31.06	2.21	37.40	2.43
Legumes	8.76	0.73	23.52	2.22	35.02	3.38	54.17	5.17
Fruits	13.53	0.13	18.92	0.20	22.72	0.23	39.44	0.42
Oil and fats	82.42	0.18	114.76	0.18	149.52	0.25	232.03	0.31
Beverages	36.96	0.47	50.79	0.61	66.97	0.76	97.69	1.07
Spices	3.15	0.14	6.28	0.28	9.58	0.44	16.14	0.69
Mics.food items	13.55	0.27	21.42	0.43	28.98	0.59	59.70	1.21
Prepared/Processed food	18.65	0.44	90.95	2.23	137.05	3.48	304.35	9.01
Total	1,192.56	26.96	1,348.42	34.43	1,523.00	39.73	1,952.02	56.26
% change as compared with SUSENAS 2007 (FSVA 2009)	(14.12)	(22.91)	(18.37)	(19.54)	(16.17)	(18.28)	(4.79)	0.02
% the level of meeting the national RDA (2,000 Kcal and 52 gr of protein/person/day)	60%	52%	67%	66%	76%	76%	98%	108%

Source: SUSENAS 2011, BPS

However, the energy and protein intake of the three lowest MPCE classes was much lower than the national RDA and lower than the national average, with a strong inverse relationship between MCPE class and energy and protein deficits. Compared with the national RDAs, people in MPCE 3 had energy and protein deficits of 24 percent each, while those in MPCE 1 had an energy deficit of 40 percent and a protein deficit of 48 percent. In other words, people in the poorest class (MPCE 1) consumed only 60 percent of the national recommended daily energy intake and 52 percent of the national recommended daily protein intake. By contrast, people in the three highest classes, MPCEs 4–6, consumed 25–30 percent more than the national recommended energy intake, with 2,720–2,850 kcal/person/day, and 35–40 percent more than the national recommended protein intake, with 80–90 g/person/day.

Similar to the situation observed in 2007, the diet of the three lowest classes in 2011 was not only deficient in energy and protein, but also nutritionally imbalanced, with 65–81 percent of dietary energy coming from cereals and tubers, compared with the national average of 49 percent; and 7–10 percent coming from oil and fat, compared with the national average of 12 percent. The heavy reliance on cereals and tubers among the lowest MPCE groups in 2011 represents an increasing trend from 2007, when these food items contributed 59–71 percent of the calorie intake.

For the three poorest classes, the main source of protein remains cereals and tubers, which provided 46–61 percent of protein intake, compared with the national average of 39 percent. Fish was the second most important source of protein, contributing approximately 10–12 percent, compared with the national average of 14 percent. Other animal products – meat, milk and eggs – contributed only 3–9 percent of protein intake. The intake of animal products was higher than in 2007 in the poorest class, MPCE 1, while remaining largely unchanged in MPCEs 2 and 3.

Additional assistance is still required to improve the energy and protein intakes of the three lowest MPCE classes, especially in poor and remote districts. Nutrition education and behaviour change communication to promote the consumption of diverse food groups should be intensified across all provinces.

4.2 Access to Health Facilities

Expenditure on health accounts for a low proportion of GDP in Indonesia. In 2013, the health budget totalled only 3 percent of national GDP, below the 5 percent mandated by the Indonesian Health Law. In 2013, Indonesia spent approximately US\$114 per capita on health, compared with US\$514 in Malaysia, US\$360 in China, US\$527 in Thailand, US\$91 in the Philippines, US\$47 in Cambodia and US\$10 in Myanmar (WHO, 2015).

Nationally, the provision of health services is relatively good, but there are wide disparities across regions. According to the Indonesian Health Profile (Ministry of Health, 2014), in 2013 the country had 2,228 hospitals with 278,450 beds, 9,655 community health centres, and about 41,841 doctors, excluding dentists.

An indicator used in Indonesia to describe the coverage of community health centers is the ratio of health facilities per 30,000 people. In 2009, there were approximately 1.13 community health facilities per 30,000 people. The coverage has improved slightly, reaching 1.17 community health facilities per 30,000 people in 2013 (Ministry of Health, 2013).

In 2013, 99.49 percent of households had access to a health facility within 5 km. Access was most limited in Papua, where 40.65 percent lacked access to a health facility within 5 km, Kalimantan Barat (31.15 percent), Papua Barat (29.29 percent), Maluku Utara (24.50 percent), and Sulawesi Barat (22.07 percent). Papua and Papua Barat have two of the highest ratios of doctors to population, but given the low population densities of these provinces, many people live far away from a health facility. In DKI Jakarta, Jawa Tengah and DI Yogyakarta almost all households had access to a health facility within 5 km (Table 4.2). In just 6 of the 398 rural districts, more than 50 percent of the population lacked access to a health facility within 5 km.

Overall access to health facilities has significantly improved over recent years, mostly because of increased investments by central and local governments in the construction and renovation of health infrastructure in all provinces. However, expenditure on health remains relatively low and has not expanded significantly.

4.3 Access to Safe Drinking-Water and Improved Sanitation Facilities

Access to improved sanitation facilities and safe, clean drinking-water is critical to reducing the burden of disease – particularly diarrhoea – thereby improving nutrition outcomes through the improved utilization of nutrients by the body. Only 59.8 percent of the population of Indonesia had access to improved sanitation in 2013. Although this rate is very low, it represents an improvement on 40.3 percent since 2007. More than half – 53.1 percent – of the people in rural areas lacked access to improved sanitation facilities, compared with 27.5 percent in urban areas. The provinces recording the greatest

Table 4.2: Percent of household with limited access to improved drinking-water and community health facilities, by province, 2013

No	Province	Hospital*	Health Center*	Doctor*	Percent of Households with limited access to Center (> 5 Km)**	Percent of Households with limited access to improved drinking water***
1	Aceh	53	334	2,790	6.59	38.56
2	Sumatera Utara	156	570	9,914	14.12	33.55
3	Sumatera Barat	61	262	3,523	3.84	32.47
4	Riau	54	207	3,246	11.83	25.98
5	Jambi	29	176	1,185	8.51	38.13
6	Sumatera Selatan	51	319	3,144	18.81	42.37
7	Bengkulu	19	180	629	6.92	63.10
8	Lampung	49	280	1,993	9.12	46.24
9	Bangka Belitung	14	60	450	11.02	35.28
10	Kepulauan Riau	25	70	972	7.95	24.52
11	DKI Jakarta	150	340	26,623	0.00	7.72
12	Jawa Barat	274	1,050	22,820	4.39	33.68
13	Jawa Tengah	275	873	13,386	4.85	26.62
14	DI Yogyakarta	69	121	4,870	0.00	20.63
15	Jawa Timur	319	960	19,869	4.32	27.03
16	Banten	77	230	6,988	8.70	35.05
17	Bali	57	120	4,664	1.40	8.71
18	Nusa Tenggara Barat	23	158	1,019	3.33	29.57
19	Nusa Tenggara Timur	41	362	748	18.23	44.20
20	Kalimantan Barat	40	237	1,110	31.15	35.78
21	Kalimantan Tengah	17	194	689	13.26	48.89
22	Kalimantan Selatan	31	228	1,417	12.65	39.40
23	Kalimantan Timur	54	222	2,318	5.75	20.53
24	Sulawesi Utara	40	183	2,406	8.33	30.11
25	Sulawesi Tengah	26	183	599	13.44	42.27
26	Sulawesi Selatan	82	440	5,935	6.77	31.18
27	Sulawesi Tenggara	25	264	584	13.64	28.17
28	Gorontalo	12	91	346	5.84	45.99
29	Sulawesi Barat	9	92	189	22.07	37.56
30	Maluku	27	190	327	19.12	32.76
31	Maluku Utara	18	125	211	24.50	39.91
32	Papua Barat	16	143	260	29.29	33.46
33	Papua	35	391	824	40.65	55.61
INDONESIA		2,228	9,655	146,048	11.97	34.39

Source: * Indonesian Health Profile 2013, Ministry of Health; **PODES 2014, BPS; *** SUSENAS 2013, BPS

improvements in provision of sanitation facilities since 2007 include Bengkulu, Lampung, Kalimantan Tengah and Kalimantan Selatan. In 2013, Gorontalo, Sulawesi Barat, Nusa Tenggara Barat, Papua and Nusa Tenggara Timur had the poorest access, with more than half of the population lacking sanitation facilities (Ministry of Health, 2013).

As shown in Table 4.2, in 2013, 34.39 percent of households did not have access to clean and safe drinking-water, defined as an improved water source – a protected well, borehole or spring, tap water or rainwater – at least 10 meters from the nearest septic tank.

The provinces with the poorest access to water were Bengkulu, Papua, and Kalimantan Tengah, where more than three-quarters of the population lacked access to clean and safe drinking-water, followed by Lampung (46.24 percent), Gorontalo (45.99 percent), Nusa Tenggara Timur (44.20 percent) and Sumatera Selatan (42.37 percent). In 16 of the 33 provinces and 61 of the 398 rural districts, more than half of the population lacked access to clean and safe drinking-water.

4.4 Female Illiteracy

The literacy level of women, especially the mothers and caregivers of young children, is well known as an important determinant of food utilization and hence influences the overall health and nutrition status of household members. Studies from around the world have shown that in developing countries, a mother's level of education and awareness of nutrition are closely correlated with the nutritional situation of her children.

One indicator for measuring women's education is the illiteracy rate. In 2013, 8.60 percent of females over 15 years of age in Indonesia were classified as illiterate. Table 4.3 shows the rates by province. The highest illiteracy rate was in Papua, where more than one in every three females over 15 years of age was illiterate (39.84 percent), followed by Nusa Tenggara Barat (19.41 percent) and Bali (14.26 percent). In 45 of the 398 rural districts at least 20 percent of females over 15 years of age were illiterate.

The highest literacy rates were reported in Sulawesi Utara, DKI Jakarta and Maluku, where fewer than three percent of females over 15 years of age were illiterate.



Table 4.3: Rate of females over 15 years of age who are illiterate, 2013

No	Province	% Female Illiteracy Rate
1	Aceh	4.94
2	Sumatera Utara	3.20
3	Sumatera Barat	3.60
4	Riau	3.06
5	Jambi	4.89
6	Sumatera Selatan	3.99
7	Bengkulu	5.62
8	Lampung	6.33
9	Kepulauan Bangka Belitung	5.06
10	Kepulauan Riau	3.17
11	DKI Jakarta	1.38
12	Jawa Barat	4.91
13	Jawa Tengah	12.62
14	D.I. Yogyakarta	10.94
15	Jawa Timur	13.92
16	Banten	5.11
17	Bali	14.26
18	Nusa Tenggara Barat	19.41
19	Nusa Tenggara Timur	11.31
20	Kalimantan Barat	12.79
21	Kalimantan Tengah	3.09
22	Kalimantan Selatan	4.66
23	Kalimantan Timur	3.62
24	Sulawesi Utara	1.08
25	Sulawesi Tengah	5.13
26	Sulawesi Selatan	12.01
27	Sulawesi Tenggara	10.45
28	Gorontalo	2.90
29	Sulawesi Barat	11.94
30	Maluku	2.85
31	Maluku Utara	3.63
32	Papua Barat	6.59
33	Papua	39.84
INDONESIA		8.60

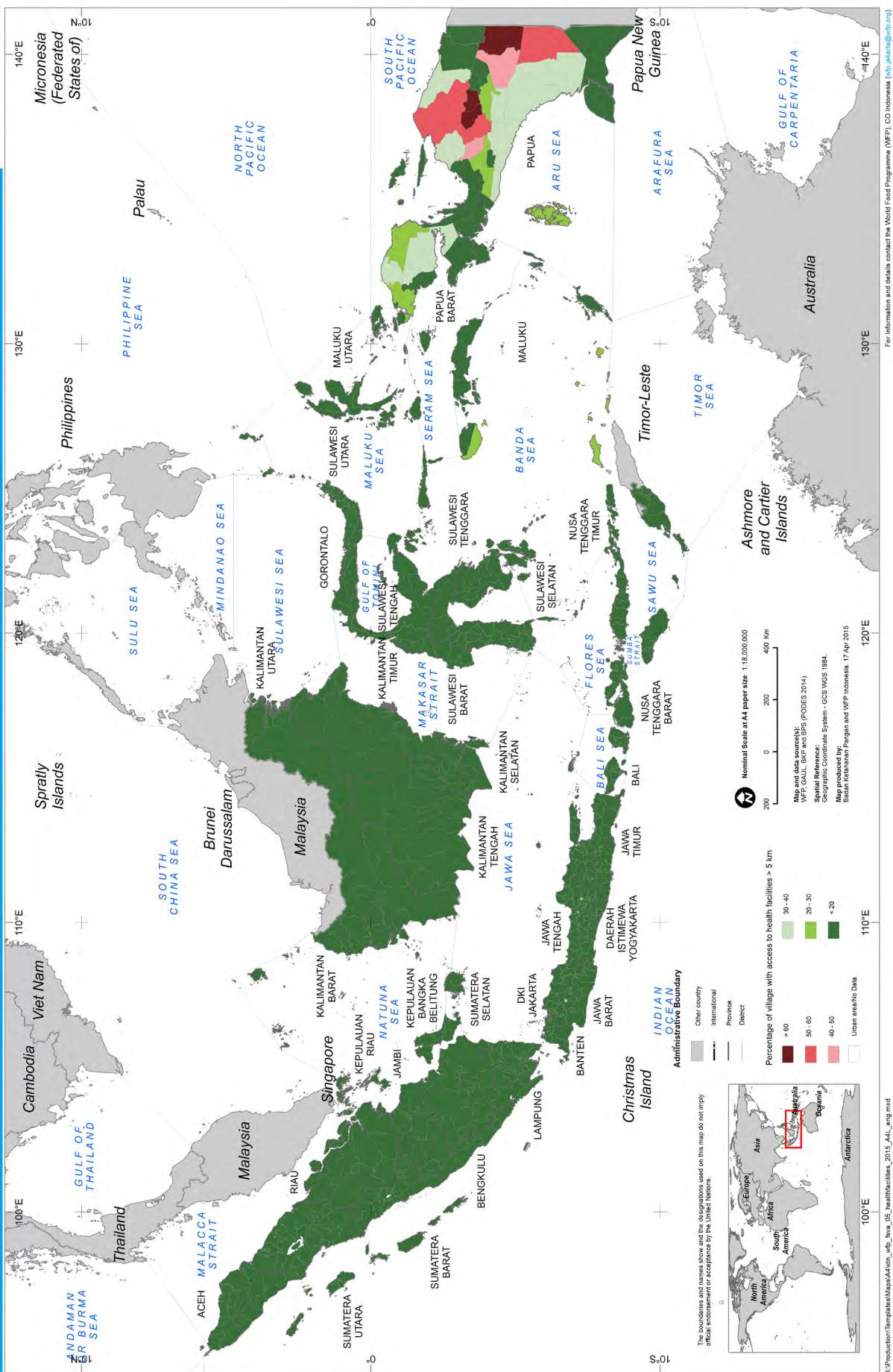
Source: SUSENAS 2013, BPS

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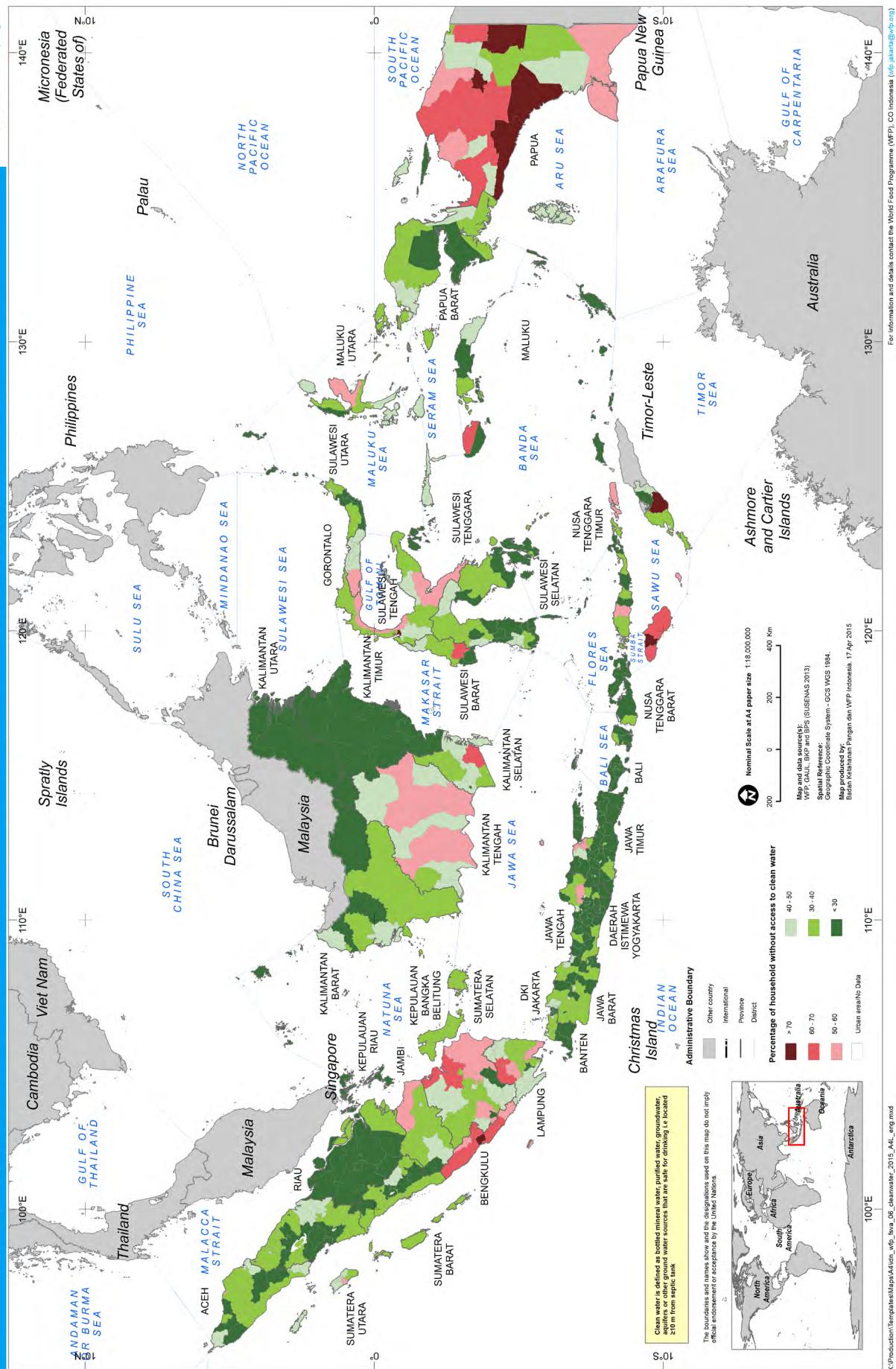
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Map 4.1 Village with access to health facilities more than 5 kilometers

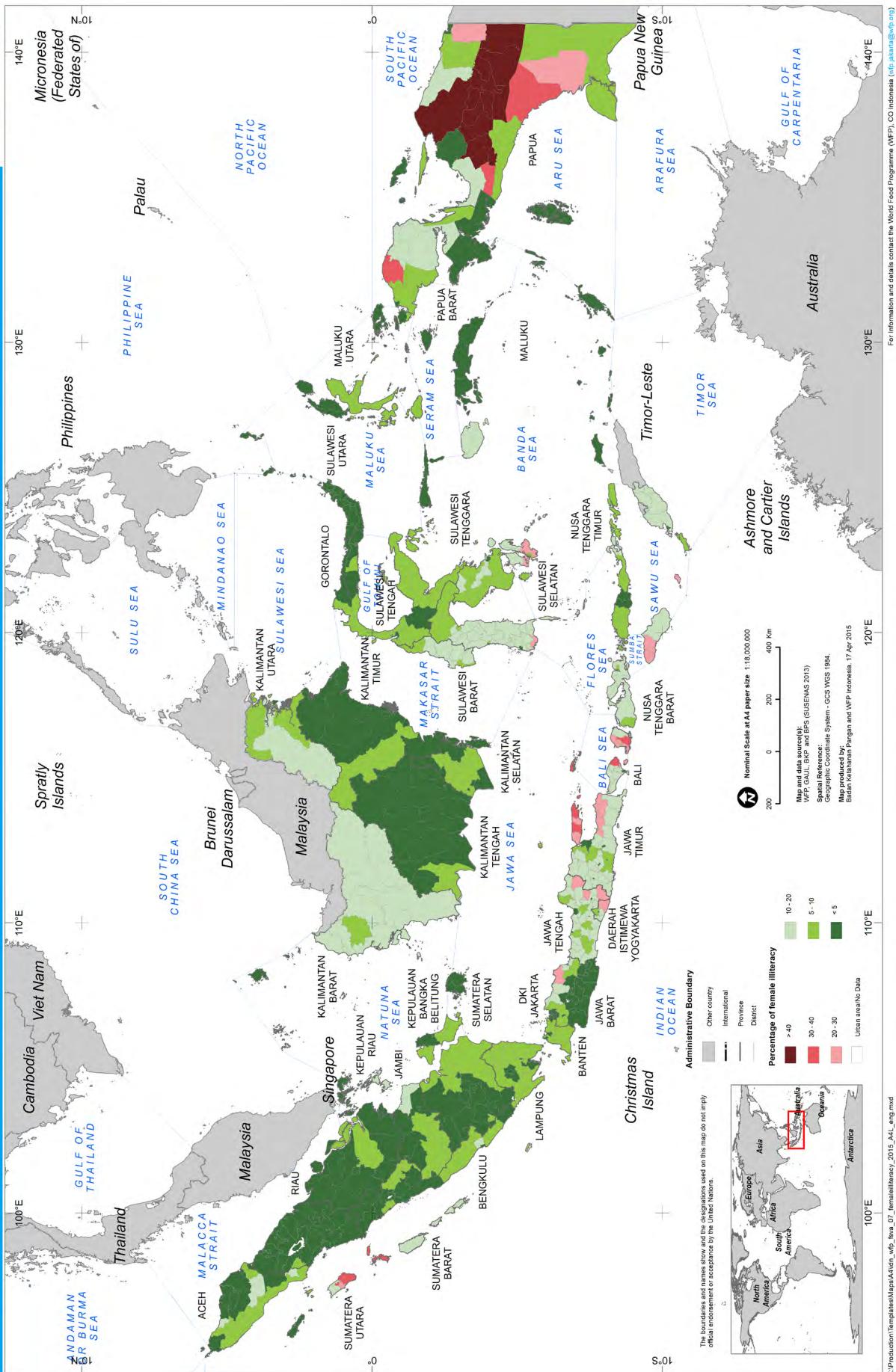


Map 4.2 Household without access to clean water by considering the distance ≥ 10 m from septic tank that are safe for drinking water





Map 4.3 Illiteracy rate: females age 15 and above



CHAPTER 5

NUTRITION AND HEALTH OUTCOMES



Nutrition, morbidity and mortality outcomes reflect a complex web of factors including the availability of and access to nutritious food, the body's utilization of nutrients, the public health and disease environment, and the health status of the individual. The nutrition status of a population is often mirrored in nutrition outcomes among children under 5 years of age, as measured through the prevalence rates of stunting (height-for-age), underweight (weight-for-age) and wasting (weight-for-height). Micronutrient deficiencies are another important indicator of the nutrition status of a population, but are often more difficult to measure and monitor.

5.1 Nutrition Outcomes

Food security is one of the key determinants of good health and nutrition, as illustrated in the food and nutrition conceptual framework (Figure 1.1 in Chapter 1). A child's nutrition status is a result of both the food consumption and the health and disease status of the child. The nutrition status of young children under 5 years of age is measured by three indicators:

1. Underweight: A weight-for-age ratio below -2 standard deviations from the mean of the 2005 WHO reference population reflects malnutrition¹.

¹ http://www.who.int/childgrowth/standards/weight_for_age/en/

2. Stunting: A height-for-age ratio below -2 standard deviations from the mean of the 2005 WHO reference population reflects persistent, long-term, chronic malnutrition².
3. Wasting: A weight-for-height ratio below -2 standard deviations from the mean of the 2005 WHO reference population reflects acute or recent malnutrition³.

Chronic malnutrition (stunting) is associated with poor foetal growth and reduced growth during the first two years of life, mainly caused by a combination of inadequate nutrient intake, high exposure to disease, and poor caring practices. As well as a higher risk of child mortality, chronic malnutrition can lead to irreversible outcomes including reduced physical and mental development, which can in turn affect school performance and attendance, future income earning capacity and, therefore, the potential to rise out of poverty. In addition, undernourished children who put on weight rapidly at later stages of childhood and adolescence are more likely to develop chronic diseases – obesity, diabetes, hypertension and coronary heart disease – related to malnutrition. Recent findings published in the Lancet (Black et al, 2013) provide further evidence of the links between stunting, obesity and chronic disease during the life cycle. The long-term damage caused by early childhood undernutrition also includes shorter adult height and the birth of babies with low birthweight, thereby perpetuating undernutrition in the next generation.

WHO classifies the level at which a nutrition situation becomes of public health significance in a country, region or district according to the prevalence of underweight, stunting and wasting in the population, as shown in Table 5.1. None of Indonesia's provinces had stunting or underweight rates considered "acceptable" according to WHO thresholds.

Table 5.1: WHO classifications of the public health significance of malnutrition

Classification	Underweight (%)	Stunting (%)	Wasting (%)
Acceptable	<10%	<20%	<5%
Serious (high)	10-19%	20-29%	5-9%
Poor	20-29%	30-39%	10-14%
Critical (very high)	≥30%	≥40%	≥15%

Source: WHO, 2000

In the 2009 atlas, data on both underweight and stunting were available, but only those on underweight were used to calculate the composite food security index and in subsequent mapping, to allow comparison with the results of the 2005 atlas. In this 2015 atlas, data on both underweight and stunting are presented in Table 5.2, while only stunting is included in the composite food security index and mapping to facilitate comparison with government programmes and monitoring for stunting reduction. This decision was made because stunting is widely considered to be the single most important nutrition challenge for Indonesia and because it has a direct impact on economic growth.

According to data from the Ministry of Health's Basic Health Research (RISKESDAS) for 2013, the national prevalence of stunting among children under 5 years of age was 37.2 percent. This rate is considered of serious public health significance according to the WHO classification and represents a slight increase from 36.8 percent in 2007. Nusa Tenggara Timur was the only province with stunting prevalence of more than 50 percent. According to the WHO thresholds, 15 provinces had critical levels of stunting, 13 had serious levels, and five had poor levels (Table 5.2). Overall, there has been little progress in reducing stunting in most provinces between 2007 and 2013.

² http://www.who.int/childgrowth/standards/height_for_age/en/

³ http://www.who.int/childgrowth/standards/weight_for_height/en/

Table 5.2: Prevalence of malnutrition among children under 5 years of age, by province, 2013

No	Province	Stunting	Underweight	Wasting
1	Aceh	41.5	26.3	15.7
2	Sumatera Utara	42.5	22.4	14.9
3	Sumatera Barat	39.2	21.2	12.6
4	Riau	36.8	22.5	15.5
5	Jambi	37.9	19.6	13.6
6	Sumatera Selatan	36.7	18.3	12.4
7	Bengkulu	39.7	18.7	14.8
8	Lampung	42.6	18.8	11.8
9	Kepulauan Bangka Belitung	28.7	15.1	10.2
10	Kepulauan Riau	26.3	15.6	12.3
11	DKI Jakarta	27.5	14	10.2
12	Jawa Barat	35.3	15.7	10.9
13	Jawa Tengah	36.8	17.6	11.1
14	DI Yogyakarta	27.2	16.2	9.5
15	Jawa Timur	35.8	19.1	11.4
16	Banten	33	17.2	13.8
17	Bali	32.5	13.1	8.8
18	Nusa Tenggara Barat	45.3	25.7	11.9
19	Nusa Tenggara Timur	51.7	33.1	15.4
20	Kalimantan Barat	38.6	26.5	18.7
21	Kalimantan Tengah	41.3	23.3	12.4
22	Kalimantan Selatan	44.2	27.4	12.8
23	Kalimantan Timur	27.5	16.6	11.5
24	Sulawesi Utara	34.8	16.5	9.9
25	Sulawesi Tengah	41.1	24	9.4
26	Sulawesi Selatan	40.9	25.6	11
27	Sulawesi Tenggara	42.6	23.9	11.4
28	Gorontalo	38.9	26.1	11.7
29	Sulawesi Barat	48	29.1	10.8
30	Maluku	40.6	28.3	16.2
31	Maluku Utara	41	24.9	12.2
32	Papua Barat	44.6	30.9	15.4
33	Papua	40.1	21.9	14.8
	INDONESIA	37.2	19.6	12.1

Source: RISKESDAS 2013, Ministry of Health

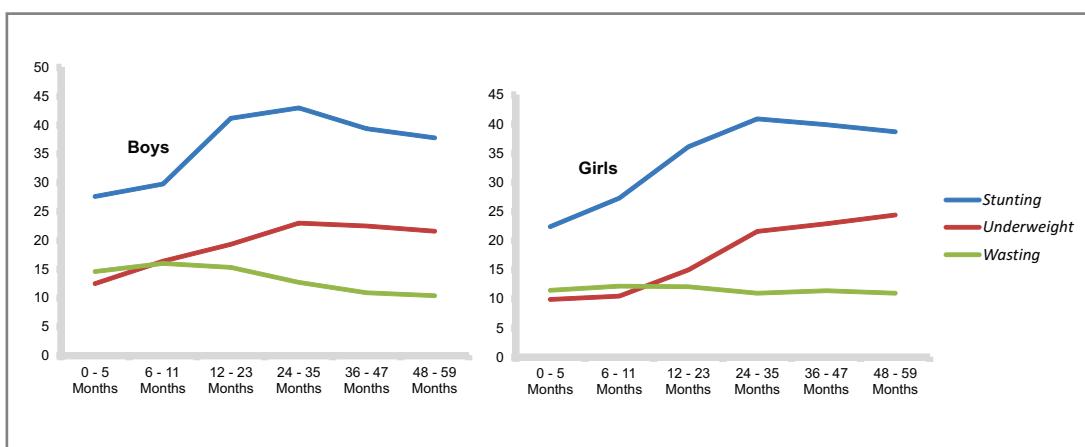
Indonesia set a nutrition target to reduce the percentage of underweight children to below 20 percent in its Medium-Term Development Plan (RPJMN) 2010–2014) (Ministry of National Development Planning, 2010). The prevalence of underweight increased from 18.4 percent in 2007 to 19.6 percent in 2013. Prior to 2013, Indonesia appeared to be on target to reach its Millennium Development Goal of halving the prevalence of underweight, from 31 percent to 15.5 percent in 2015. Given the recent trend, this may remain a challenge. The newest RPJMN for 2015-2019 aims to reduce the prevalence of underweight children to 17% by 2019.

There are disparities in the prevalence of underweight among provinces: two provinces –Papua Barat and Nusa Tenggara Timur – were classified as critical (≥ 30 percent); 16 as serious (20–29 percent); and 15 as poor (10–19 percent).

In 2013, 12.1 percent of young children were wasted, a decrease of 1.6 percentage points since 2007, but still a serious prevalence according to the WHO classification. Six provinces had critical wasting prevalence (≥ 15 percent), 23 serious (10-14 percent) and four poor (5-9 percent).

By age group, stunting and underweight increase significantly for both boys and girls after 6 months of age and continue to increase until the second year of life. This reflects a globally recognized pattern of increased prevalence corresponding to the introduction of complementary feeding. However, it is also important to note the relatively high rates of stunting within the first five months of life (27.6 percent for boys and 22.4 percent for girls), and the prevalence of low birthweight (10.2 percent) – defined as a liveborn infant weighing less than 2.5kg. Both of these statistics point to the poor nutrition status of women during pregnancy and the breastfeeding period in the first 6 months of a child's life (Figure 5.1).

Figure 5.1: Prevalence of stunting, underweight and wasting, by sex and age group, 2013



Source: RISKESDAS 2013, Ministry of Health

Although undernutrition (stunting, underweight and wasting) is the main malnutrition concern in Indonesia, the country is also facing an increasing double burden of malnutrition. In 2013, the prevalence rates of obesity were 11.9 percent among children under 5 years of age, 19.7 percent among men and 32.9 percent among women. The figures for adults represent increases from 2007, when 13.9 percent of men and 14.8 percent of women were obese, while those for children had declined slightly, from 12.2 percent in 2007. There is increasing evidence of a strong link between early malnutrition (under- or overnutrition) and nutrition and health outcomes later in life, including obesity and non-communicable diseases (NCDs). The cost of treating NCDs escalates rapidly later in life, particularly in comparison with the cost of preventing malnutrition in young children (Shrimpton and Rokx, 2012).

At the provincial level, in 2013, the prevalence of obesity among children ranged from 6 percent in Maluku to 21.4 percent in Lampung. Twenty provinces had child obesity rates exceeding 10 percent. For adult obesity, the lowest prevalence was in Nusa Tenggara Timur and the highest in DKI Jakarta.

Micronutrient deficiencies, also known as “hidden hunger”, are another form of malnutrition that can impair mental and physical development. Micronutrient deficiencies result from an incomplete diet and/or the physical inability to absorb nutrients. Although data on the full range of micronutrient deficiencies are limited, the most recent data available suggest that deficiencies in essential micronutrients – iodine, vitamin A, zinc and iron – remain a concern in Indonesia.

According to RISKESDAS (Ministry of Health, 2013), 22.9 percent of households did not consume sufficient quantities of iodized salt in 2013, compared with 37.7 percent in 2007. Again, there were disparities across provinces: in 22 provinces, at least 80 percent of households had adequate quantities

of iodized salt, while in four – Aceh, Bali, Nusa Tenggara Timur and Nusa Tenggara Barat – fewer than 60 percent did. Vitamin A consumption was adequate for 75.5 percent of children aged 6–59 months in 2013, a marginal increase from 71.5 percent in 2007. According to the Micronutrient Initiative⁴, an estimated 14.6 percent of children under 5 experience sub-clinical deficiency (Micronutrient Initiative, 2013). RISKESDAS for 2013 also found that 21.7 percent of all Indonesians were anaemic, with rates of 28.1 percent among children aged 12–59 months and 37.1 percent among pregnant women.

In recent years, zinc has gained prominence as an essential micronutrient given its role in reducing the negative impact of diarrhoeal disease in children. Diarrhoeal disease is a leading cause of child morbidity and a contributing factor to mortality, with an estimated incidence of 6.7 percent among children in Indonesia according to the RISKESDAS 2013. While the RISKESDAS data did not estimate zinc deficiency directly, the Micronutrient Initiative estimates that approximately 32 percent of children may be deficient in zinc. According to RISKESDAS, only 17 percent of children with diarrhoea were treated with zinc supplements.

5.2 Health Outcomes

Poor health status increases susceptibility to communicable diseases, while stunting among children increases vulnerability to NCDs in adulthood. Indonesia's development may soon lead to an epidemiological transition from a disease profile defined mostly by communicable diseases to one defined increasingly by NCDs. Currently, the rates of NCDs are increasing while the prevalence of communicable diseases remains high.

While the incidence rates of malaria, acute respiratory infection and pneumonia have fallen, those of cancer, diabetes mellitus, hypertension, coronary heart disease and lung disease, among other NCDs, are on the rise, with significant cost implications in terms of both financial and human capital losses. According to RISKESDAS 2013, diabetes mellitus affected 2.1 percent, cancer 1.4 percent, coronary heart disease 1.5 percent and hypertension 25.8 percent of the population in 2013.

RISKESDAS 2013 data report a slight increase in the prevalence of acute respiratory infection, from 24 percent in 2007 to 25 percent in 2013. The province with the highest prevalence was Nusa Tenggara Timur (more than 40 percent). Diarrhoea prevalence decreased by 5.5 percentage points, from 9 percent in 2007 to 3.5 percent in 2013. On average, across provinces, diarrhoea affected 6.7 percent of children under 5, with higher-than-average rates in ten provinces.

Life expectancy at birth is an outcome of health and nutrition status. In Indonesia, the average life expectancy was 70.07 years in 2013. The highest life expectancy was reported in DI Yogyakarta, at 73.62 years, and the lowest in Nusa Tenggara Barat, at 63.21 years. Fourteen of the 33 provinces and 117 of the 398 districts had life expectancies of at least 70 years (Table 5.3).

5.3 Milestones in the Health Sector

As well as national food and nutrition action plans, recent milestones in the health sector also affect food and nutrition security in Indonesia:

- Launch of the National Movement for Acceleration of the Reduction of Undernutrition in Indonesia in October 2013, following Presidential Regulation No. 42/2013, marked Indonesia's participation in the global Scaling Up Nutrition (SUN) movement. SUN aims to unite governments, development partners, civil society, businesses and populations in a worldwide effort to scale-up nutrition-specific interventions, focusing on the first 1,000 days of life.

⁴ <http://www.micronutrient.org/>

Table 5.4: Life expectancy, by province, 2013

No	Province	Life Expectancy (year)
1	Aceh	69.40
2	Sumatera Utara	69.90
3	Sumatera Barat	70.09
4	Riau	71.73
5	Jambi	69.61
6	Sumatera Selatan	70.10
7	Bengkulu	70.44
8	Lampung	70.09
9	Kepulauan Bangka Belitung	69.46
10	Kepulauan Riau	69.97
11	DKI Jakarta	73.56
12	Jawa Barat	68.84
13	Jawa Tengah	71.97
14	D.I. Yogyakarta	73.62
15	Jawa Timur	70.37
16	Banten	65.47
17	Bali	71.20
18	Nusa Tenggara Barat	63.21
19	Nusa Tenggara Timur	68.05
20	Kalimantan Barat	67.40
21	Kalimantan Tengah	71.47
22	Kalimantan Selatan	64.82
23	Kalimantan Timur	71.78
24	Sulawesi Utara	72.62
25	Sulawesi Tengah	67.21
26	Sulawesi Selatan	70.60
27	Sulawesi Tenggara	68.56
28	Gorontalo	67.54
29	Sulawesi Barat	68.34
30	Maluku	67.88
31	Maluku Utara	66.97
32	Papua Barat	69.14
33	Papua	69.13
Total Indonesia		70.07

Source: SUSENAS 2013, BPS

- The expanded Universal Health Coverage programme, launched in January 2014, provides accessible health services nationwide, which may improve the coverage of several nutrition interventions, such as multivitamin supplementation.
- Since 2007, implementation of conditional cash transfers through poverty reduction programmes focusing on health and education (PNPM Healthy and Smart Generation/GSC) in selected areas is increasing the access of vulnerable groups to health and nutrition services, especially for pregnant and lactating women and children under 5 years of age.
- Oil and wheat fortification is already mandatory, while rice fortification will be piloted in the near future through the Rice for Poor Households (Raskin) programme.

5.4 Strategies for Improving the Health and Nutrition Status of Nutritionally Vulnerable Groups

Although Indonesia has made progress on the MDG target for reducing underweight rates among children under 5 years of age, chronic malnutrition (stunting) remains high across the country. As stunting limits the potential of individuals and the nation, it represents a significant obstacle to economic growth and development.

To accelerate reductions in underweight rates and to tackle the persisting high rates of stunting, there is an urgent need to plan and implement nutrition interventions more effectively at all levels, from the household to the community. It is important that nutritionally vulnerable groups are targeted, the underlying multidimensional causes are understood, appropriate and effective interventions to address these causes are selected, and commitment and investment in nutrition are increased.

The following nutrition strategies are recommended.

1. Target nutritionally vulnerable groups:

- a. Health and nutrition interventions should prioritize children under 2 years of age. The thousand days between conception and the first two years of life are known as the “window of opportunity” to prevent malnutrition for the greatest benefits for both individuals and society throughout the life cycle.
- b. Severely and moderately malnourished children have a higher risk of dying because of their increased susceptibility to infections. Once diagnosed, malnourished children should be given appropriate treatment. A speedy intervention can save the lives of severely acutely malnourished children and prevent moderately acutely malnourished ones from becoming severely malnourished. For both groups, intervening is critical in preventing children from being trapped in a cycle of malnutrition and disease, which often results in irreversible stunted growth.

Box 5.1 - The SUN movement in Indonesia

The 2015-2019 National Medium Term Development Plan (RPJMN) aims to reduce the prevalence of underweight and stunting. To achieve this, the Government has adopted multiple policies and programmes for 2015 -2019, including stepping up the fight against malnutrition through the Scaling Up Nutrition (SUN) network. In line with Indonesia's participation in the global SUN network, the National movement to accelerate nutrition improvement, which gathers stakeholders to plan and coordinate measures for accelerating the improvement of nutrition in Indonesia, focuses on activities for the first 1,000 days from conception to a child's second birthday. The movement seeks to address acute and chronic malnutrition, anemia, low birth weight, and obesity, including by promoting exclusive breastfeeding for the first six months after birth. The World Health Assembly adopted long term goals to 2025: i) reduce the proportion of stunted children under five by 40 percent; ii) reduce the proportion of wasting children under five years to less than 5 percent; iii) decrease the prevalence of low birth weight by 30 percent; (iv) prevent the proportion of overweight children from increasing; v) decrease the proportion of anaemic women of childbearing age by 50 percent; and vi) increase the percentage of mothers who exclusively breastfeed for the first six months after their children's birth.

- c. Pregnant and lactating women have greater nutritional needs resulting from foetal growth and development and the need to produce breastmilk for infants.
 - d. Chronically ill people suffering from tuberculosis and/or HIV/AIDS have higher-than-average nutritional needs and require nutrition support to facilitate their recovery and reintroduction into the workforce.
 - e. People of all age groups suffering from micronutrient deficiencies should be targeted, particularly young children, adolescent girls and pregnant and lactating women. Micronutrient deficiencies are assumed to be widespread among the people of Indonesia because of their carbohydrate-based diets and low intakes of proteins (animal), vegetables, fruits and fortified foods. In this context, stunting is usually widely prevalent.
2. Plan and implement multisectoral interventions to address the multidimensional underlying causes of undernutrition through improved food security, health status and access to care:
- a. Direct nutrition-specific interventions, implemented mainly through the health sector:
 - Improve the nutrition and care of pregnant and lactating women, especially during the second half of pregnancy, through daily intakes of iron tablets and/or multiple micronutrient powder and at least four antenatal care check-ups during a pregnancy.
 - Promote breastfeeding of children aged 0–24 months with initiation of breastfeeding immediately after birth, exclusive breastfeeding for the first six months, and continued breastfeeding until the child is 24 months old and during periods when the child is ill.
 - Improve complementary feeding of children aged 6–24 months: start complementary feeding from the seventh month of life, providing frequent, small, diversified and nutritious meals – animal foods, eggs, beans, peas, peanuts, vegetables, fruits, oil – and avoiding unhealthy snacks.
 - Promote regular monitoring of weight and height of children aged 0–24 months, and 25–59 months when possible, to detect malnutrition early and enable its timely treatment. Provide families with more information on children's weight and height. Educate parents on ways to improve weight gain and prevent growth failure.
 - Initiate and support facility- and community-based management of acute malnutrition among children under 5, applying WHO/United Nations Children's Fund (UNICEF) and Ministry of Health guidelines.
 - Improve micronutrient intake by promoting the consumption of iodized salt, diversified diets and fortified food; distributing iron tablets for pregnant women, and semi-annual vitamin A supplementation for children aged 6–59 months and for lactating mothers for the first month after giving birth; and carrying out de-worming campaigns.
 - Intensify health and nutrition information, education and communication by using various channels – mass media, village loudspeakers, village events, etc. – to address not only mothers and caregivers, but also village and religious leaders, fathers and other family members, adolescents, teachers, extension workers and community service providers.
 - b. Indirect interventions with indirect benefits for nutrition, mainly through non-health sectors:
 - Promote the consumption of frequent, diverse and nutritious meals.
 - Promote homestead agriculture: home gardening of vegetables, fruits, beans and peanuts; small animal husbandry (chicken and duck); and fish ponds.

- Mobilize community-based leadership including village heads, religious leaders, women's associations and farmers' associations in nutrition interventions, particularly in the areas of hygiene and nutrition education.
- Improve access to drinking water: increase the access of households and institutions (schools, etc.) to improved water sources; promote the drinking of boiled water instead of raw water; construct water tanks to collect water during the rainy season; and encourage students to bring their own drinking-water to school.
- Improve hygiene and sanitation: promote hand-washing before meals and after the use of toilets; improve sewage systems; and promote proper waste/excretion disposal.
- Improve women's status: increase education of girls and women; promote adequate childcare and feeding practices; and enhance shared responsibility of husbands and other family members in childcare and feeding.
- Strengthen the capacity of provincial and district officials to plan, implement, monitor and evaluate nutrition interventions.

It should be emphasized that indirect interventions complement, not substitute, direct nutrition interventions.

3. Prioritize and increase investments in nutrition and commitment to solving nutrition problems:

- Investments in the nutrition sector are important to achieving five of the eight MDGs. In many developing countries, nutrition interventions have become the most cost-effective investment for supporting development. Well-coordinated, multisectoral interventions can help reduce the burden of malnutrition while saving lives and improving economic growth.

Presidential Instruction No. 3/2010 on equitable development programmes stressed the need to develop a national food and nutrition action plan along with regional plans for each of the 33 provinces. In accordance with this Presidential Instruction, the National Action Plan on Food and Nutrition (RAN-PG) 2011-2015 was established. The RAN-PG provides the overall framework for achieving the MDGs relating to nutrition and was followed by the formulation of Food and Nutrition Action Plans at provincial level. The local action plans directly engage districts and municipalities across Indonesia. These plans work together with the national plan to guide and direct development on food and nutrition at all levels of government as well as with institutions, communities, and other stakeholders engaged in food and nutrition improvement.

The new National Medium Term Development Plan (RPJMN) 2015-2019 provides firm direction for development of community health and nutrition (Ministry of National Development Planning, 2015). Specific nutrition goals set forth in the new RPJMN include reducing the prevalence of underweight in children under five to 17 percent and reducing the prevalence of stunting among children under two to 28 percent by 2019. The action plans are expected to support achievement of these targets. The food and nutrition policy for the action plans has five pillars:

1. Enhance community nutrition by improving the availability of and access to health services, focusing on effective nutrition services for pre-pregnant and pregnant women, for infants and for children under 2 years of age.
2. Improve access to diversified food by promoting the production of vegetables, fruits and nutrient-rich commodities and assisting vulnerable and food-insecure households.
3. Improve food quality and safety control, focusing on promoting healthy snacks and certified home-made food products.

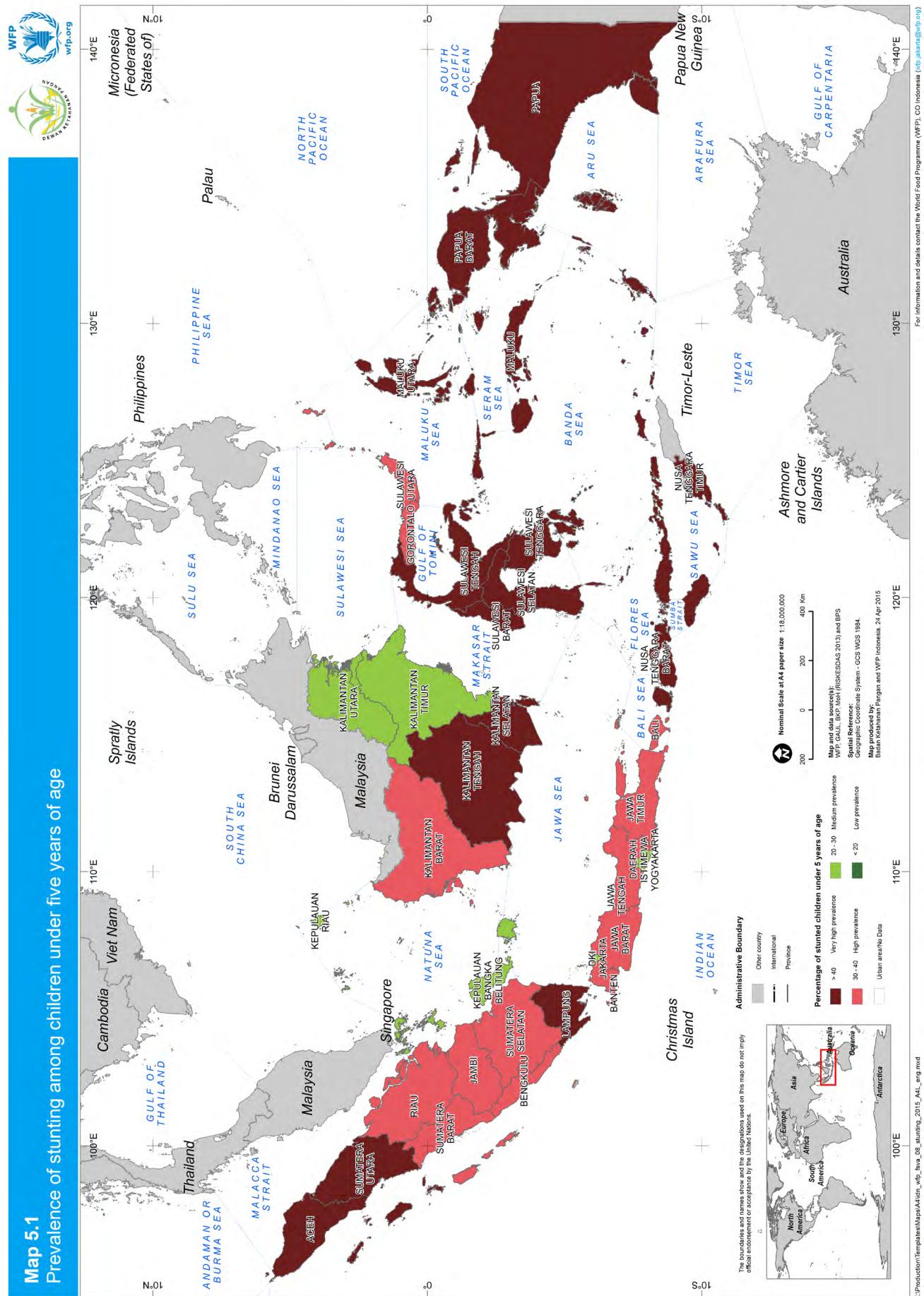
4. Improve hygiene and healthy behaviour by empowering communities and developing appropriate communication strategies for behaviour change that promote the consumption of diversified local foods, health, hygiene and the revitalization of community health centres.
5. Strengthen food and nutrition institutions at the national, provincial and district/municipality levels, including through enhanced resources and research.

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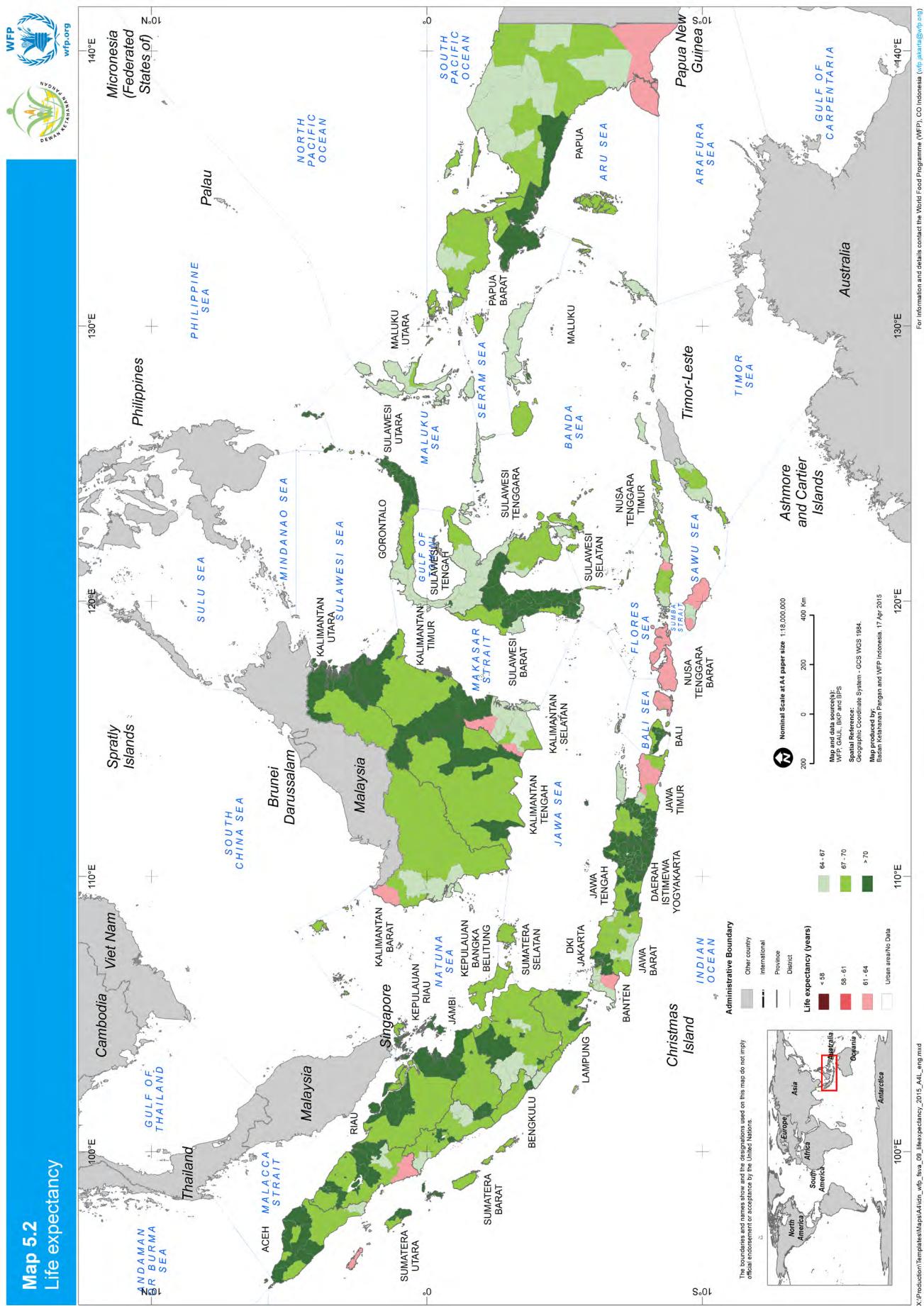
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Map 5.1

Prevalence of stunting among children under five years of age



Map 5.2 Life expectancy



CHAPTER 6

Climatic and Environmental Factors Affecting Food Security



Natural disasters and other shocks can have negative impacts on food and nutrition security, temporarily and/or for extended periods. Temporary inability to meet food needs is known as transient food insecurity, which can be triggered by sudden natural or technological disasters, slow-onset disasters, price or market shocks, health epidemics or civil conflict, among other causes. Transient food insecurity can affect one or more of the dimensions of food security – food availability, food access and food utilization.

Transient food insecurity is sometimes divided into two subcategories: cyclical food insecurity, when a regular pattern of food insecurity is repeated every year, such as during the lean season just before harvest; and temporary food insecurity, which results from a short-term, exogenous shock such as a drought or flood. Civil conflict is also a temporary shock, but its negative impact on food security often continues over an extended period. Transient food insecurity can affect chronically food-insecure households by pushing them into more severe or acute food insecurity as a result of the temporary shock; it can also affect households that are usually food-secure.

This chapter analyses food insecurity from the perspective of climate and the environment. Climatic and environmental factors and people's ability to cope with shocks determine the capacity of a country or region to achieve and maintain food and nutrition security. This aspect of food and nutrition security is based on the impact of natural disasters and environmental degradation on food availability and access. Deforestation, rainfall variability and the area affected by floods and landslides are some of the indicators used to explain transient food insecurity in Indonesia.

The comprehensive analysis of climate conditions affecting transient food insecurity carried out for the 2015 FSVA, examined four main factors: i) natural disasters experienced at the district level; ii) estimated losses in rice production caused by floods or droughts; iii) rates of deforestation; and iv) the strength of El Niño/Southern Oscillation (ENSO), which drives rainfall variability.

6.1 Natural Disasters

Indonesia is one of the most disaster-prone countries in the world, and natural disasters are the main cause of transient food insecurity in the country. According to the Centre for Research on the Epidemiology of Disasters, Afghanistan, China, India, Indonesia, the Philippines and the United States of America are the six countries that were most frequently affected by natural disasters in 2012 and 2013 (Table 6.1).

Table 6.1: Top 10 countries for frequency of natural disasters, 2012 and 2013

2012	No. of Major Events	2013	No. of Major Events
China	29	China	42
Amerika Serikat	25	Amerika Serikat	28
Philipina	21	Indonesia	17
Indonesia	15	Philipina	14
Afghanistan	11	India	12
India	10	Vietnam	10
Rusia	8	Jepang	10
Jepang	7	Brazil	7
Bangladesh	5	Afghanistan	6
Haiti	5	Bolivia	5

Source: Centre for Research on the Epidemiology of Disasters, 2012 and 2013

According to the Government, more than 15,430 natural disaster events occurred in Indonesia during the period 2000–2014, causing more than 183,100 deaths (Table 6.2). The data list events of any magnitude, including typhoons, floods, droughts, volcanic eruptions, earthquakes, tsunamis, landslides, abrasions, epidemics, pest infestations and forest fires. In 2000-2014, the most frequent natural disasters were floods, typhoons and landslides, while earthquakes and tsunamis were the most fatal, accounting for more than 167,700 deaths.

Across the country, natural disasters occurred most frequently in Jawa Tengah, followed by Jawa Timur, Jawa Barat and Aceh (Figure 6.1).

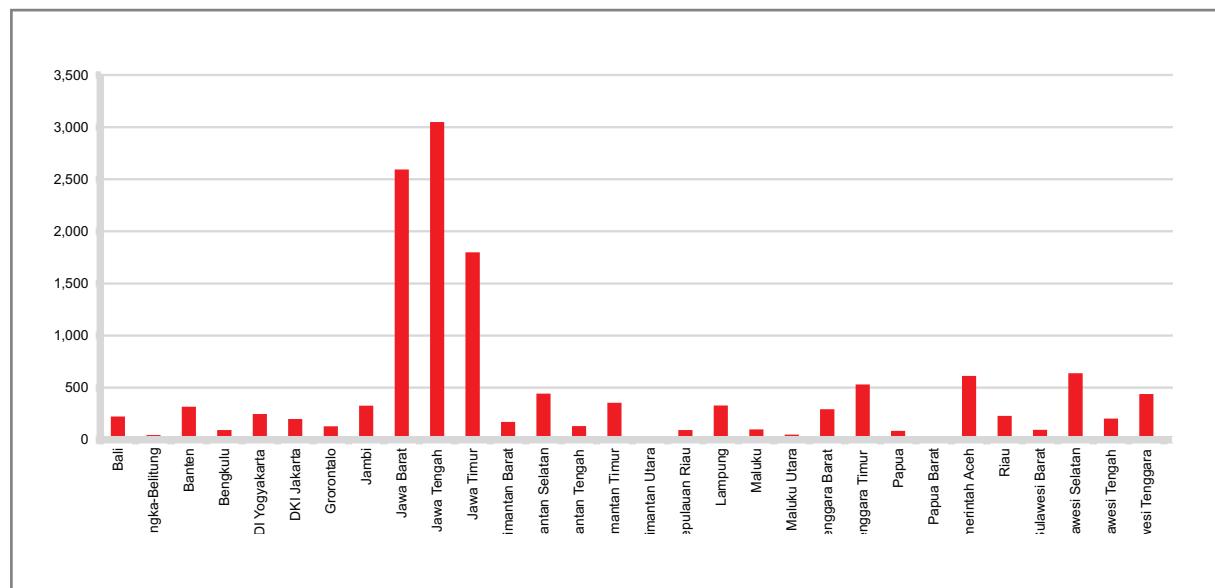
Map 6.1 illustrates the numbers of natural disasters related to climate factors: disasters related to volcanic and seismic activity (tsunami and earthquakes) are not included. The map therefore shows the districts most affected by climate: the number of districts and the intensities of the effects may increase as more extreme climate events become more common. For example, provinces in Java reported by far the most typhoons, floods, landslides and droughts between 2000 and 2014. However, it should be noted that provinces in Java may also report data more frequently than other provinces do.

Table 6.2: Summary of natural disasters and estimated damage caused, 2000–2013

Events	#Events	Deaths	Injured	IDP	Severe Damaged Houses	Light Damaged Houses	Damaged Health Facilities	Damaged Schools	Rice Field (ha)
Flood	5,822	1,800	91,828	4,373,793	93,197	143,534	1,907	4,757	1,173,843
Flood and Landslides	461	1,233	36,907	467,777	39,995	52,476	235	982	281,925
Wave and Abrasion	275	21	216	28,734	3,253	3,270	4	10	141
Earthquake	325	7,415	38,263	1,810,677	406,682	499,779	1,579	16,693	1,993
Earthquake and Tsunami	41	167,748	3,984	462,272	324,589	97,160	254	1,262	58,087
Pest Infection	4	-	-	-	-	-	-	-	321
Forest Fire	313	13	13,483	2,739	9	-	-	2	414
Drought	1,754	2	-	-	-	-	-	-	1,398,037
Epidemic	104	743	36,352	-	-	-	-	-	-
Volcano Eruption	85	427	3,455	300,370	6	-	26	375	52,682
Typhoon	3,453	252	1,762	20,836	20,761	25,513	70	412	16,455
Landslides	2,792	1,850	2,050	69,085	6,375	5,381	15	60	65,686
Tsunami	3	1	-	67	-	-	2	-	-
Total	15,432	181,505	228,300	7,536,350	894,867	827,113	4,092	24,553	3,049,585

Source: <http://dibi.bnbp.go.id>

Figure 6.1: Natural disasters by province 2000–2014



Source: BNPB, Data and Information Dashboard: <http://dibi.bnbp.go.id>

6.2 Rainfall Variability

Climate variability directly influences many aspects of food and nutrition security, particularly food availability and access. Variation in rainfall is a common element of many natural disasters – droughts, floods, typhoons and tsunamis – and is influenced by global, regional and/or local factors. Global climate factors include El Niño, La Niña and the dipole mode; regional factors include monsoon circulation, the Madden-Julian oscillation and fluctuations in the surface temperature of the seas of Indonesia; and local factors can include elevation, island position, the circulation of land and sea breezes, and land cover.

Extremes of climate are responsible for floods during the rainy season and drought in the dry season. Climate can also influence the development of pest infestation: different pests may thrive in wetter or drier conditions, resulting in infestations that adversely affect crop growth and may lead to crop failure. In Indonesia, the occurrence of extreme climate events that cause huge losses in food crop production is associated mostly with El Niño/Southern Oscillation (ENSO) events. El Niño years are normally associated with drought, while La Niña years are associated with higher rainfall, which can cause floods.

Map 6.2 shows the changes in monthly rainfall likely to result from a 1°C change in sea surface temperature (SST). Areas in red exhibit very high negative change in rainfall; those in green exhibit very high positive changes. Each square in the grid represents a 50 x 50 km square. The areas with the highest negative changes in rainfall per 1°C change in SST include Maluku, Nusa Tenggara Barat, western parts of Nusa Tenggara Timur, large parts of Sulawesi Selatan, Sulawesi Utara, and Sulawesi Tengah, and Jawa Tengah. Increased rainfall caused by a rise in SST is shown in the north of Papua, Kalimantan Barat, Sumatera Barat, Riau and the south of Sumatera Utara.

Areas where rainfall may decrease as a result of a change in SST could face significant crop production losses, particularly in areas without irrigation. Map 6.3 classifies districts according to the average decrease in monthly rainfall associated with a change in SST. Districts in dark red have the largest negative changes in rainfall associated with a rise in SST. These districts would require monitoring of the food security situation, particularly food production during El Niño years. Rainfall variation is likely to be detrimental to sustainable agriculture unless water storage and irrigation systems are improved. Analysis of climate change impacts on rice production in Java suggests that production is likely to be 1.8 million mt lower than current levels in 2025 and 3.6 million mt lower in 2050 (Boer et al., 2009).

6.3 Production Losses Caused by Drought, Floods and Pests

The production and productivity of food crops are influenced by climate and weather conditions. A damaged area is defined as an area where crop production has declined as a result of natural disasters (floods, droughts) and/or pest infestations.

Indonesian statistics categorize production losses as totally lost (puso) and damaged (when less than 50 percent is lost). Table 6.3 presents the proportions of paddy and maize areas damaged by floods, droughts and/or pest infestations in each province between 2011 and 2013. Nationally, damage to maize and paddy fields was relatively low during this period, at less than 1 percent/year of total cultivated area for each crop. Damage to rice fields in 2013 (0.50 percent) was smaller than in 2012 (0.67 percent) and 2011 (0.93 percent). The provinces with the greatest damage to paddy fields in 2013 were Aceh (2.63 percent), Banten (2.30 percent), Sulawesi Selatan (1.87 percent) and Jambi (1.71 percent). Damage to maize crops declined from 0.23 percent in 2011 to 0.11 percent in 2012 and increased 0.15 percent in 2013. The provinces with the greatest damage to maize fields in 2013 were Sulawesi Selatan (1.30 percent), followed by Sulawesi Tenggara (1.05 percent) and Jambi (0.66 percent).

As the impact of rainfall variability is a major determinant of crop loss in Indonesia, the effects of rainfall-related climate factors on rice were analysed further. Map 6.4 shows average annual rice production losses caused by drought from 1990 to 2013, in metric tons lost. Areas in dark red experienced heavy losses averaging more than 20,000 mt/year in this period. Most of the affected districts are in Jawa Barat, but Sulawesi Selatan, Jawa Tengah, and Nusa Tenggara Barat also experienced significant rice production losses because of drought.

Conversely, map 6.5 depicts the average annual rice production losses to floods from 1990 to 2013. Again, areas in dark red faced the heaviest losses of more than 20,000 mt/year. Jawa Barat, Aceh, Sumatera Utara, Jambi, Sumatera Selatan, Lampung, and Sulawesi Selatan faced the highest losses to floods in this period.

Table 6.3: Proportion of paddy and maize cultivated areas damaged by floods, droughts and pest infestation, 2010–2013

No	Province	Paddy (%)				Maize (%)			
		2010	2011	2012	2013	2010	2011	2012	2013**
1	Aceh	0.65	1.83	2.93	2.63	0.09	0.10	0.54	0.37
2	Sumatera Utara	0.16	0.11	0.23	0.53	1.55	0.56	0.43	0.04
3	Sumatera Barat	0.20	0.31	0.14	0.10	0.71	2.45	0.11	0.19
4	Riau	0.11	2.16	0.58	1.01	0.19	1.10	0.05	0.15
5	Jambi	3.08	1.06	1.27	1.71	31.45	0.81	0.63	0.66
6	Sumatera Selatan	1.53	0.34	0.17	0.23	0.15	0.01	0.31	0.08
7	Bengkulu	-	0.10	0.03	0.08	0.01	1.46	-	-
8	Lampung	2.15	1.42	1.45	0.81	0.24	0.08	0.17	0.01
9	Kep Bangka Belitung*	-	-	-	-	-	-	-	-
10	Kep Riau*	-	-	-	-	-	-	-	-
11	DKI Jakarta	0.75	-	-	-	-	-	-	-
12	Jawa Barat	0.44	0.84	0.22	0.26	-	0.01	0.00	-
13	Jawa Tengah	0.63	0.70	0.78	0.79	0.48	0.06	0.03	0.02
14	DI Yogyakarta	1.07	1.84	0.76	-	0.21	0.01	-	-
15	Jawa Timur	0.47	2.04	0.36	0.81	0.38	0.13	0.02	0.18
16	Banten	0.14	0.57	3.58	2.30	-	-	-	-
17	Bali	-	0.12	0.12	0.00	-	-	-	-
18	Nusa Tenggara Barat	2.10	0.25	0.62	0.47	8.93	-	0.48	0.11
19	Nusa Tenggara Timur	2.24	0.38	0.10	0.28	2.32	0.02	0.03	0.53
20	Kalimantan Barat	0.03	0.21	0.26	0.08	-	0.00	-	-
21	Kalimantan Tengah	1.98	0.15	0.96	0.26	1.21	-	0.27	0.09
22	Kalimantan Selatan	1.05	0.24	0.34	0.00	0.01	0.02	0.01	-
23	Kalimantan Timur	0.42	0.45	0.44	0.48	0.13	-	-	-
24	Sulawesi Utara	0.17	0.02	0.01	0.05	-	-	-	0.00
25	Sulawesi Tengah	0.15	0.05	0.18	0.04	0.18	0.00	-	0.01
26	Sulawesi Selatan	2.22	1.86	0.97	1.87	0.83	0.71	0.37	1.30
27	Sulawesi Tenggara	0.47	1.37	1.38	0.78	0.02	-	0.01	1.05
28	Gorontalo	10.95	0.68	0.35	0.02	1.81	0.58	0.03	0.03
29	Sulawesi Barat	0.23	0.76	0.67	0.01	0.03	-	-	-
30	Maluku	2.65	-	0.47	0.12	0.46	-	0.03	-
31	Maluku Utara	-	0.17	0.20	0.08	-	-	-	0.02
32	Papua Barat	-	0.04	-	0.03	-	-	-	-
33	Papua	0.03	0.86	0.01	0.67	-	-	-	-
	INDONESIA	0.88	0.93	0.67	0.50	0.92	0.23	0.11	0.15

* These provinces reported very negligible damaged areas; ** OPT Data is not included
Source: Ministry of Agriculture 2010-2013

6.4 Deforestation

Indonesia's forests play a central role in the livelihoods and food and nutrition security of a large proportion of the population, especially in central and southern parts of Sumatra, Kalimantan and Papua. Non-timber forest products – wild animals, plants, roots, etc. – contribute significantly to local diets, providing essential nutrients and serving as an important source of food during the lean season or when access to other sources is limited.

Deforestation and forest degradation in Indonesia have considerable impacts on not only the local but also the global population. Forest conversion contributes significantly to carbon emissions, which are identified as a major driver of global climate change. Forest degradation – especially in upstream areas - also has negative effects on water resources. Complete removal of tree cover upstream may accelerate water discharge - increasing the downstream flood risk in the wet season and drying out river beds in the dry season – and increase soil erosion, leading to sedimentation of waterways and greater risk of landslides. Subsequent water shortages will affect the irrigation supply for agriculture, fisheries and dam operations, reducing food security and increasing vulnerability through decreased economic productivity. These impacts are compounded by the changing rainfall trend that results from climate change.

Much loss of forests has been related to legal and illegal harvesting of timber and forest products, particularly plywood. The spread of oil-palm and rubber plantations is another threat to virgin forests, the destruction of which releases large amounts of carbon, increases the risk of global warming and natural disasters, and destroys the natural habitat of a wide range of species. From 1990 to 2005, 56 percent of the increase in oil-palm plantations in Indonesia resulted from damage to biodiversity-rich forests.

The Government of Indonesia has developed strategies for reducing deforestation to decrease the number of damaging events and increase protection of the country's forests. In October 2009, President Susilo Bambang Yudhoyono, committed to reducing Indonesia's greenhouse gas emissions by 2020, by 26 percent on a voluntary basis and 41 percent with international support. Most of the actions for achieving this objective will be implemented by the forestry sector, which is the biggest contributor of greenhouse gas emissions. Indonesia's Second National Communication under the United Nations Framework Convention on Climate Change (2010) reported that 80 percent of the country's total emissions come from land use, land-use change and forestry, including forest fires. Indonesia has also signed bilateral and unilateral agreements on reducing emissions from the forestry sector, such as the Letter of Intent with the Government of Norway signed on 26 May 2010.

As part of its strategy, from 2011 to 2013 the Government implemented a two-year moratorium on new concession licences for logging and the conversion of forests and peat lands. The moratorium provided an opportunity for Indonesia to find ways of using its resources more sustainably and has been extended for another two years, to 2015. Implementation of the National Action Plan to Reduce Greenhouse Gas Emissions and enactment of the moratorium have slowed deforestation. In 2009 - 2011, the deforestation rate was significantly reduced to 450,640 ha/year, compared with 1.17 million ha/year in 2003–2006 and 2.28 million ha/year in 1997–2000.

Maps 6.6 to 6.8 depict deforestation in Indonesia. The large illustration in map 6.6 shows average annual deforestation rates from 2000 to 2013, the smaller maps show deforestation rates in four three-year periods. Deforestation data were derived from analysis of Landsat satellite imagery at 30-m spatial resolution for 2000–2013, conducted by the University of Maryland (Hansen et al 2013). These maps show concentrations of forest loss, defined as a change from forest to non-forest state. Both the geographic extent and the intensity of forest losses show troubling trends.

Map 6.7 examines annual rates of forest loss from 2000 to 2013. Areas in dark red represent increases in deforestation rates of at least 2.5 percent per year. Map 6.8 illustrates average forest losses in terms of hectares per year from 2000 to 2013. Districts in dark red lost more than 20,000 ha/year over the 13 year period. Several provinces still have very high deforestation rates, including Riau, Kalimantan Tengah, Kalimantan Barat, Kalimantan Timur and Jambi. These provinces were among the nine that the Government prioritized for implementation of its Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) strategy, together with Papua, Papua Barat, Sumatera Selatan and Aceh.

6.5 Climate Change and Food Security

Climate change poses one of the most serious risks to food and nutrition security in Indonesia. The impacts of climate change can be continuous, discontinuous or permanent (Boer and Kartikasari, 2014). Continuous impacts effect mainly crop yields and are caused by changes in rainfall (pattern, length and onset of seasons), evaporation, run off of surface water, salt intrusion, CO₂ concentrations in the atmosphere and soil moisture levels. Discontinuous impacts result from increasing extreme weather events, leading to crop failure. Permanent impacts are irreversible conditions such as loss of arable land in coastal areas because of sea level rise. All of these changes have impacts on agricultural production and productivity, which in turn can affect food and nutrition security.

A trend in increasing mean temperatures is already being observed in Indonesia. Between 1965 and 2009, mean temperatures increased by about 0.0160C/year. The 2009 Indonesia Climate Change Sectoral Roadmap (Ministry of Planning and Economic Development, 2009) reported that higher temperatures will likely lead to decreases in yields of rice of 20.3–27.1 percent, maize of 13.6 percent, soybeans of 12.4 percent and sugar cane of 7.6 percent. Pollination and grain-set processes begin to fail if crops are frequently exposed to high temperature thresholds. Higher temperatures also increase crop respiration rates and reduce carbon capture.

Another important continuous impact is change in monsoon onset, which leads to changes in rainfall intensity and the onset and length of seasons. Naylor et al. (2007) projected an increasing probability of delay in the annual rainfall cycle of rainfall in Java and Bali, which are important rice-growing areas. The study indicated increasing probability of a 30-day delay in monsoon onset in 2050, which could reduce rice production in Indonesia by 14 percent.

Changes in temperature and rainfall also alter crop pest and disease prevalence. MoE (2007) reported significant increases in the brown plant hopper population when rainfall in transitional seasons increases. Invasions of new pests and diseases may also occur with a changing climate. Field observations by Nastari Bogor and Klinik Tanaman IPB (2007) and Wiyono (2007) have identified this risk.

While most of the literature agrees on the continuous impacts of climate change, there are disagreements regarding the discontinuous impacts on the occurrence of extreme events. Some studies, such as Knutson et al. (2010), predict that average intensity of tropical cyclones will increase by 2-11 percent by 2100, while modelling indicates a substantial decrease of 6-30 percent in the frequency of cyclones, meaning that the overall impact will not necessarily increase even if the intensity of cyclones increases. Although detailed quantitative studies are lacking, a regional study conducted for member countries of the Association of Southeast Asian Nations reported an increasing trend in climate-related disasters such as floods and droughts caused by climate change in the last decade (ADB, 2010).

Studies on the impacts of sea level rise, such as inundation and loss of agricultural area, are limited. A number of studies use a sea level rise of 100 cm for projecting potential impacts (Jevrejeva, Moore and Grinsted, 2010; Rahmstorf 2007; Forster et al., 2011). Forster et al. (2011) predicted a potential loss of 120,446 ha of agricultural area in Indonesia when the sea level rises by about 100 cm. This loss would be equivalent to 885,430 mt of rice production.

To mitigate the potential impacts of climate change on food and nutrition security, the Government of Indonesia launched the National Action Plan for Climate Change Adaptation (RAN-API) (Ministry of National Development Planning, 2014). RAN-API aims to harmonize and coordinate Indonesia's various policies on climate change adaptation into a comprehensive and integrated strategy with the overall goal of achieving sustainable development that adapts to climate change. The plan aims to strengthen endeavours on mitigation formulated under the National Action Plan to Reduce Greenhouse Gas Emissions. RAN-API is organized into five sectors: (i) build economic resilience, (ii) establish livelihoods that are resilient to climate change impacts, (iii) maintain the sustainability of ecosystem services and

(iv) strengthen resilience in urban areas, coastal areas and small islands. A support system is needed to reinforce national resilience towards a development system that is sustainable and resilient to climate change.

The action plan's economic resilience sector, contains a sub sector on food security. The food security objectives of RAN-API are to:

1. Decrease food production loss due to extreme weather events and climate change.
2. Develop new growth areas of food production in areas with a low climate risk and minimum environmental impact (low emission).
3. Develop food security of farmers, fisheries, and communities through food diversification that leads to a healthy, nutritious and balanced diet.

To achieve these objectives, RAN-API defines seven actions:

1. Develop food production systems that can adapt to climate change.
2. Expand agriculture and aquaculture areas.
3. Restore and develop climate proof agricultural infrastructure¹.
4. Accelerate food diversification.
5. Develop innovative and adaptive technologies.
6. Develop information and communication systems that address climate and agriculture.
7. Support programmes.

RAN-API encompasses an action plan for sector priorities in the short term and mainstreaming into the 2015-2019 National Medium Term Development Plan.

6.6 Strategies for Sustainable Food Security

An area that is currently food-secure may become food-insecure if farmers, the private sector and policy-makers adopt strategies and practices that are not environmentally sustainable. The impact of disasters can also reverse the food and nutrition security situation unless disaster preparedness and response mechanisms are adequate. The following strategies are recommended for all vulnerable districts of Indonesia, to assist them in achieving sustainable food security:

- a. *Slowing deforestation and promoting reforestation:* Some districts in Jambi, Riau, Sumatera Selatan and Bengkulu, and all the districts in Kalimantan should embark on a comprehensive plan for slowing deforestation and regenerating degraded forests; coastal areas should concentrate on mangrove regeneration. Similar efforts are also necessary in Java, Nusa Tenggara Barat, Nusa Tenggara Timur and Sulawesi. As a result of climate change, Indonesia is expected to have fewer days of rainfall, but rainfall will sometimes be of greater intensity. Districts with very little vegetation cover will experience increasing numbers of flash floods and landslides.
- b. *Watershed development:* All districts, particularly those in Java, Nusa Tenggara Barat and Nusa Tenggara Timur, should plan integrated watershed development projects for improving soil and water management. Such measures will enhance land productivity and crop yields, while the use of appropriate indigenous techniques will create more sustainable agricultural livelihoods.

¹ 'Climate proof' refers to the construction or development of systems that can function normally in the face of changing climatic conditions.

- c. *Disaster preparedness and contingency planning:* Districts that frequently experience disasters should prepare community-level contingency plans and put in place the necessary structures and institutions for enhancing disaster risk reduction and resilience.
- d. *Early warning and surveillance systems:* Innovative early warning and surveillance systems for food and nutrition security need to be put in place in all disaster-prone districts to ensure the timely identification of risks and enable adequate corrective measures for mitigating the possible impacts of any impending disasters.
- e. *Establishing regional remote sensing agencies:* The Government of Indonesia should consider establishing regional remote sensing agencies to facilitate more disaggregated analyses and improved dissemination of satellite data on land use, forest fires, floods, vegetation cover, groundwater and other major parameters, promoting more scientific natural resource management at the local level.
- f. *Mainstreaming climate change issues into all policies and projects:* The Government at all levels, the United Nations and non-governmental organizations should ensure that all the policies and programmes that they develop address the challenges of climate change. Agencies must also ensure that policies and programmes addressing climate change are pro-poor.

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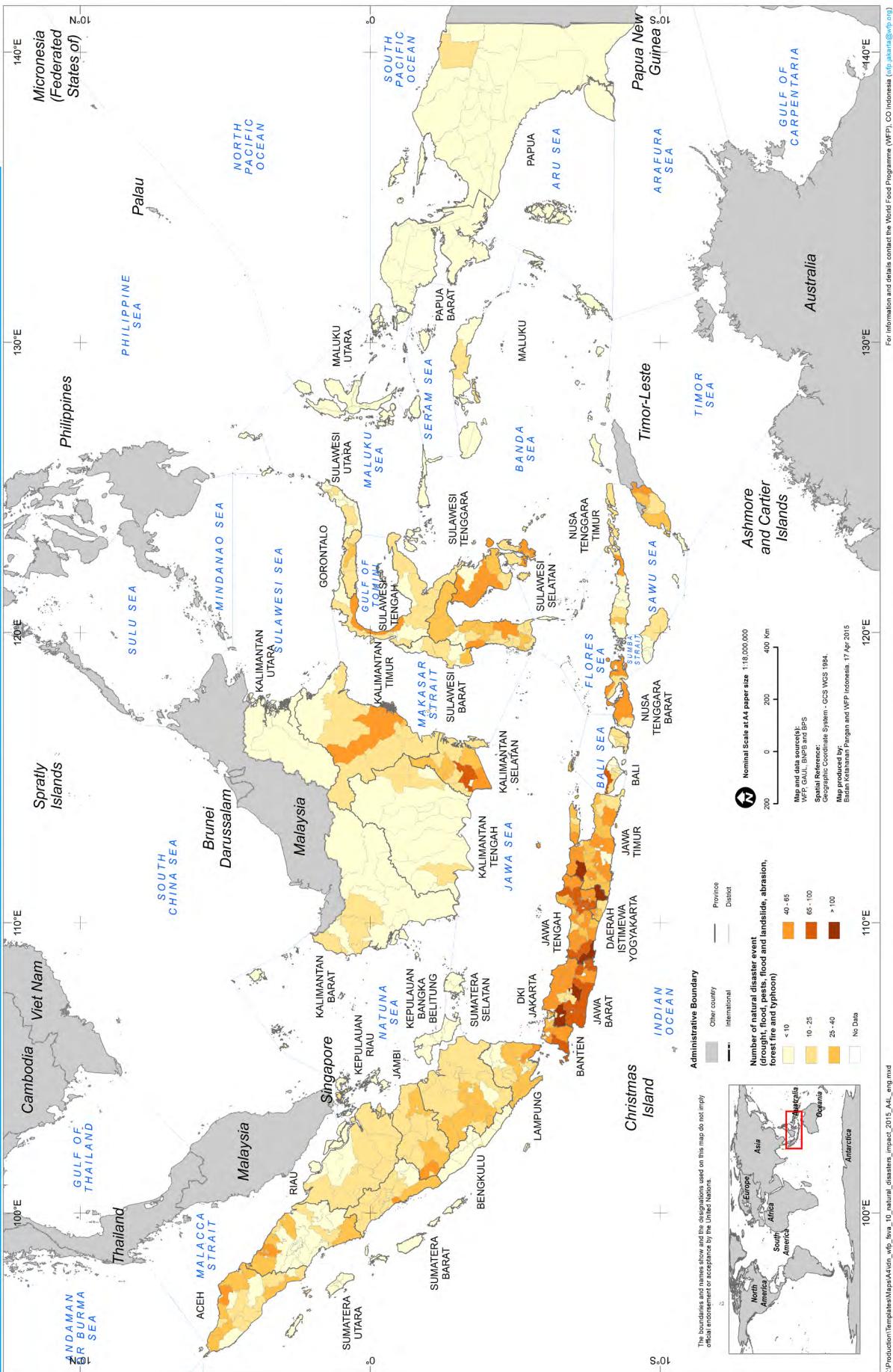
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Rahmstorf S (2007) *A semi-empirical approach to projecting future sea-level rise*. Sciece 315:368-370.

Wiyono, S. (2009). *Perubahan Iklim, Pemicu Ledakan Hama dan Penyakit Tanaman*. Majalah Salam Edisi 26 Januari 2009.



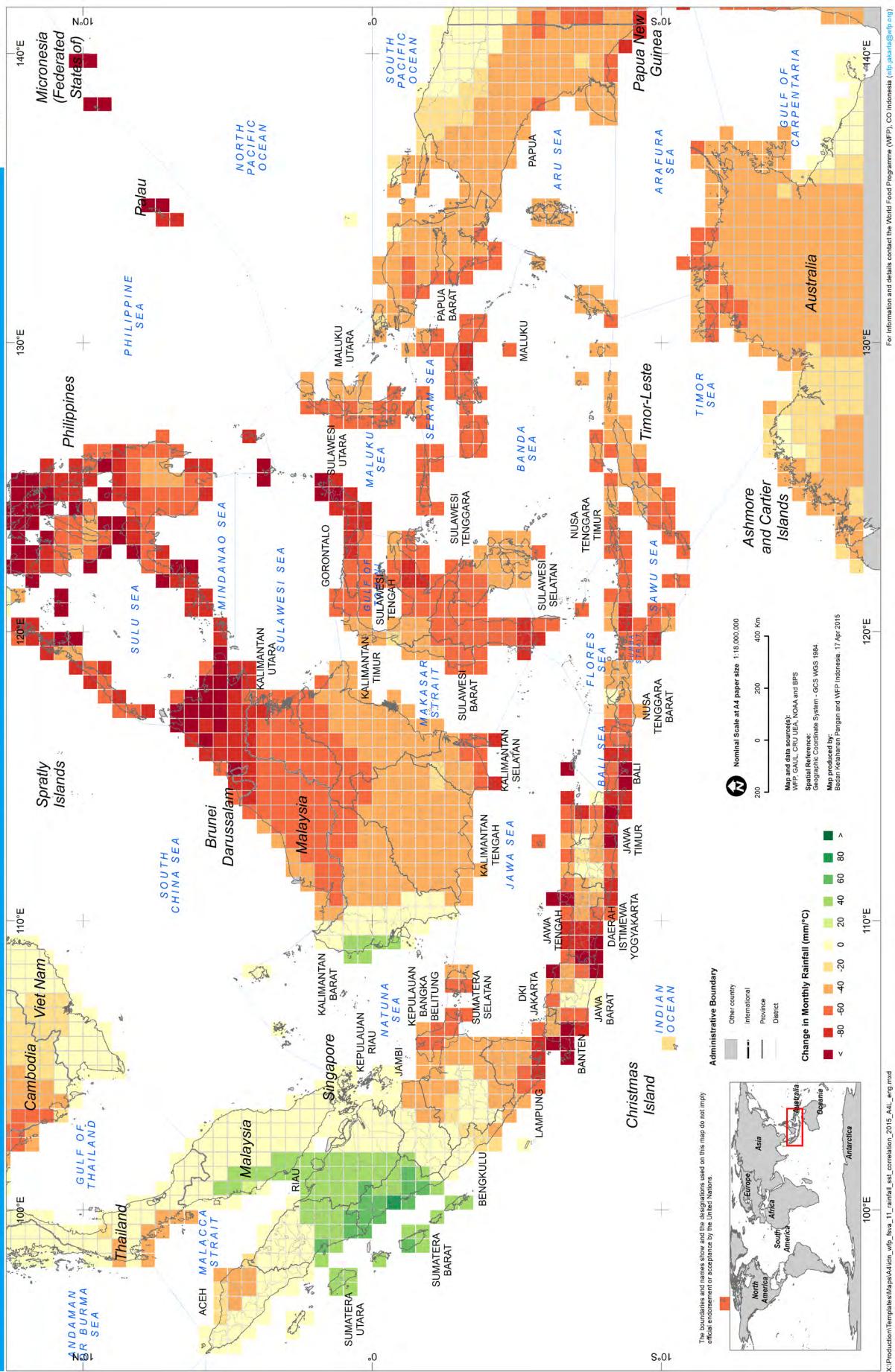
Map 6.1 Number of natural disasters with potential impact on food access and utilization from 2000 – 2013





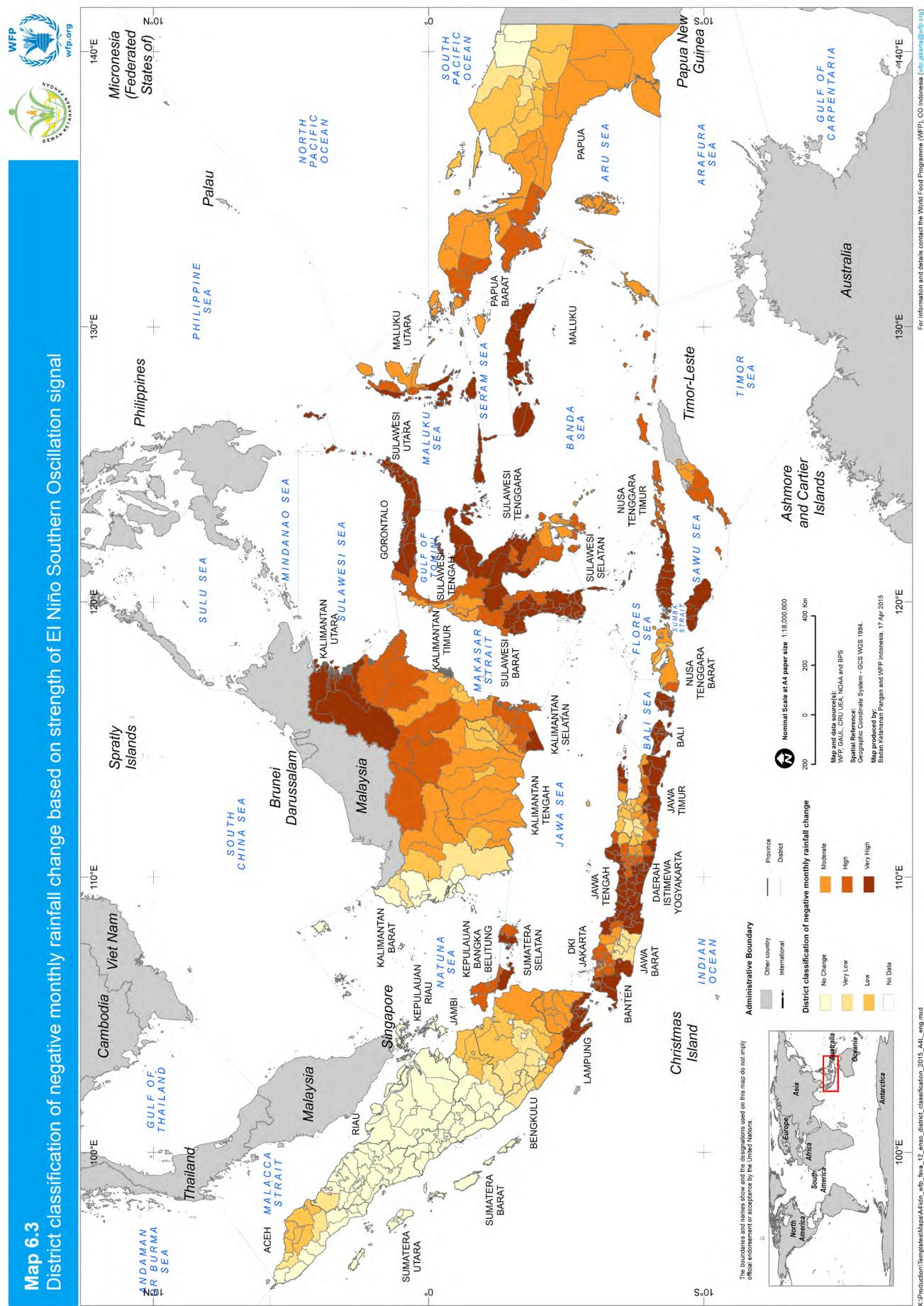


Map 6.2 Change in monthly rainfall with 1 degree increase in sea surface temperature

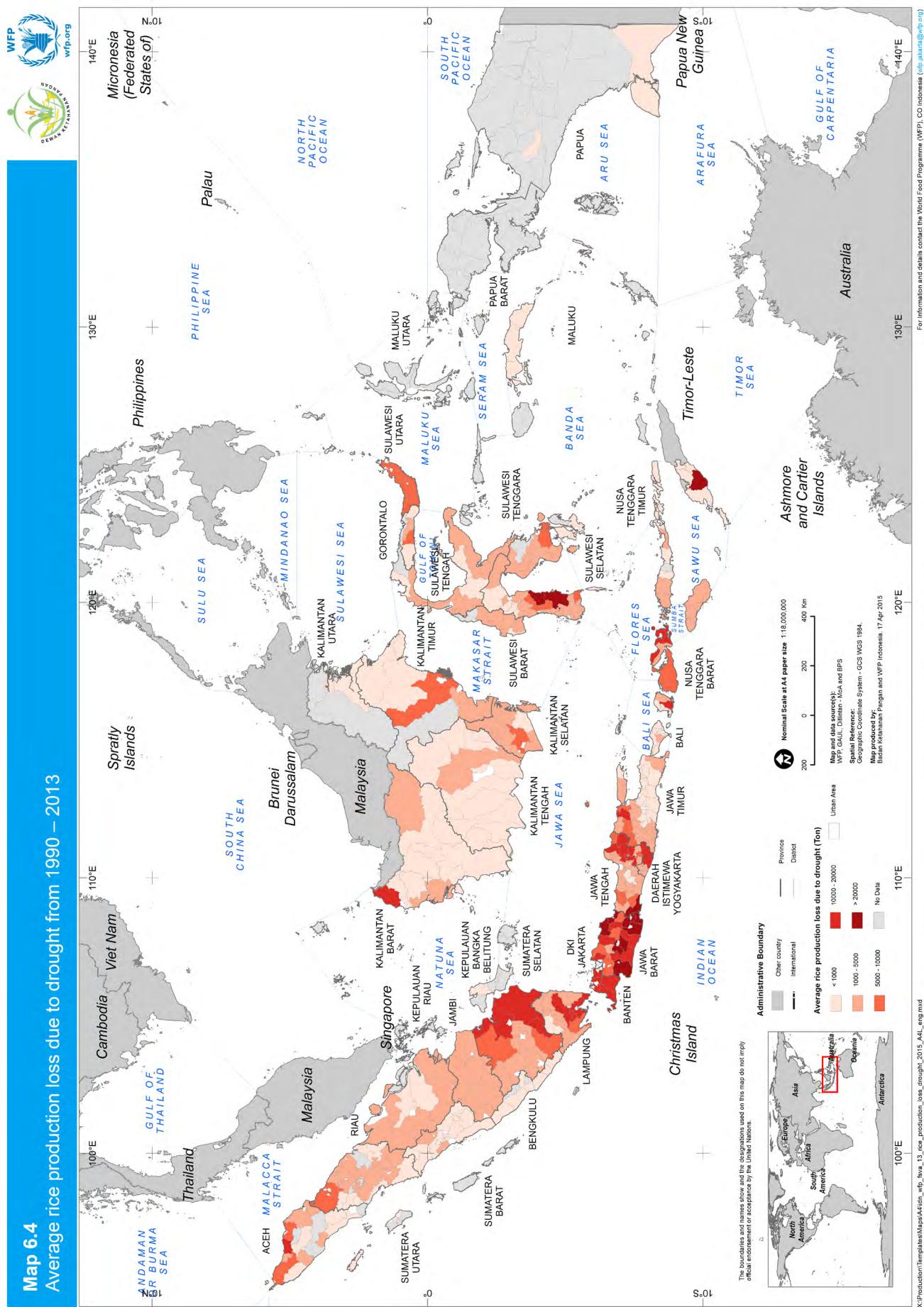


Map 6.3

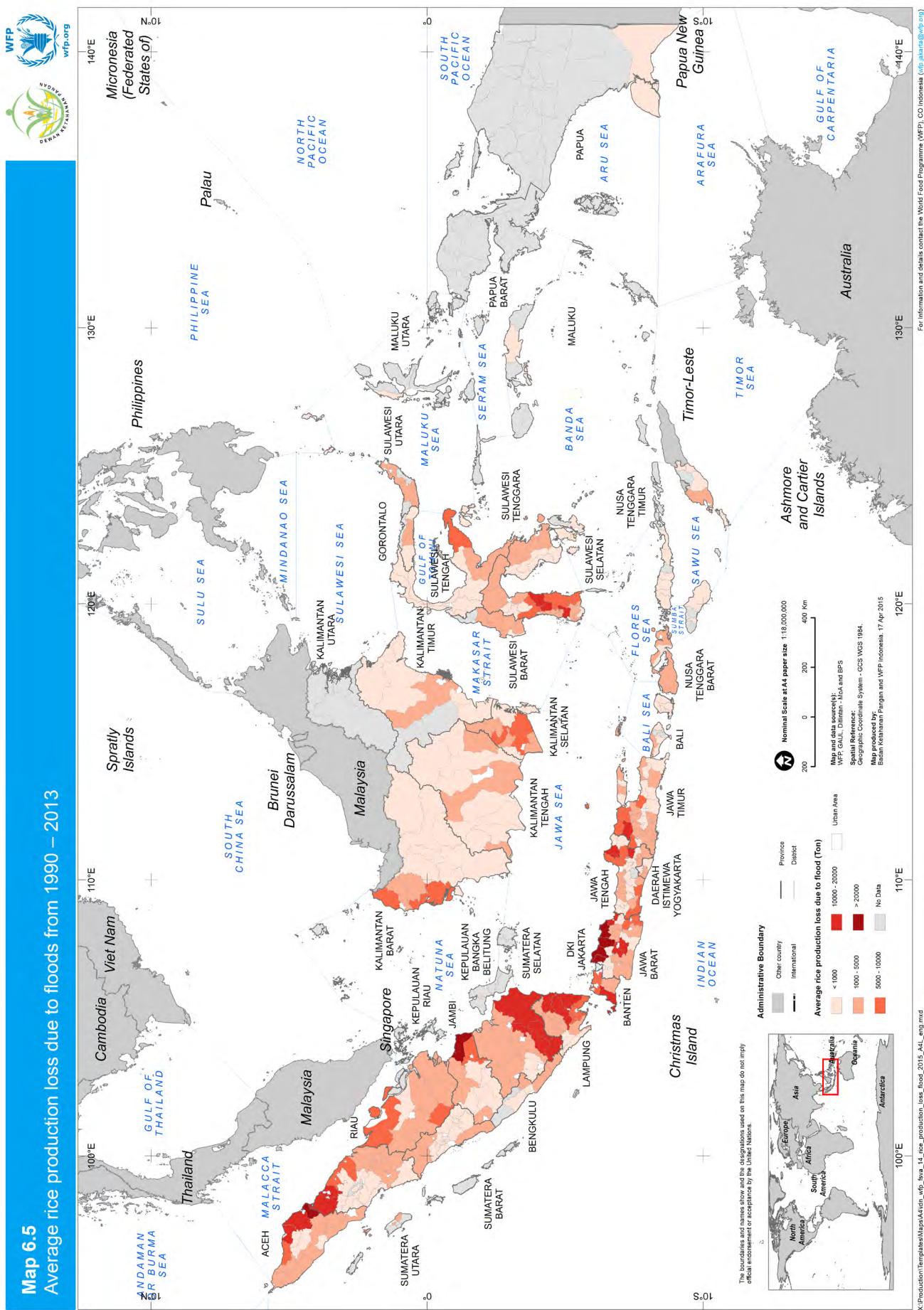
District classification of negative monthly rainfall change based on strength of El Niño Southern Oscillation signal



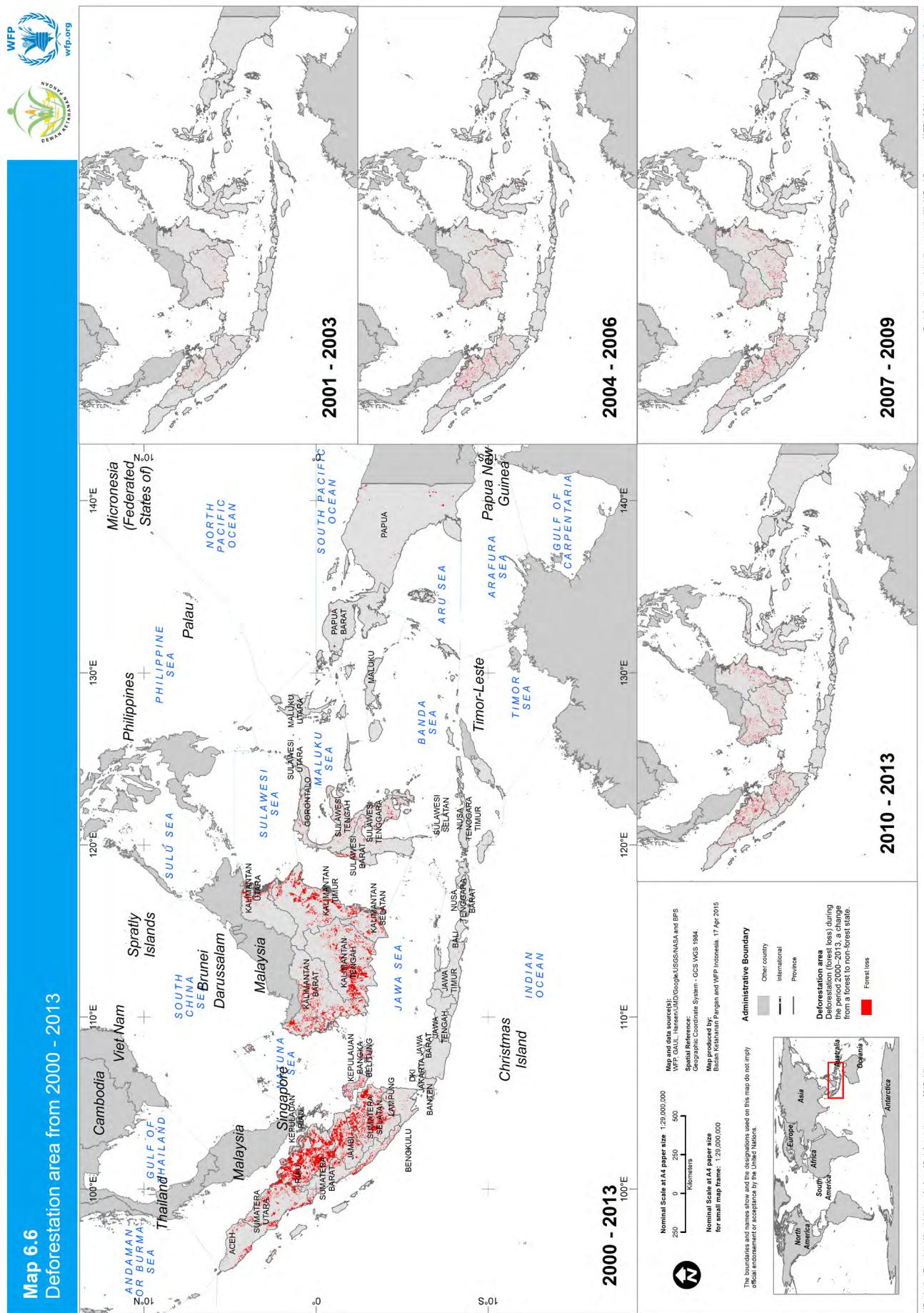
Map 6.4
Average rice production loss due to drought from 1990 – 2013

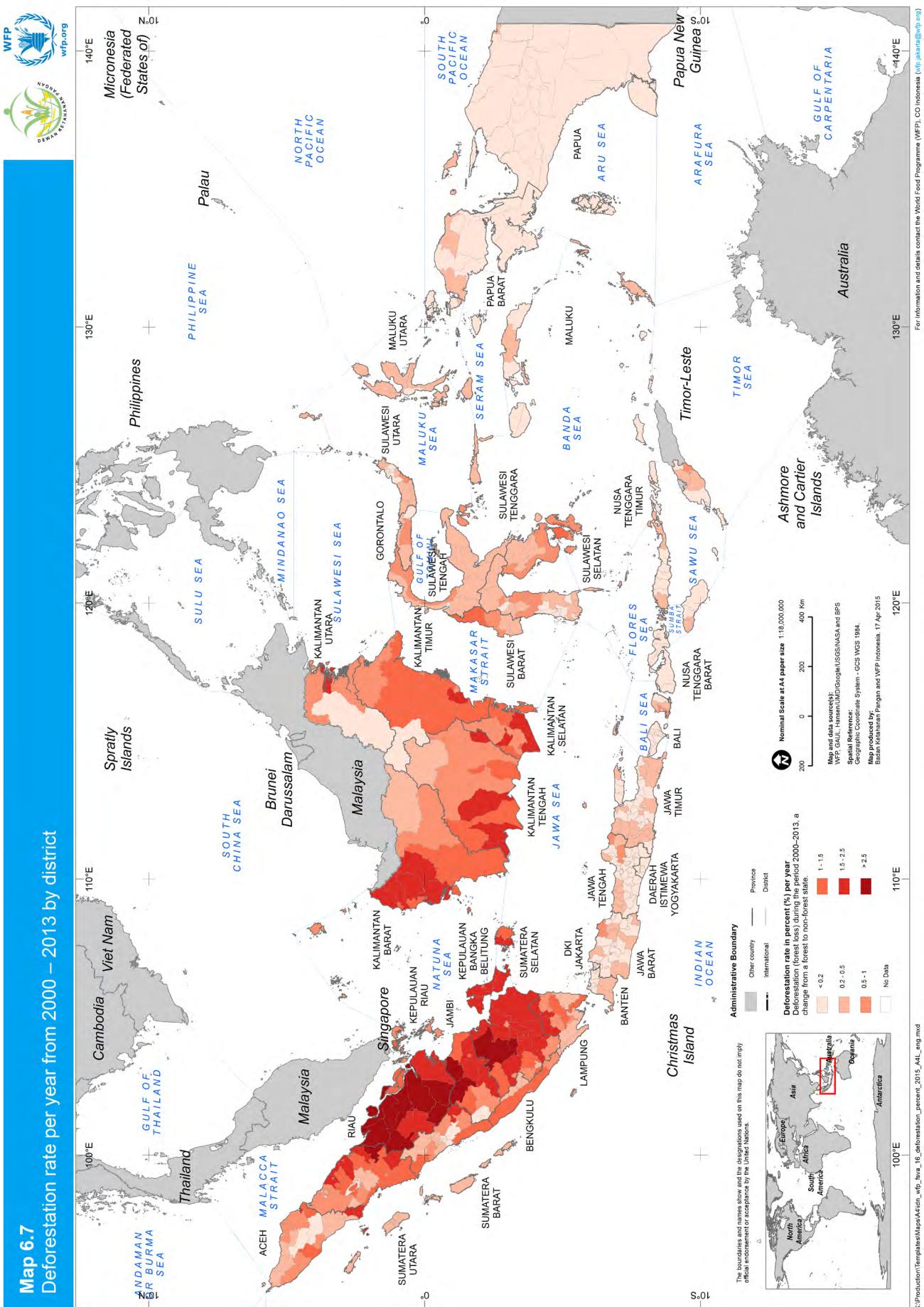


Map 6.5
Average rice production loss due to floods from 1990 – 2013

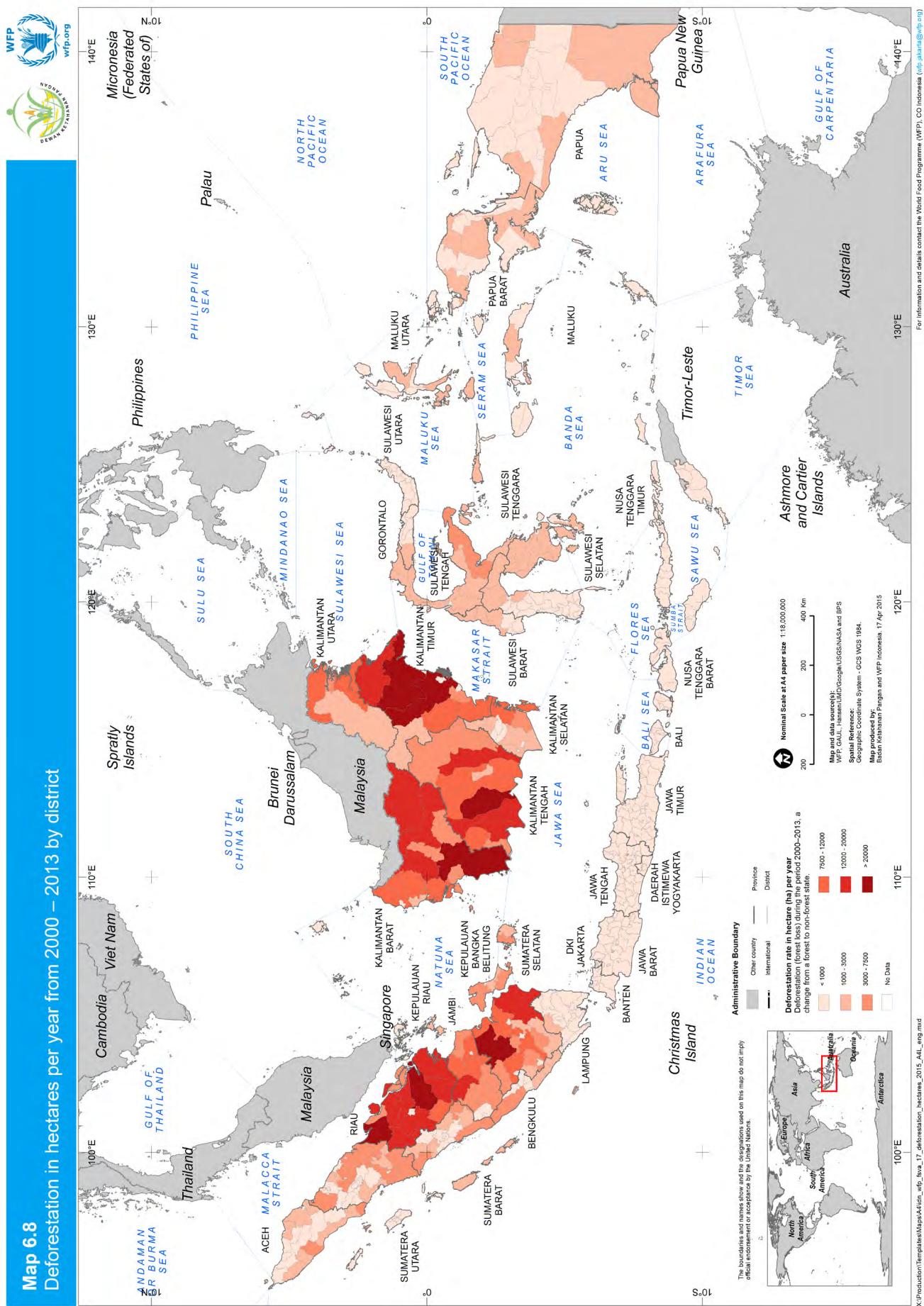


Map 6.6
Deforestation area from 2000 - 2013



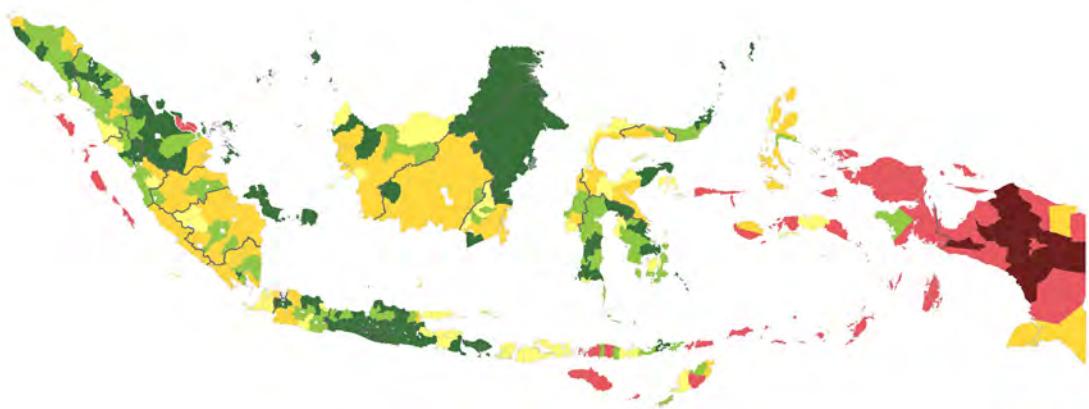


Map 6.8
Deforestation in hectares per year from 2000 – 2013 by district



CHAPTER 7

COMPOSITE FOOD SECURITY AND VULNERABILITY ANALYSIS



7.1 Food Security Across Indonesia

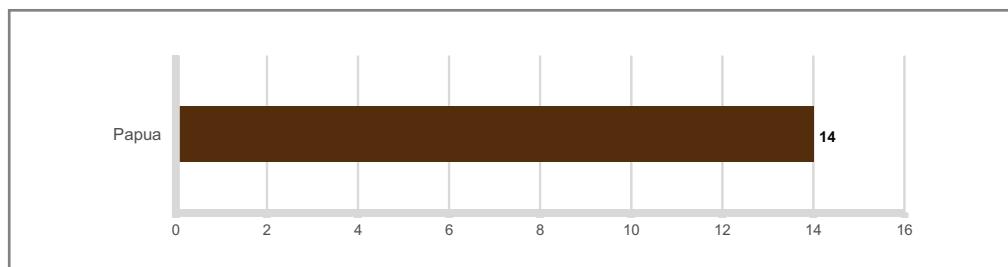
A vast number of factors affect a household's vulnerability to food insecurity. These factors are typically categorized according to their relationship to the three dimensions of food security: food availability, food access, and utilization of the nutrients in food. This atlas has selected nine indicators that aim to capture the core aspects of the three dimensions along with nutrition and health outcomes. The definition, computation and sources of each indicator are provided in Table 1.1 in Chapter 1. Detailed explanations of the relationships between indicators and the food security dimensions can be found in Chapters 2–5.

As agreed by the FSVA Technical Working Group, the methodology for ranking and categorizing districts into priority groups was updated for this 2015 atlas by including cluster analysis and discriminant analysis in addition to the principal component analysis method used in previous atlases. Principal component analysis is used to determine the weight of each individual indicator within the composite index, while cluster and discriminant analyses are used to classify each district into one of six priority groups. The combination of these three methodologies increases the objectivity, robustness and reliability of results.

Districts are classified into food and nutrition security priority groups according to the severity and causes of the food and nutrition security situation. The aim is to maximize both the homogeneity within each group and the variation between groups. Because of the sometimes conflicting and contradictory effects of human development, districts do not always progress at the same rate in all indicators: districts may perform very well in some indicators but lag in others. Therefore, as districts are aggregated, those in high priority groups may perform better than those in lower priority groups in some indicators, and vice versa. Although counterintuitive, this is an unavoidable result of combining indicators into composite indices.

Districts designated as priority group 1 are those most vulnerable to food and nutrition insecurity, while districts in priority group 6 are the most food secure. Districts in priority groups 1 and 2 are severely vulnerable to food and nutrition insecurity; those in priority groups 3 and 4 are moderately vulnerable, and significantly better off than those in groups 1 and 2. Districts in priority groups 3 and 4 have similar levels of food and nutrition insecurity, but differences in the underlying determinants driving vulnerability distinguish districts in group 3 from those in group 4. Priority groups 5 and 6 are the least vulnerable to food and nutrition insecurity. Districts are mapped in red for priority groups 1 and 2, yellow for priority groups 3 and 4, and green for priority groups 5 and 6 (see Map 7.1). It is important to note that not all households in the top priority districts (groups 1 and 2) are food-insecure, while not all those in the low priority areas (groups 5 and 6) are food-secure. The goal of prioritization is to identify areas where there is an overall greater prevalence of households vulnerable to food and nutrition insecurity.

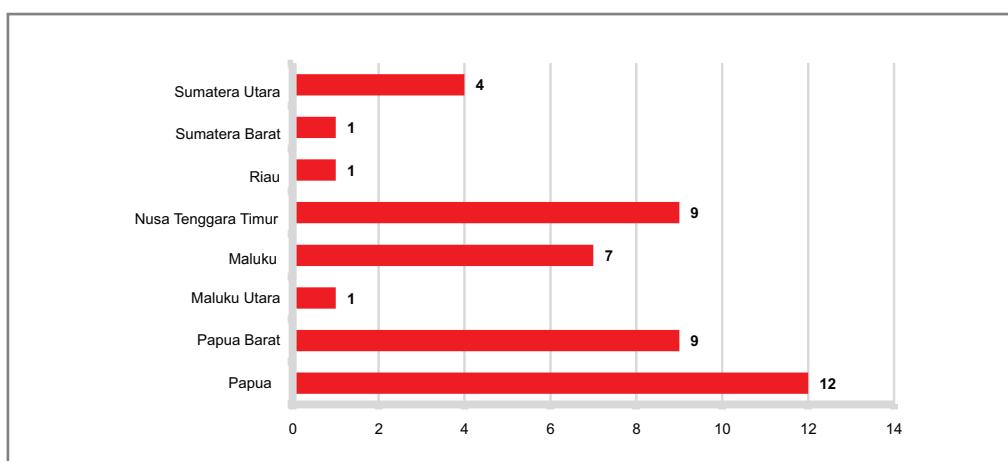
Figure 7.1: Number of districts in priority group 1, by province



Source: FSVA 2015

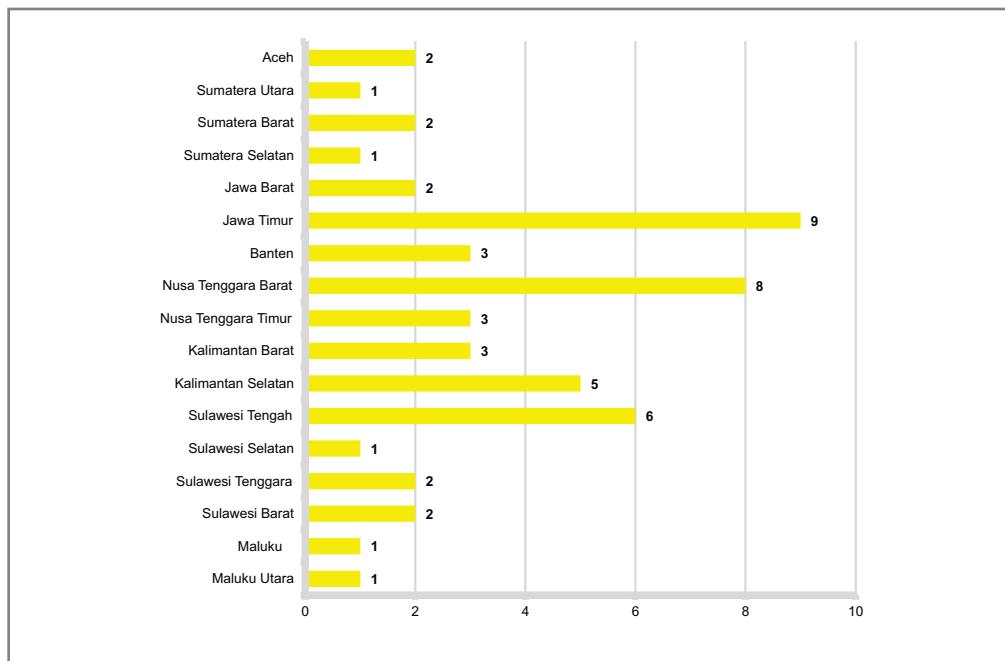
Based on composite food security analysis, the 398 districts were divided into the six priority groups as follows: 14 in group 1 (4 percent), 44 in group 2 (11 percent), 52 in group 3 (13 percent), 84 in group 4 (21 percent), 85 in group 5 (21 percent), and 119 in group 6 (30 percent). The total number of districts in the most vulnerable priority groups 1 and 2 was 58, while there were 136 districts in the moderately food-insecure priority groups 3 and 4. All 14 districts in priority group 1 were located in Papua province, which has a total of 28 districts (Figure 7.1). Districts in priority group 2 were distributed among the provinces of Papua (twelve), Nusa Tenggara Timur (nine districts), Papua Barat (nine), Maluku (seven), Sumatera Utara (four), and one district each in Sumatera Barat, Riau and Maluku Utara (Figure 7.2).

Figure 7.2: Numbers of districts in priority group 2, by province



Source: FSVA 2015

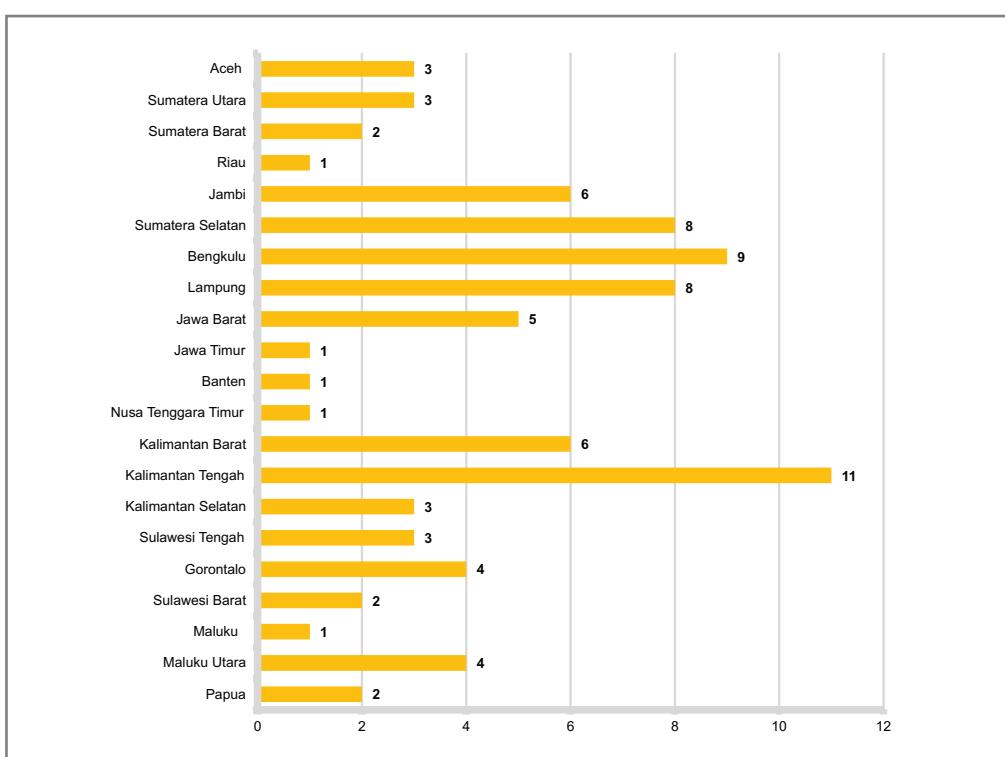
Figure 7.3: Numbers of districts in priority group 3, by province



Source: FSVA 2015

The priority group 3 districts were located in Jawa Timur (nine), Nusa Tenggara Barat (eight), Sulawesi Tengah (six), Kalimantan Selatan (five), Nusa Tenggara Timur (three), Kalimantan Barat (three), Sulawesi Tenggara (two), Sulawesi Barat (two), Aceh (two), and one district each in Sumatera Utara, Sulawesi Selatan, Maluku, and Maluku Utara (Figure 7.3). The priority group 4 districts were located in Kalimantan Tengah (eleven), Bengkulu (nine), Sumatera Selatan (eight), Lampung (eight), Kalimantan Barat (six), Jambi (six), Jawa Barat (five), (Figure 7.4).

Figure 7.4: Numbers of districts in priority group 4, by province



Source: FSVA 2015

Among the 398 districts, 307 districts retained the same boundaries as the previous FSVA while 41 districts were divided into new districts resulting in 50 new districts. Of the 50 newly formed districts, 40 percent were classified in priority groups 1 and 2 while another 26 percent were classified in priority groups 3 and 4. The remaining 34 percent of the new districts were classified in priority groups 5 and 6. Among the 41 districts which were modified since the last FSVA, 29 percent were classified in priority groups 1 and 2, another 32 percent in priority groups 3 and 4, and the remaining 39 percent in groups 5 and 6. Of the total 398 districts analysed in the 2015 FSVA, nine of the 14 priority 1 districts were newly formed since the 2009 FSVA. This suggests that newly formed districts tend to have higher vulnerability to food insecurity than their counterparts. (Table 7.1).

Table 7.1: Priority classification of unchanged districts, modified districts and newly formed districts

Priority	Unchanged district	Modified district (parent of new district)	New district	Total
1	2	3	9	14
2	24	9	11	44
3	46	3	3	52
4	64	10	10	84
5	61	11	13	85
6	110	5	4	119
Total	307	41	50	398

Source: FSVA 2015

The same data is presented in terms of percentages in tables 7.2 and 7.3 below. Table 7.2 shows the distribution of priority groups across provinces whereas table 7.3 shows the distribution across priority groups for each province. Both of these tables highlight the concentration of priority one and two districts in Papua, Papua Barat, Nusa Tenggara Timur, Maluku, Maluku Utara, Sumatera Utara, Sumatera Barat, and Riau.

The main characteristics of vulnerability to food insecurity vary by district, so approaches to reducing vulnerability will differ across areas. By highlighting the main determinants of food insecurity at the district level, the atlas aims to provide better guidance to policy-makers for improving the design and effectiveness of food security responses.

Across all districts, the main characteristics that are associated with high levels of vulnerability to food insecurity include: i) a high number of households without access to electricity; ii) a high number of villages with no proper road/water access; iii) a high number of villages without access to a health facility within five km; iv) a high rate of illiteracy among women; and v) a large share of the population living under the poverty line.

Table 7.2: Distribution of priority groups across provinces (percent)

Province	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6
Aceh	0%	0%	4%	4%	12%	3%
Sumatera Utara	0%	9%	2%	4%	15%	3%
Sumatera Barat	0%	2%	4%	2%	5%	3%
Riau	0%	2%	0%	1%	2%	5%
Jambi	0%	0%	0%	7%	4%	0%
Sumatera Selatan	0%	0%	2%	10%	2%	0%
Bengkulu	0%	0%	0%	11%	0%	0%
Lampung	0%	0%	0%	10%	4%	1%
Kepulauan Bangka Belitung	0%	0%	0%	0%	0%	5%
Kepulauan Riau	0%	0%	0%	0%	0%	4%
Jawa Barat	0%	0%	4%	6%	7%	3%
Jawa Tengah	0%	0%	0%	0%	8%	18%
D.I Yogyakarta	0%	0%	0%	0%	0%	3%
Lampung	0%	0%	17%	1%	1%	15%
Banten	0%	0%	6%	1%	0%	0%
Bali	0%	0%	0%	0%	0%	7%
Nusa Tenggara Barat	0%	0%	15%	0%	0%	0%
Nusa Tenggara Timur	0%	20%	6%	1%	7%	1%
Kalimantan Barat	0%	0%	6%	7%	1%	2%
Kalimantan Tengah	0%	0%	0%	13%	1%	1%
Kalimantan Selatan	0%	0%	10%	4%	2%	1%
Kalimantan Timur	0%	0%	0%	0%	0%	8%
Sulawesi Utara	0%	0%	0%	0%	7%	4%
Sulawesi Tengah	0%	0%	12%	4%	0%	1%
Sulawesi Selatan	0%	0%	2%	0%	11%	9%
Sulawesi Tenggara	0%	0%	4%	0%	6%	3%
Gorontalo	0%	0%	0%	5%	1%	0%
Sulawesi Barat	0%	0%	4%	2%	1%	0%
Maluku	0%	16%	2%	1%	0%	0%
Maluku Utara	0%	2%	2%	5%	1%	0%
Papua Barat	0%	20%	0%	0%	1%	0%
Papua	100%	27%	0%	2%	0%	0%
Total	100%	100%	100%	100%	100%	100%

Source: FSVA 2015

Table 7.3: Spread of priority groups within each province (percent)

Province	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	Total
Aceh	0%	0%	11%	17%	56%	17%	100%
Sumatera Utara	0%	16%	4%	12%	52%	16%	100%
Sumatera Barat	0%	8%	17%	17%	33%	25%	100%
Riau	0%	10%	0%	10%	20%	60%	100%
Jambi	0%	0%	0%	67%	33%	0%	100%
Sumatera Selatan	0%	0%	9%	73%	18%	0%	100%
Bengkulu	0%	0%	0%	100%	0%	0%	100%
Lampung	0%	0%	0%	67%	25%	8%	100%
Kepulauan Bangka Belitung	0%	0%	0%	0%	0%	100%	100%
Kepulauan Riau	0%	0%	0%	0%	0%	100%	100%
Jawa Barat	0%	0%	12%	29%	35%	24%	100%
Jawa Tengah	0%	0%	0%	0%	24%	76%	100%
D.I Yogyakarta	0%	0%	0%	0%	0%	100%	100%
Jawa Timur	0%	0%	31%	3%	3%	62%	100%
Banten	0%	0%	75%	25%	0%	0%	100%
Bali	0%	0%	0%	0%	0%	100%	100%
Nusa Tenggara Barat	0%	0%	100%	0%	0%	0%	100%
Nusa Tenggara Timur	0%	45%	15%	5%	30%	5%	100%
Kalimantan Barat	0%	0%	25%	50%	8%	17%	100%
Kalimantan Tengah	0%	0%	0%	85%	8%	8%	100%
Kalimantan Selatan	0%	0%	45%	27%	18%	9%	100%
Kalimantan Timur	0%	0%	0%	0%	0%	100%	100%
Sulawesi Utara	0%	0%	0%	0%	55%	45%	100%
Sulawesi Tengah	0%	0%	60%	30%	0%	10%	100%
Sulawesi Selatan	0%	0%	5%	0%	43%	52%	100%
Sulawesi Tenggara	0%	0%	20%	0%	50%	30%	100%
Gorontalo	0%	0%	0%	80%	20%	0%	100%
Sulawesi Barat	0%	0%	40%	40%	20%	0%	100%
Maluku	0%	78%	11%	11%	0%	0%	100%
Maluku Utara	0%	14%	14%	57%	14%	0%	100%
Papua Barat	0%	90%	0%	0%	10%	0%	100%
Papua	50%	43%	0%	7%	0%	0%	100%
Total	4%	11%	13%	21%	21%	30%	100%

Source: FSVA 2015

Priority group 1	
Consumption to production ratio	35.4
Poverty	39.5%
Lack of road access	72.4%
Lack of access to electricity	87.1%
Lack of access to drinking-water	60.4%
Life expectancy	66.9
Lack of access to health facilities	40.0%
Illiteracy among women	70.7%
Stunting	44.2%

Priority group 1 districts perform very poorly on all or nearly all indicators. On average, these districts have very high consumption to production ratios, meaning that their requirements for consumption far exceed what they produce. They are therefore dependent on markets and purchasing for the majority of their staple foods. These districts have a high average poverty rate (40 percent), and an estimated 60 percent of their population has limited access to basic infrastructure (roads, electricity and safe water). Limited access to other critical infrastructure (health and education) is also common, reflected in key health and education outcomes: an estimated 40 percent of the population has limited access to health facilities; 71 percent of women are illiterate; 44 percent of children are stunted; and life expectancy is lower than the national average, at 66.9 years.

The main characteristics of districts in priority group I, reflecting their high vulnerability to food insecurity, are: i) high proportion of villages without proper road/water access; ii) high number of households without access to electricity; iii) high rate of illiteracy among women; iv) low level of access to health services; and v) high rate of stunting among children under 5 years of age.

On average, districts classified as priority group 2 perform decidedly better than those in group 1, while remaining very vulnerable to food and nutrition insecurity. Although they are still not producing enough staple foods to satisfy the consumption requirements of their populations, these districts perform better on this indicator than districts in group 1, suggesting that more food is available locally. Poverty rates are slightly lower than in group 1, averaging about 28 percent, and access to basic infrastructure is also better. Illiteracy among women is markedly lower than in group 1 districts, at 14 percent, while life expectancy is higher, at 67.4 years. The one exception in performance between districts in priority groups 1 and 2 is in the prevalence of stunting: on average, districts in priority group 1 have a stunting rate of 44 percent, while in group 2 the average is 47 percent. The main characteristics of vulnerability to food insecurity in priority group 2 are the same as in group 1, but their relative importance differs slightly: i) high rate of stunting among children under 5 years of age; ii)) high number of households without access to safe drinking-water; iii) low life expectancy; and iv) high number of households without access to electricity.

Priority group 2	
Consumption to production ratio	4.1
Poverty	27.6%
Lack of road access	25.8%
Lack of access to electricity	38.3%
Lack of access to drinking-water	45.3%
Life expectancy	67.4
Lack of access to health facilities	16.8%
Illiteracy among women	13.8%
Stunting	46.5%

Priority group 3	
Consumption to production ratio	0.6
Poverty	15.0%
Lack of road access	5.7%
Lack of access to electricity	6.6%
Lack of access to drinking-water	29.3%
Life expectancy	64.4
Lack of access to health facilities	1.1%
Illiteracy among women	12.2%
Stunting	45.1%

Districts in priority group 3 are moderately vulnerable to food and nutrition insecurity, and characterized by surplus production compared with consumption requirements, moderate levels of poverty, and better access to roads, electricity, safe drinking-water and health facilities than districts in priority groups 1 and 2 have. However, the average rate of stunting remains high, at 45 percent. The main characteristics of vulnerability to food insecurity in priority group 3 are: i) high number of villages without proper road/water access; ii) high number of households without access to electricity; iii) high number of villages without access

to a health facility within 5 km; and iv) high number of households without access to safe drinking-water.

Districts in priority group 4 are similar to those in group 3 in terms of overall severity of the food and nutrition security situation; however, the relative importance of the factors differs. The main factors that distinguish priority group 4 from group 3 are the lower levels of stunting, of 40 percent in group 4 versus 45 percent in group 3; lower poverty rates, of 12 percent in group 4 compared with 15 percent in group 3; and a lower illiteracy rate among women, of 6 percent in group 4 versus 12 percent in group 3. Districts in priority group 4 on average fare considerably worse than those in group 3 on the three indicators relating to infrastructure – access to clean drinking water, road access, and access to electricity.

Priority group 4	
Consumption to production ratio	0.6
Poverty	11.7%
Lack of road access	11.7%
Lack of access to electricity	10.3%
Lack of access to drinking-water	48.5%
Life expectancy	68.3
Lack of access to health facilities	2.8%
Illiteracy among women	6.0%
Stunting	39.5%

	Priority 5	Priority 6
Consumption to production ratio	0.7	1.9
Poverty	14.0%	10.7%
Lack of road access	4.7%	3.7%
Lack of access to electricity	6.7%	3.2%
Lack of access to drinking-water	31.6%	24.3%
Life expectancy	69.5	70.7
Lack of access to health facilities	1.6%	1.1%
Illiteracy among women	6.9%	10.1%
Stunting	47.6%	33.5%

Priority groups 5 and 6 are the least vulnerable to food and nutrition insecurity. Performance in all indicators is above the national average, with good access to basic infrastructure and services, low poverty rates, long life expectancy and low illiteracy rates among women. However, stunting remains above the national average (37 percent) in priority group 5 (48 percent), and food production relative to consumption requirements is lower in priority group 6 than in groups 3, 4 and 5.

In 2012 there was a significant paradigm shift in the definition of food security in Indonesia, with enactment of Food Law No. 18/2012 replacing the previous Food Law No. 7/1996. The new Food Law defines food security as “the fulfilment of conditions such that all people in all households at all times have sufficient food in both quantity and quality, that is safe, diverse, nutritious, equitably distributed, and affordable, and that does not conflict with religion, beliefs, or culture, to enable them to live healthy, active, productive and sustainable lives”. The law also emphasizes that the food system should be based on the following principles: i) sovereignty; ii) independence; iii) resilience; iv) safety; v) benefits; vi) equity; vii) sustainability; and viii) justice.

Efforts to improve food and nutrition security and reduce vulnerability to food and nutrition insecurity have to focus on the main determinants of vulnerability according to the new paradigm of food security mandated by Food Law No. 18/2012.

7.2 Changes in Vulnerability to Chronic Food Security, 2009-2015

To determine the changes in food and nutrition security between 2009 and 2015, a composite analysis of pooled data from both the 2009 and the 2015 atlases was conducted using principal component analysis, cluster analysis and discriminant analysis.

The FSVA 2015 also identifies changes in districts' priority status between 2009 and 2015 (Map 7.2). The map illustrates five categories of change in districts' priority status:

1. Dark green represents improvements of two or more levels of priority status, for example, from priority group 3 to group 5.
2. Light green represents improvements of one level of priority status, for example, from priority group 3 to group 4.
3. Yellow represents no change in priority status, for example, remaining in priority group 3 in both years.
4. Light red represents declines of one level of priority status, for example, from priority group 3 to group 2.
5. Dark red represents declines of two or more levels of priority status, for example from priority group 3 to group 1.

Based on this analysis, 135 districts (34 percent) improved their priority status by two or more levels, and 40 districts (10 percent) by one level. These improvements occurred mainly in the provinces of Banten, Papua Barat, Maluku, Kalimantan Selatan, Kepulauan Bangka Belitung, Sumatera Barat, Sumatera Utara, Kalimantan Timur, Kepulauan Riau and Sulawesi Barat. There was no change in the priority status of 191 districts (48 percent), while 30 (8 percent) deteriorated by one level and 26 (7 percent) by two levels or more. The deterioration by two levels occurred in Kepulauan Riau and Papua.

Overall, 48 percent of districts were in the same priority group in 2015 as in 2009, while 44 percent improved by one or more levels. Thus, the situation has generally improved since 2009. However, among the 48 percent of districts that saw no change, two districts (0.5 percent) are in priority group 1, and another seven districts (1.8 percent) in priority group 2. The deterioration in 9 percent of districts and the stagnation of nearly half of districts (48 percent), including some in priority group 1 or 2, are cause for concern (Table 7.4).

Table 7.4: Change in priority levels of districts, by province, 2009 - 2015 (percent)

Province	Large deterioration (2 or more levels)	Deterioration (1 level)	No change	Improvement (1 level)	Large improvement (2 or more levels)
Aceh	0%	6%	39%	11%	44%
Sumatera Utara	0%	12%	52%	24%	12%
Sumatera Barat	0%	8%	67%	25%	0%
Riau	0%	0%	40%	0%	60%
Jambi	0%	22%	67%	0%	11%
Sumatera Selatan	0%	9%	27%	0%	64%
Bengkulu	0%	0%	33%	0%	67%
Lampung	0%	17%	33%	8%	42%
Kepulauan Bangka Belitung	0%	0%	50%	33%	17%
Kepulauan Riau	20%	0%	0%	20%	60%
Jawa Barat	0%	12%	59%	12%	18%
Jawa Tengah	0%	3%	90%	0%	7%
D.I Yogyakarta	0%	0%	100%	0%	0%
Jawa Timur	0%	3%	83%	0%	14%
Banten	0%	25%	25%	50%	0%
Bali	0%	0%	88%	0%	13%
Nusa Tenggara Barat	0%	0%	100%	0%	0%
Nusa Tenggara Timur	0%	0%	15%	5%	80%
Kalimantan Barat	0%	17%	25%	8%	50%
Kalimantan Tengah	0%	8%	38%	0%	54%
Kalimantan Selatan	0%	0%	55%	36%	9%
Kalimantan Timur	0%	0%	20%	20%	60%
Sulawesi Utara	0%	9%	45%	0%	45%
Sulawesi Tengah	0%	0%	20%	0%	80%
Sulawesi Selatan	0%	14%	67%	0%	19%
Sulawesi Tenggara	0%	0%	0%	0%	100%
Gorontalo	0%	0%	0%	0%	100%
Sulawesi Barat	0%	0%	20%	20%	60%
Maluku	0%	0%	22%	44%	33%
Maluku Utara	0%	0%	0%	0%	100%
Papua Barat	0%	0%	50%	50%	0%
Papua	4%	29%	43%	11%	14%
Total	1%	8%	48%	10%	34%

2009 data are based on the 348 original districts.

Analyses for 2009 and 2015 were conducted using the same methods and indicators.

Source: FSVA 2015

Between 2009 and 2015, 41 districts were split to form 91 districts, while 307 districts remained unchanged. Therefore, the total number of districts in 2014 is 398: 50 new districts, 41 districts with new borders, and 307 unchanged districts. Accounting for this change improves the comparability between FSVA 2015 and FSVA 2009. For this purpose, “original district” refers to the 307 districts for which borders remained unchanged from 2009 to 2015. “Changed districts” denotes districts whose borders were changed between 2009 and 2015, while typically retaining their original names. “New districts” refers to new administrative units that were created during the splitting and redrawing of boundaries and that were not identified as districts in the 2009 FSVA.

Among the 307 original districts, the proportion in the worst off priority groups 1 and 2 declined from 5 percent in 2009 to 2 percent in 2015; the proportion in the least vulnerable priority groups 5 and 6 increased from 52 to 85 percent; and the proportion in the moderately vulnerable priority groups 3 and 4 decreased from 43 to 13 percent (Table 7.5).

Table 7.5: Numbers and percentages of original districts in each priority group

Priority	Original districts		Original districts (%)	
	2009	2013	2009	2013
1	1	2	0.33	0.65
2	15	3	4.89	0.98
3	93	19	30.29	6.19
4	39	21	12.70	6.84
5	61	133	19.87	43.32
6	98	129	31.92	42.02
Total	307	307	100	100

Source: FSVA 2015

In Indonesia’s decentralized government – regulated by the Government Law on Regional Autonomy, which provides for the redrawing of district boundaries and the creation of new districts – there is growing need for further research on the impact that creating new districts has on the food and nutrition security status of new and changed districts.

7.3 Conclusions

Continued poverty reduction, among other factors, has resulted in improved food security for the majority of Indonesians. However, this progress risks stagnation if key challenges are not addressed. Three areas require particular attention: i) improving the economic/financial access to food – including continued investments in infrastructure, especially to improve food access among poor households; ii) accelerating action to prevent malnutrition; and iii) addressing increasing vulnerability to climate-related hazards.

The following subsections provide key recommendations within these three areas. While the three areas are closely intertwined, nutrition is a central issue that intersects across them all, reflecting the importance of mainstreaming a nutrition-centred approach in programmes and policies related to food security.

Economic access

With poverty affecting 27.73 million people, and potentially millions more living just above the poverty line, social assistance and social safety nets serve a critical function in facilitating households’ access to sufficient food while longer-term activities are being implemented, such as livelihood strengthening and diversification and the expansion of basic infrastructure and services. In 2014, the Government of Indonesia spent approximately 0.75 percent of GDP on social assistance, below both the regional average

and the average for middle-income countries¹. An increase in budget allocations to social assistance programmes, coupled with reforms aimed at improving the effectiveness and nutrition sensitivity of programmes, could have significant impacts on food access. The World Bank's 2012 review of social assistance programmes finds room for improvement in the relative size of current programmes and in their targeting (World Bank, 2012). Regarding nutrition security, there are opportunities for fine-tuning social assistance programmes to increase their effectiveness in reducing or preventing malnutrition (as discussed in the following section).

A central theme throughout many national efforts to improve food and nutrition security is increased reliance on domestic production of staple foods. The Government of Indonesia has made progress in increasing production and productivity and, as a result, the need to import some food commodities is diminishing. However, a comprehensive review of agricultural policies found that the focus on domestic food production and multifaceted support to food producers has had a detrimental impact on the general population's access to food, not least through maintaining relatively high prices for food (OECD, 2012). A revision of agricultural policies could inform efforts to find the right balance between supporting domestic food production while protecting poor consumers' access to food and maintaining the agriculture sector's competitiveness.

A review and revision of incentives for food production, including price guarantees, subsidies and trade restrictions, could help ensure that the production of highly nutritious foods, including soybeans, vegetables and fruits, is given the same priority as staple food production. A comprehensive approach would also include acknowledgement of the important role currently played by imports in addressing the dietary needs of the population. As many of the more nutritious foods are at least partially imported, it is important to acknowledge that there may not be full alignment between attaining food self-sufficiency and achieving the desirable nutrition outcomes in the short term. Increasing production of some nutritious crops may require imposing higher prices to create incentives for farmers to produce them, which will make these foods less affordable to people at the highest risk of malnutrition. This apparent contradiction can be mitigated to some extent through the appropriate use of social safety nets.

Nutrition

While there have been encouraging overall improvements in food and nutrition security, it is clear from the data that nutrition security still lags behind. Progress on several health and nutrition-related MDGs has stalled: stunting increased slightly between 2010 and 2013; maternal mortality rose; HIV prevalence is still rising, with less access to treatment than in some much poorer Asian countries; and infant mortality seems to be stagnant. Indonesia's delay in achieving the MDGs on hygiene is particularly worrisome in light of the knowledge that poor health and malnutrition form a vicious circle. Poor hygiene promotes disease, especially in environments where children have weak immune systems because of inadequate diets, while disease results in loss of appetite and poor nutrient absorption, thereby increasing malnutrition.

Malnutrition in Indonesia is not just a problem of the poor: the proportion of stunted children is almost four times as high as the proportion of the population considered poor. For non-poor malnourished people, the barrier to improved nutrition status is not necessarily lack of economic access or government poverty reduction programmes, but rather limited understanding of good dietary and nutrition practices. Poor malnourished people face the additional barriers of economic and social access.

¹ Per the World Bank, the Philippines budgets 1 percent of GDP; Brazil 1.4 percent and India 2.2 percent

A multisectoral approach to reducing and preventing malnutrition in Indonesia is essential, involving a diversity of government agencies, non-governmental organizations, United Nations agencies, civil society and private sector actors. Within the Government, intersectoral coordination can be greatly improved by working to break down sectoral divisions in policy-making and government programmes, not least by improving the nutrition sensitivity of traditional welfare, agriculture and/or climate change programmes. Given the short 1,000 day window of opportunity for intervention, improved timing and quality of data collection on nutritional status would enhance the ability of all sectors to respond.

Social safety net programmes can be a major avenue for improving nutrition outcomes. Currently, the country's largest social assistance programme, the Rice for Poor Households (Raskin) programme, provides subsidized rice to poor households, serving as an income transfer that uses food as its main modality. However, by shifting towards the provision of fortified rice, Raskin could become a cost-efficient way of improving the micronutrient intake of low-income families. It is encouraging that a rice fortification pilot programme is ongoing.

There is considerable room to improve the nutrition sensitivity of agriculture programmes. Agricultural extension services could be directed more towards advising and assisting farmers on the cultivation, post-harvest handling and storage of a diversified range of food crops in fields and home gardens. The agriculture sector would benefit from research and development directed more towards food crop species and varieties of relatively high nutritional value. These programmes could work through established community groups to educate Indonesians about health and nutrition. Greater inclusion of women, especially women in farming communities, both in the design of agricultural programmes and as participants in the programmes, would also contribute to improving food and nutrition security given women's primary responsibilities in food production, purchasing, preparation and intra-household distribution and in feeding/care practices.

Outside government-led programmes, the private sector has an increasingly important role in the nutrition status of Indonesia's population, as processed foods – often high in fats and sugars – become more readily available at low prices. While education, outreach and increased awareness of the importance of nutritious foods and a balanced diet should continue to be at the centre of strategies for addressing nutrition gaps in the country, these activities should be complemented by work with the private sector to encourage the manufacture and distribution of nutritious foods at affordable prices. Social safety nets and nutrition improvement programmes can also have a role in stimulating the private sector to produce specialized nutritious foods designed specifically for vulnerable groups according to international standards. Introducing a nutrition component into the conditional cash transfer programme, for example in the form of nutrition vouchers, could also establish incentives for good nutrition in poor households.

Climate change

Climate change remains a major threat to food and nutrition security, especially for households whose livelihoods depend on food production. As the climate becomes increasingly erratic, anticipated outcomes such as rainfall deviation, increased frequency and intensity of climatic events, and increases in pest and crop diseases will have negative impacts on farmers, ranging from difficulties in timing agricultural activities to effects on the yields and productivity of crops, undermining farmers' overall livelihood resilience.

Indonesia continues to face not only major and sudden-impact disasters but also geographically disbursed slow-onset emergencies related to climate change. Droughts, floods and mudslides caused by extreme rainfall are expected to worsen, exacerbating existing food insecurity and requiring emergency responses that draw on national financial and human resources.

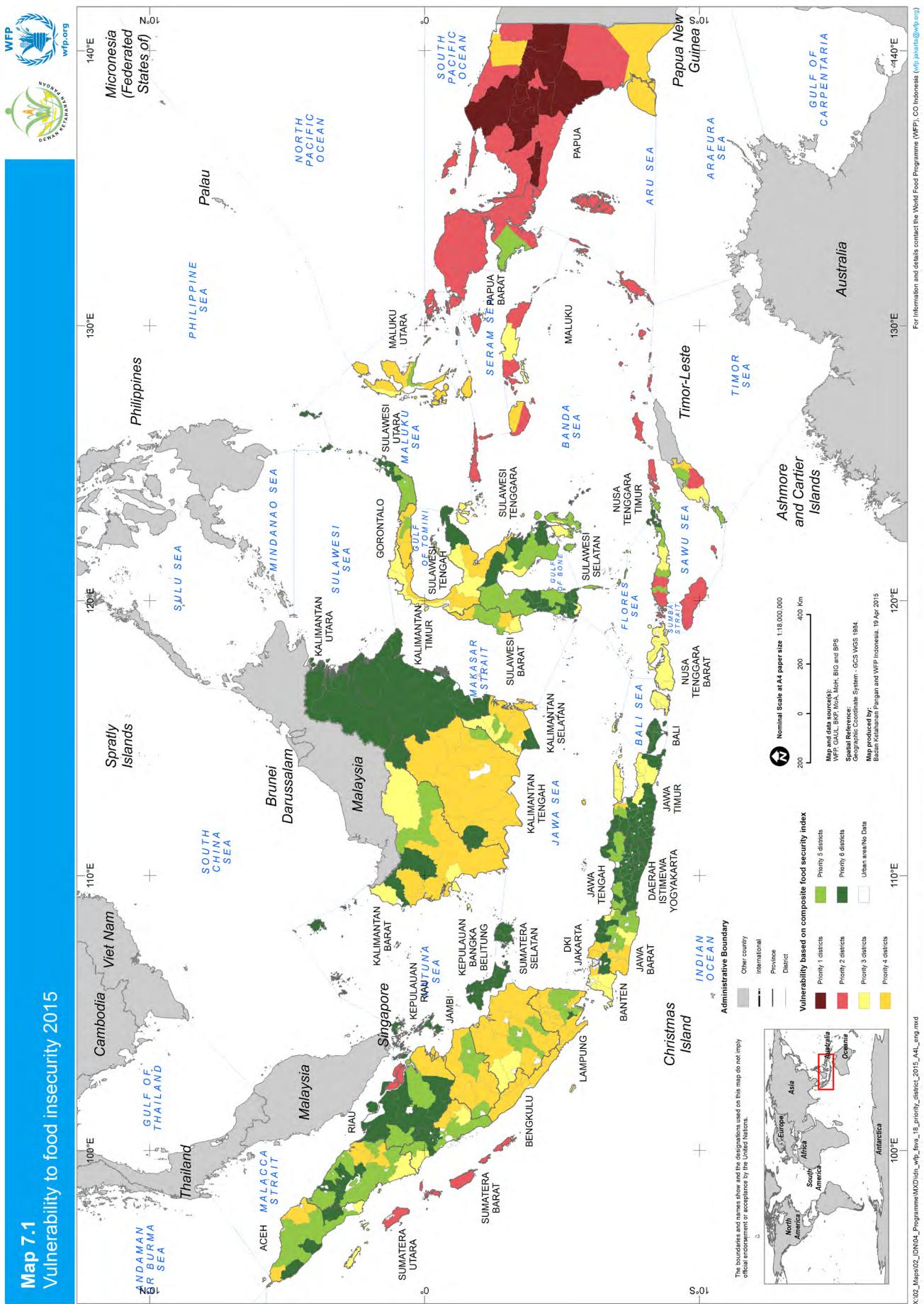
The sustainability of water supplies and other environmental services is important to local communities' ability to adapt to climate change. Water management could be enhanced through improved spatial planning and land-use systems, management of conservation and essential ecosystem areas, rehabilitation of degraded ecosystems, and acceleration of the development and rehabilitation of infrastructure to support agricultural activities, including irrigation systems, dams and reservoirs, using new, more resilient technology. Other opportunities include improving early warning systems for both predictable, slow-onset and abrupt, sudden-onset disasters associated with climate change, and establishing incentives for research and development in improving plant resistance to new climate conditions and pests.

Economic access, nutrition outcomes and sensitivity to climate change are three key factors in the achievement of food and nutrition security in Indonesia. Given its strong economic growth and considerable institutional capacities, the country is well positioned to make good progress on food and nutrition security over the next few years. There may be need for greater focus on poverty reduction, nutrition-sensitive programmes, dietary diversification and climate adaptation strategies. Through increased dialogue and coordination, and more efforts to integrate and harmonize public and private sector initiatives, the country can continue to work towards the achievement of a healthier, more equal, prosperous and developed Indonesia with strong resilience to the inevitable setbacks of natural and other disasters.

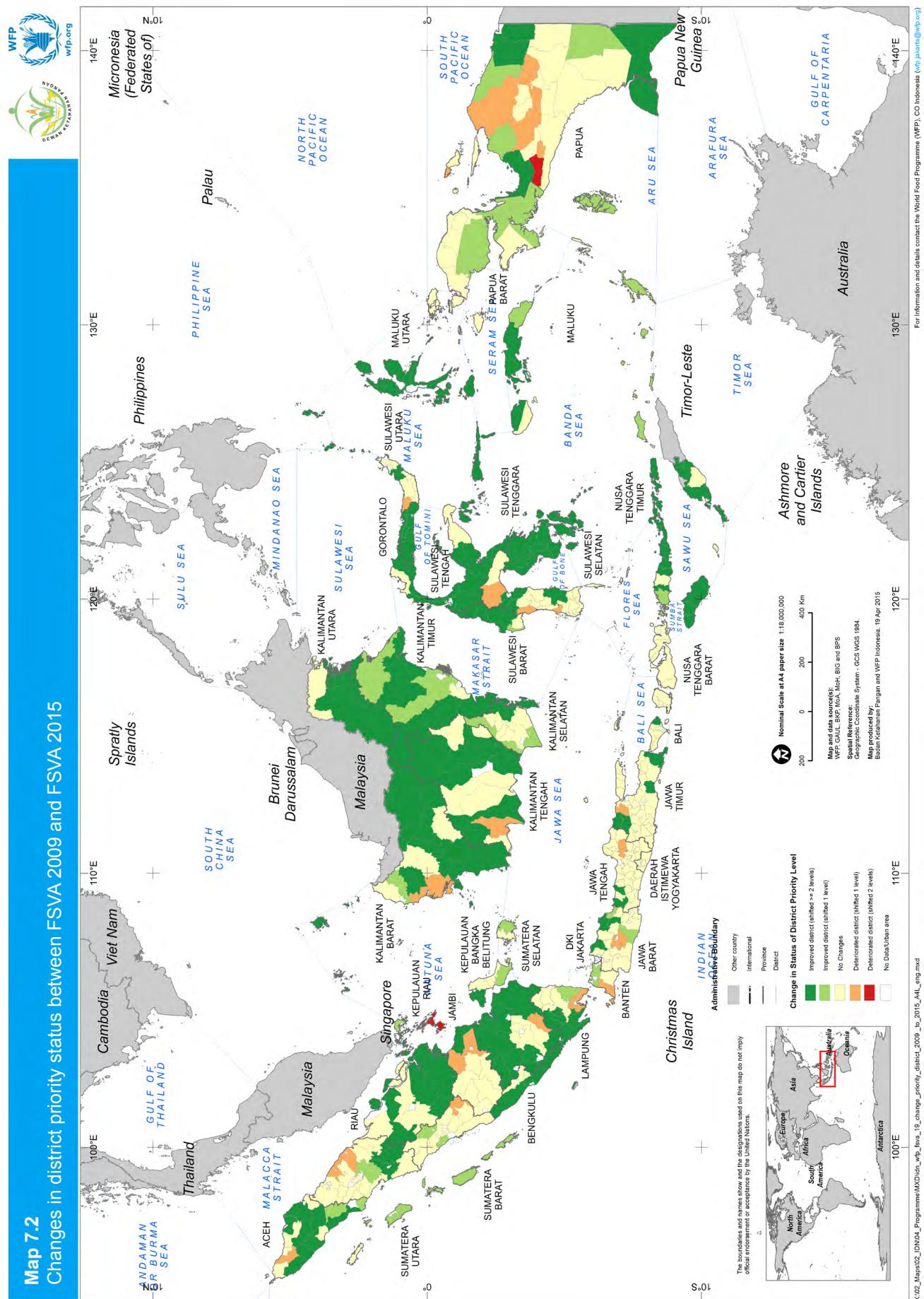
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Map 7.1
Vulnerability to food insecurity 2015



Map 7.2
Changes in district priority status between FSVA 2009 and FSVA 2015



Annex 1

**Ranking of districts based on the individual indicators and
composite food security priority group**

Annex 1: Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
	Aceh	0.36	17.72	4.79	2.75	38.56	69.4	41.5	4.94	1.6			
1	Simeuleu	0.66	20.57	5.80	4.28	43.72	63.32	-	0.37	0.00	117	3	82,762
2	Aceh Singkil	2.86	18.73	9.17	5.22	44.40	65.58	-	8.85	1.67	100	3	107,781
3	Aceh Selatan	0.36	13.44	6.54	2.97	33.76	67.54	-	7.91	2.69	204	5	208,002
4	Aceh Tenggara	0.13	14.39	4.68	2.38	27.69	69.69	-	3.45	0.52	331	6	184,150
5	Aceh Timur	0.34	16.59	9.34	5.55	39.53	70.26	-	3.59	0.78	206	4	380,876
6	Aceh Tengah	1.10	17.76	4.07	2.62	33.51	70.26	-	1.16	2.71	201	5	182,680
7	Aceh Barat	0.60	23.70	10.59	3.49	37.10	70.55	-	5.05	6.54	123	5	182,495
8	Aceh Besar	0.37	16.88	0.17	2.91	43.91	71.17	-	4.89	1.32	244	4	371,412
9	Pidie	0.35	21.12	1.50	1.73	29.85	70.34	-	7.94	0.55	191	5	393,225
10	Bireuen	0.42	17.65	6.08	3.72	28.90	72.63	-	2.23	0.49	287	5	406,083
11	Aceh Utara	0.34	20.34	6.92	3.93	33.61	70.26	-	4.54	3.05	187	5	549,370
12	Aceh Barat Daya	0.22	18.92	4.61	1.78	36.38	67.78	-	6.53	0.00	173	5	131,087
13	Gayo Lues	0.44	22.33	4.14	2.56	25.16	67.62	-	14.76	4.83	119	5	82,962
14	Aceh Tamiang	0.40	15.13	7.98	1.50	44.49	68.75	-	5.56	0.47	189	4	261,125
15	Nagan Raya	0.22	21.75	1.35	0.71	30.07	70.26	-	9.19	1.80	229	6	146,243
16	Aceh Jaya	0.37	17.53	2.91	0.71	28.35	68.53	-	6.42	1.16	263	6	82,172
17	Bener Meriah	1.48	23.47	3.43	4.01	36.21	68.04	-	1.53	1.72	152	5	128,558
18	Pidie Jaya	0.39	22.70	0.00	2.94	33.52	69.76	-	11.46	0.00	192	5	138,415
	Sumatera Utara	0.3	10.39	11.94	4.45	33.55	69.9	42.49	3.2	4.83			
19	Nias	0.66	17.28	44.12	49.51	48.10	70.12	-	30.27	15.88	25	2	132,860
20	Mandailing Natal	0.43	9.62	10.07	11.73	32.07	63.79	-	2.28	4.91	149	3	410,931

Note:

NCPR:	Normative Consumption to Net Per Capita Production Ratio	Stunt: Stunting Children < 5 years (%)
Pov:	People Below Poverty Line (%)	Filt: Female Illiteracy (%)
Road:	Villages with inadequate connectivity (%)	Health: Villages with distance from Health Facilities more than 5 kilometers (%)
Elec:	Households without Access to Electricity (%)	Rank: District Rank
Water:	Households without Access to Clean Drinking Water (%)	Priority: District Priority
Life:	Life Expectancy (year)	Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
21	Tapanuli Selatan	0.29	11.33	5.24	12.25	22.57	67.61	-	2.21	6.85	212	5	268,095
22	Tapanuli Tengah	0.39	15.41	6.51	8.43	29.62	68.57	-	4.96	4.19	177	5	318,908
23	Tapanuli Utara	0.30	11.68	6.35	0.77	22.50	70.47	-	2.68	2.38	322	5	283,871
24	Toba Samosir	0.18	9.54	2.87	5.52	15.61	70.86	-	2.84	0.41	372	6	174,865
25	Labuhanbatu	0.71	8.53	12.24	5.68	47.80	70.25	-	1.54	1.02	238	4	424,644
26	Asahan	0.99	11.60	6.37	3.01	34.13	69.32	-	2.91	0.98	259	5	677,876
27	Simalungun	0.13	10.45	2.91	1.16	20.61	69.24	-	4.28	2.18	358	6	830,986
28	Dairi	0.16	8.68	7.69	10.36	33.37	68.99	-	2.36	0.00	266	5	273,394
29	Karo	0.09	9.79	2.64	0.97	9.61	72.44	-	1.40	1.13	393	6	358,823
30	Deli Serdang	0.53	4.71	1.54	0.32	33.50	71.31	-	1.02	0.26	388	6	1,845,615
31	Langkat	0.29	10.44	5.05	2.31	32.25	69.25	-	3.09	1.08	262	5	976,885
32	Nias Selatan	0.55	18.83	51.19	44.07	33.45	70.86	-	33.28	18.87	29	2	294,069
33	Humbang Hasundutan	0.30	10.00	4.55	2.66	23.34	68.09	-	3.60	0.00	312	5	174,765
34	Pakpak Barat	0.21	11.28	3.85	8.01	34.62	68.20	-	5.21	1.92	208	5	41,492
35	Samosir	0.33	14.01	7.46	2.22	32.02	70.01	-	3.48	0.00	248	5	121,594
36	Serdang Bedagai	0.19	9.35	4.94	1.22	32.32	69.27	-	3.86	1.65	297	5	604,026
37	Batu Bara	0.31	11.92	4.64	0.91	36.16	68.92	-	2.11	0.00	252	5	381,023
38	Padang Lawas Utara	0.53	10.28	29.90	13.64	38.07	66.76	-	1.78	18.30	66	4	229,064
39	Padang Lawas	0.59	8.59	5.92	17.43	31.51	67.19	-	0.72	7.24	162	5	232,166
40	Labuhanbatu Selatan	7.04	12.36	0.00	2.91	44.66	70.67	-	1.46	0.00	225	5	284,809
41	Labuhanbatu Utara	0.43	11.34	11.11	4.41	45.90	70.47	-	0.95	0.00	226	4	335,459
42	Nias Utara	1.29	30.94	30.09	34.78	45.68	69.39	-	14.99	5.31	42	2	128,533
43	Nias Barat	1.33	29.65	29.52	30.40	54.96	69.40	-	25.87	1.90	39	2	82,701

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
Pov: People Below Poverty Line (%)
Road: Villages with inadequate connectivity (%)
Elec: Households without Access to Electricity (%)
Water: Households without Access to Clean Drinking Water (%)
Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
Filt: Female Illiteracy (%)
Health: Villages with distance from Health Facilities more than 5 kilometers (%)
Rank: District Rank
Priority: District Priority
Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
Sumatera Barat													
44	Kepulauan Mentawai	0.22	7.56	3.23	5.85	32.47	70.09	39.24	3.6	0.96			
45	Pesisir Selatan	0.19	8.64	1.65	4.01	33.39	68.72	-	10.10	6.98	43	2	78,511
46	Solok	0.19	10.26	2.70	9.08	26.14	67.92	-	3.35	3.85	261	5	437,638
47	Sijunjung	0.49	8.53	3.23	7.31	41.55	67.63	-	4.40	0.00	276	5	355,077
48	Tanah Datar	0.21	5.77	0.00	3.41	25.25	71.75	-	9.39	1.61	223	4	207,474
49	Padang Pariaman	0.26	9.17	0.00	4.71	33.15	69.44	-	7.38	0.00	314	5	396,883
50	Agam	0.22	7.68	1.22	6.62	32.96	69.43	-	2.09	0.00	362	6	463,719
51	Lima Puluh Kota	0.24	8.26	1.27	4.42	34.95	69.20	-	2.78	0.00	357	6	355,928
52	Pasaman	0.21	8.37	2.70	16.40	24.01	68.17	-	2.57	0.00	256	5	258,929
53	Soliok Selatan	0.17	8.12	5.13	6.72	26.10	64.94	-	3.64	0.00	260	3	148,437
54	Dharmasraya	0.59	7.74	3.85	1.04	39.48	66.55	-	5.67	0.00	269	4	198,614
55	Pasaman Barat	0.13	7.86	0.00	8.37	37.64	65.77	-	4.45	0.00	231	3	376,548
Riau													
56	Kuantan Singgingi	1.48	8.42	18.75	5.82	25.98	71.73	36.76	3.06	1.42			
57	Indragiri Hulu	1.09	11.28	4.80	1.33	22.15	68.61	-	3.85	0.44	335	6	302,674
58	Indragiri Hilir	3.17	7.50	11.86	6.14	21.22	69.03	-	3.68	1.03	290	6	376,578
59	Pelalawan	0.95	7.88	56.78	19.42	31.71	71.95	-	3.42	4.66	76	4	685,698
60	Siaik	0.83	12.00	11.02	10.36	26.04	69.17	-	6.31	0.85	217	5	312,738
61	Kampar	2.01	5.54	7.63	2.34	29.15	72.07	-	3.47	0.00	384	6	390,359
62	Rokan Hulu	2.25	9.04	9.39	2.65	17.46	68.92	-	3.13	0.00	353	6	713,078
63	Bengkalis	1.64	10.86	11.76	6.62	20.14	67.28	-	2.90	0.00	218	5	492,006
		3.37	7.57	5.81	3.37	28.62	70.61	-	2.69	1.94	352	6	516,348

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
 Pov: People Below Poverty Line (%)
 Road: Villages with inadequate connectivity (%)
 Elec: Households without Access to Electricity (%)
 Water: Households without Access to Clean Drinking Water (%)
 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Flit: Female Illiteracy (%)
 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank

Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
64	Rokan Hilir	1.00	7.73	13.19	5.18	27.32	67.41	-	3.58	2.20	270	6	573,211
65	Kepulauan Meranti	4.32	35.74	77.23	15.44	32.48	69.00	-	6.58	3.96	34	2	182,662
Jambi		0.71	8.41	7.87	4.74	38.13	69.61	37.93	4.89	0.64			
66	Kerinci	0.24	7.35	1.39	3.12	26.75	71.19	-	5.79	0.00	340	5	234,669
67	Merangin	0.80	9.31	5.58	4.39	41.92	69.15	-	7.07	0.93	247	4	351,101
68	Sarolangun	0.89	10.51	15.82	9.55	38.91	69.85	-	6.97	0.63	188	4	262,925
69	Batang Hari	1.15	10.42	3.54	4.36	36.71	69.80	-	5.39	0.00	275	5	252,504
70	Muaro Jambi	1.14	4.58	3.87	1.23	32.01	69.49	-	2.35	1.94	337	5	370,239
71	Tanjung Jabung Timur	0.39	13.42	23.66	7.97	58.47	71.23	-	12.75	0.00	83	4	211,522
72	Tanjung Jabung Barat	0.65	11.61	26.87	16.81	54.15	70.29	-	4.73	2.24	104	4	295,690
73	Tebo	1.89	6.86	8.93	2.56	37.28	69.47	-	2.89	0.00	292	4	315,329
74	Bungo	1.23	5.25	1.96	4.63	37.23	67.95	-	4.87	0.65	329	4	324,047
Sumatera Selatan		0.29	14.06	8.22	5.39	42.37	70.1	36.75	3.99	0.9			
75	Ogan Komering Ulu	0.89	12.31	5.10	3.64	41.23	69.70	-	3.17	0.00	253	4	338,369
76	Ogan Komering Ilir	0.24	15.82	8.56	8.51	57.30	68.52	-	7.05	0.92	120	4	752,906
77	Muara Enim	0.67	14.26	4.31	3.66	32.68	68.11	-	4.47	0.00	232	5	741,795
78	Lahat	0.53	18.61	2.13	2.76	50.85	68.99	-	3.59	1.60	185	4	380,398
79	Musi Rawas	0.43	17.85	9.05	7.45	38.07	65.56	-	4.11	0.00	151	3	543,349
80	Musi Banyuasin	0.38	18.02	13.75	6.45	47.69	70.44	-	1.42	0.83	160	4	587,325
81	Banyu Asin	0.16	12.28	29.28	8.13	61.20	67.84	-	5.12	2.30	80	4	773,878
82	Ogan Komering Ulu Selatan	0.49	11.57	11.97	24.91	42.70	69.59	-	3.07	1.93	140	4	324,836
83	Ogan Komering Ulu Timur	0.16	10.28	1.92	1.84	27.11	68.56	-	7.92	0.00	303	5	628,827

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
 Pov: People Below Poverty Line (%)
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 Elec: Households without Access to Electricity (%)
 Water: Households without Access to Clean Drinking Water (%)
 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Flit: Female Illiteracy (%)
 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
84	Ogan Ilir	0.37	13.86	7.05	7.13	50.96	66.90	-	3.09	0.83	182	4	392,989
85	Empat Lawang	0.32	13.10	0.00	8.07	40.91	65.78	-	2.53	0.64	241	4	225,737
Bengkulu		0.37	17.75	3.98	4.85	63.1	70.44	39.7	5.62	1.04			
86	Bengkulu Selatan	0.32	22.59	0.00	9.86	64.22	67.77	-	6.40	0.63	93	4	146,891
87	Rejang Lebong	0.34	18.48	0.00	4.95	63.24	68.03	-	6.16	0.00	115	4	250,986
88	Bengkulu Utara	0.46	14.50	4.87	4.26	63.29	69.97	-	5.54	2.65	143	4	268,921
89	Kaur	0.38	23.25	2.54	5.93	53.23	67.93	-	4.38	0.51	103	4	110,921
90	Seluma	0.39	21.84	5.94	8.47	66.28	66.26	-	7.48	0.99	77	4	178,689
91	Mukomuko	0.29	12.98	2.63	3.36	64.03	68.17	-	8.22	0.00	155	4	161,087
92	Lebong	0.38	12.89	7.08	7.78	56.31	67.49	-	5.29	3.54	147	4	102,126
93	Kepahiang	0.34	16.13	0.85	5.37	64.24	64.93	-	5.75	1.71	102	4	127,047
94	Bengkulu Tengah	0.45	7.24	13.99	4.89	73.84	70.28	-	13.95	0.00	121	4	101,028
Lampung		0.15	14.39	4.9	3.9	46.24	70.09	42.64	6.33	0.65			
95	Lampung Barat	0.39	13.96	13.24	20.96	40.53	67.81	-	5.41	0.74	131	4	472,443
96	Tanggamus	0.51	15.24	14.24	14.45	49.18	70.21	-	6.08	0.00	127	4	708,967
97	Lampung Selatan	0.15	17.09	1.15	0.94	53.80	69.05	-	9.49	0.00	168	4	1,104,763
98	Lampung Timur	0.11	17.38	2.65	0.72	37.25	70.74	-	7.57	0.00	233	5	1,117,023
99	Lampung Tengah	0.09	13.37	0.98	1.35	36.62	69.72	-	7.41	1.30	230	5	1,454,969
100	Lampung Utara	0.13	23.67	2.43	2.66	58.12	68.49	-	4.90	0.81	133	4	781,787
101	Way Kanan	0.18	15.36	3.14	4.25	68.41	69.96	-	7.82	2.24	148	4	473,368
102	Tulangbawang	0.18	8.04	7.28	2.98	46.26	69.46	-	6.02	0.66	246	4	539,002
103	Pesawaran	0.34	17.86	1.39	7.98	31.01	68.71	-	4.77	1.39	199	5	570,094

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 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
104	Pringsewu	0.51	9.81	0.76	1.58	17.91	68.77	-	6.63	0.00	368	6	472,022
105	Mesuji	0.26	5.81	7.62	2.67	49.86	68.50	-	8.58	1.90	214	4	320,333
106	Tulang Bawang Barat	0.07	6.31	2.08	3.82	61.61	68.78	-	7.59	0.00	221	4	268,645
Kepulauan Bangka Belitung		6.42	5.25	1.57	2.6	35.28	69.46	28.66	5.06	0			
107	Bangka	9.45	5.40	0.00	1.41	34.17	68.26	-	4.76	0.00	310	6	291,585
108	Belitung	10.91	8.48	0.00	2.80	38.29	69.56	-	3.92	0.00	298	6	163,977
109	Bangka Barat	5.31	3.26	3.13	1.51	32.26	68.32	-	8.59	0.00	317	6	169,568
110	Bangka Tengah	15.33	5.46	0.00	2.99	33.01	68.39	-	6.22	0.00	257	6	184,228
111	Bangka Selatan	2.66	4.01	1.89	5.85	32.47	68.33	-	6.07	0.00	342	6	181,436
112	Belitung Timur	8.19	6.90	7.69	5.10	38.17	69.50	-	3.25	0.00	271	6	111,963
Kepulauan Riau		16.35	6.35	8.19	1.77	24.52	69.97	26.33	3.17	1.93			
113	Karimun	34.14	6.69	14.08	4.32	20.51	70.11	-	3.80	2.82	118	6	218,524
114	Bintan	10.70	6.23	0.00	1.16	20.17	69.91	-	2.48	0.00	365	6	147,187
115	Natuna	7.36	3.78	9.21	4.72	28.13	68.57	-	4.27	1.32	286	6	71,498
116	Lingga	44.05	14.03	0.00	7.24	24.08	70.48	-	19.72	0.00	62	6	87,465
117	Kepulauan Anambas	14.89	4.47	31.48	8.56	28.51	67.80	-	11.69	9.26	81	6	38,781
Jawa Barat		0.45	9.61	1.39	0.28	33.68	68.84	35.33	4.91	0.3			
118	Bogor	1.45	9.54	0.69	0.06	35.75	70.20	-	5.47	0.46	350	6	4,989,939
119	Sukabumi	0.47	9.24	3.11	0.57	37.64	67.90	-	2.75	0.26	318	4	2,408,338
120	Cianjur	0.43	12.02	7.78	1.58	36.47	66.80	-	3.50	3.06	216	4	2,231,107
121	Bandung	0.88	7.94	0.00	0.25	37.52	69.37	-	2.12	0.00	346	5	3,307,396

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (%)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
122	Garut	0.23	12.79	0.23	0.48	27.56	66.51	-	1.58	0.45	326	3	2,481,152
123	Tasikmalaya	0.31	11.57	0.85	0.37	35.19	68.80	-	1.60	0.00	323	5	1,722,514
124	Ciamis	0.38	8.62	1.13	0.06	24.60	67.73	-	2.34	0.00	360	5	1,562,886
125	Kuningan	0.42	13.34	0.00	0.22	22.84	68.11	-	5.86	0.00	327	5	1,056,275
126	Cirebon	0.77	14.65	0.47	0.27	40.61	66.04	-	10.75	0.00	196	3	2,110,147
127	Majalengka	0.27	14.07	0.29	0.15	31.34	67.38	-	6.18	0.00	308	6	1,189,191
128	Sumedang	0.30	11.31	0.00	0.28	23.23	68.13	-	2.59	0.00	351	5	1,124,902
129	Indramayu	0.22	14.99	0.63	0.00	39.48	67.74	-	22.04	0.32	175	6	1,696,598
130	Subang	0.27	12.35	0.40	0.16	23.38	69.89	-	12.52	0.00	320	6	1,497,501
131	Purwakarta	0.57	9.28	3.65	0.21	38.26	67.74	-	4.05	0.00	311	4	882,799
132	Karawang	0.37	10.69	1.62	0.16	36.09	67.80	-	10.27	0.00	273	4	2,198,978
133	Bekasi	0.97	5.20	3.21	0.00	49.17	70.45	-	7.49	0.00	334	4	2,786,638
134	Bandung Barat	0.92	12.92	4.24	0.92	24.92	69.23	-	1.87	0.61	285	5	1,563,389
Jawa Tengah		0.34	14.44	0.58	0.25	26.62	71.97	36.76	12.62	0.06			
135	Cilacap	0.37	15.24	0.70	0.41	32.01	71.63	-	12.14	0.00	282	6	1,679,864
136	Banyumas	0.67	18.44	0.00	0.21	25.66	70.23	-	7.90	0.00	300	6	1,603,037
137	Purbalingga	0.45	20.53	0.42	0.80	22.74	71.08	-	8.56	0.00	281	6	877,489
138	Banjarnegara	0.40	18.71	0.72	0.76	21.16	69.56	-	12.82	0.00	265	6	890,962
139	Kebumen	0.39	21.32	0.00	0.67	39.12	69.73	-	13.70	0.22	194	6	1,181,678
140	Purworejo	0.31	15.44	1.01	0.35	29.11	71.44	-	10.68	0.20	304	6	708,483
141	Wonosobo	0.33	22.08	0.00	0.16	13.84	70.58	-	8.43	0.00	293	6	771,447
142	Magelang	0.48	13.96	0.54	0.27	18.72	70.63	-	11.36	0.27	339	6	1,219,371

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
143	Boyolali	0.35	13.27	1.12	0.30	27.10	70.71	-	18.70	0.00	284	6	953,317
144	Klaten	0.48	15.60	0.00	0.41	24.46	72.16	-	17.57	0.00	305	6	1,153,047
145	Sukoharjo	0.46	9.87	0.00	0.00	33.00	70.64	-	13.91	0.00	343	6	848,718
146	Wonogiri	0.13	14.02	0.00	0.18	12.42	72.82	-	24.87	0.00	345	6	946,373
147	Karanganyar	0.41	13.58	1.69	0.00	19.74	72.56	-	14.76	0.00	359	6	838,762
148	Sragen	0.21	15.93	0.00	0.00	30.56	73.05	-	24.45	0.00	264	6	875,283
149	Grobogan	0.17	14.87	0.71	0.35	52.79	70.45	-	12.48	0.00	161	5	1,339,127
150	Blora	0.20	14.64	5.08	0.00	31.44	72.02	-	20.03	0.00	195	5	847,125
151	Rembang	0.25	20.97	0.00	0.22	25.22	70.64	-	11.52	0.00	267	6	608,548
152	Pati	0.21	12.94	0.49	0.00	36.03	73.05	-	15.96	0.00	289	6	1,219,993
153	Kudus	0.81	8.62	0.00	0.00	34.11	69.83	-	9.66	0.00	319	5	807,005
154	Jepara	0.51	9.23	2.05	0.21	28.79	71.23	-	8.49	0.00	366	6	1,144,916
155	Demak	0.25	15.72	0.40	0.00	37.78	71.95	-	11.01	0.00	235	5	1,091,379
156	Semarang	0.55	8.51	0.00	0.31	20.13	72.90	-	8.38	0.00	392	6	968,383
157	Temanggung	0.39	12.42	0.00	0.36	15.99	72.87	-	10.38	0.00	379	6	730,720
158	Kendal	0.32	12.68	0.00	0.45	21.98	69.42	-	13.77	0.00	306	6	926,325
159	Batang	0.52	11.96	0.40	0.09	20.34	70.97	-	11.28	0.00	355	6	728,578
160	Pekalongan	0.72	13.51	0.00	0.12	25.34	69.96	-	9.21	0.70	307	5	861,366
161	Pemalang	0.51	19.27	0.90	0.37	31.86	68.52	-	15.60	0.00	181	5	1,285,024
162	Tegal	0.53	10.58	1.05	0.25	28.40	69.58	-	12.08	0.00	321	6	1,421,001
163	Brebes	0.43	20.82	0.34	0.20	25.70	68.36	-	18.40	0.00	184	5	1,770,480

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
	DI. Yogyakarta	0.31	15.03	0	0.33	20.63	73.62	27.24	10.94	0			
164	Kulon Progo	0.37	21.39	0.00	0.46	17.05	75.03	-	10.05	0.00	363	6	393,221
165	Bantul	0.67	16.48	0.00	0.57	19.99	71.62	-	10.85	0.00	348	6	927,956
166	Gunung Kidul	0.12	21.70	0.00	0.53	18.99	71.36	-	20.23	0.00	249	6	684,740
167	Sleman	0.60	9.68	0.00	0.09	21.63	75.79	-	8.41	0.00	394	6	1,114,833
	Jawa Timur	0.27	12.73	0.68	0.3	27.03	70.37	35.81	13.92	0.02			
168	Pacitan	0.17	16.66	0.58	0.58	29.20	72.18	-	14.82	0.00	274	6	544,229
169	Ponorogo	0.15	11.87	0.00	0.16	12.70	70.85	-	12.42	0.00	374	6	860,218
170	Trenggalek	0.27	13.50	0.00	0.17	34.30	72.33	-	10.48	0.00	316	6	678,791
171	Tulungagung	0.27	9.03	1.48	0.35	30.09	72.02	-	8.13	0.00	373	6	999,640
172	Blitar	0.26	10.53	0.00	0.27	20.40	71.80	-	9.79	0.00	386	6	1,126,151
173	Kediri	0.36	13.17	0.00	0.35	19.42	70.65	-	10.33	0.29	349	6	1,514,132
174	Malang	0.42	11.44	0.00	0.28	9.29	69.70	-	13.63	0.00	377	6	2,473,612
175	Lumajang	0.28	12.09	0.49	0.45	12.19	67.95	-	18.33	0.00	299	6	1,014,625
176	Jember	0.28	11.63	1.21	0.82	21.27	63.64	-	19.67	0.00	205	3	2,355,283
177	Banyuwangi	0.31	9.57	0.00	0.24	20.96	68.58	-	12.79	0.00	341	6	1,568,956
178	Bondowoso	0.21	15.23	3.20	0.07	14.22	63.95	-	26.37	0.00	141	3	744,067
179	Situbondo	0.19	13.59	0.74	0.24	25.71	63.95	-	26.74	0.00	163	3	654,153
180	Probolinggo	0.25	21.12	0.61	0.41	20.96	62.10	-	23.64	0.00	107	3	1,108,584
181	Pasuruan	0.30	11.22	0.82	0.28	17.08	64.81	-	11.98	0.00	291	3	1,531,025
182	Sidoarjo	2.04	6.69	0.29	0.00	34.43	71.43	-	2.46	0.00	383	6	1,981,096
183	Mojokerto	0.36	10.94	0.33	0.00	29.95	71.13	-	8.31	0.00	361	6	1,039,477

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
184	Jombang	0.30	11.12	0.00	0.15	26.13	70.64	-	8.28	0.00	356	6	1,214,086
185	Nganjuk	0.22	13.55	0.00	0.40	21.12	69.82	-	15.64	0.00	279	6	1,025,416
186	Madiun	0.23	12.40	0.00	0.33	17.92	69.68	-	16.03	0.00	344	6	666,519
187	Magetan	0.24	12.14	0.00	0.26	13.19	71.96	-	10.31	0.00	387	6	626,851
188	Ngawi	0.16	15.38	1.84	0.72	21.97	70.97	-	17.11	0.00	301	6	826,213
189	Bojonegoro	0.22	15.95	0.93	0.25	25.26	67.81	-	19.32	0.00	224	6	1,217,850
190	Tuban	0.16	17.16	1.22	0.00	28.69	68.71	-	19.57	0.00	213	6	1,129,050
191	Lamongan	0.18	16.12	0.63	0.08	44.27	68.98	-	15.04	0.00	171	5	1,191,239
192	Gresik	0.41	13.89	0.00	0.10	51.60	71.57	-	5.56	0.00	280	4	1,196,124
193	Bangkalan	0.32	23.14	1.07	0.73	19.73	64.02	-	24.66	0.36	116	3	919,002
194	Sampang	0.33	26.97	1.08	0.60	23.41	64.52	-	37.19	0.00	74	3	891,982
195	Pamekasan	0.40	18.45	1.06	0.00	6.54	65.19	-	21.43	0.00	209	3	808,057
196	Sumenep	0.24	21.13	3.61	0.63	20.34	65.49	-	30.60	0.00	97	3	1,051,763
Banten		0.67	5.89	2.06	0.52	35.05	65.47	32.99	5.11	1.55			
197	Pandeglang	0.34	10.25	4.42	1.23	28.77	64.35	-	6.91	4.13	228	3	1,181,430
198	Lebak	0.46	9.50	2.61	3.12	29.23	63.62	-	5.60	2.32	245	3	1,239,660
199	Tangerang	1.56	5.78	0.73	0.00	38.05	66.33	-	6.57	0.36	325	4	3,050,929
200	Serang	0.63	5.02	0.92	0.27	32.23	64.39	-	5.69	0.31	330	3	1,448,964
Bali		0.56	4.49	0.56	0.57	8.71	71.2	32.53	14.26	0			
201	Jembrana	0.93	5.56	0.00	0.28	9.67	72.31	-	11.35	0.00	396	6	275,148
202	Tabanan	0.36	5.21	0.00	0.42	6.68	74.91	-	13.86	0.00	397	6	441,900

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

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203	Badung	0.62	2.46	0.00	0.00	12.71	72.24	-	11.41	0.00	398	6	420,075
204	Gianyar	0.45	4.27	0.00	0.22	4.31	72.56	-	15.48	0.00	395	6	458,182
205	Klungkung	0.63	7.01	0.00	0.25	7.26	69.52	-	23.82	0.00	382	6	190,867
206	Bangli	0.66	5.45	5.56	2.47	6.55	72.18	-	19.41	0.00	371	6	216,804
207	Karangasem	0.53	6.88	0.00	1.73	7.21	68.32	-	31.49	0.00	296	6	457,204
208	Buleleng	0.76	6.31	0.00	0.94	5.57	70.00	-	15.79	0.00	391	6	693,625
Nusa Tenggara Barat													
209	Lombok Barat	0.56	17.43	1.64	7.48	25.34	62.13	-	27.19	0.00	89	3	613,161
210	Lombok Tengah	0.35	16.20	0.00	1.05	23.81	62.44	-	31.10	0.00	108	3	875,231
211	Lombok Timur	0.43	19.16	1.57	0.72	25.42	62.14	-	17.31	0.00	135	3	1,123,488
212	Sumbawa	0.11	17.04	4.82	2.76	29.47	61.43	-	10.63	0.00	128	3	423,029
213	Dompu	0.12	14.24	0.00	8.49	20.79	61.68	-	13.76	0.00	164	3	223,678
214	Bima	0.17	16.24	2.59	6.26	18.65	63.95	-	11.82	0.00	203	3	447,286
215	Sumbawa Barat	0.17	17.10	0.00	1.23	38.42	62.13	-	9.52	0.00	176	3	118,608
216	Lombok Utara	0.31	35.88	0.00	7.93	33.45	61.72	-	29.86	0.00	49	3	203,564
Nusa Tenggara Timur													
217	Sumba Barat	0.40	28.92	6.76	48.85	60.58	65.75	-	22.75	1.35	37	2	116,621
218	Sumba Timur	0.36	28.58	7.05	35.16	65.93	62.33	-	15.15	4.49	41	2	238,241
219	Kupang	0.35	20.06	7.34	18.79	36.44	65.94	-	12.35	0.00	84	3	321,384
220	Timor Tengah Selatan	0.22	27.81	6.47	48.76	70.65	67.26	-	19.40	14.75	23	2	453,386
221	Timor Tengah Utara	0.28	21.59	2.07	30.40	29.57	69.19	-	11.71	1.04	101	5	238,426
222	Belu	0.51	14.58	3.70	38.92	43.95	66.75	-	16.46	0.00	72	4	370,770

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 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Filt: Female Illiteracy (%)
 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
223	Alor	0.78	20.11	12.57	26.46	51.69	67.67	-	7.10	10.86	53	2	196,179
224	Lembata	0.39	23.25	4.64	14.65	36.01	66.88	-	8.76	1.32	85	5	124,912
225	Flores Timur	0.50	8.10	4.40	19.93	17.02	68.79	-	10.31	0.40	250	6	241,053
226	Sikka	0.49	12.66	8.13	19.04	32.04	69.66	-	9.49	0.00	180	5	309,074
227	Ende	0.99	21.03	14.03	10.09	19.19	65.31	-	6.95	3.96	124	3	267,262
228	Ngada	0.49	11.19	1.99	16.19	22.70	67.46	-	4.43	4.64	179	5	148,969
229	Manggarai	0.58	20.96	2.47	15.19	32.64	67.74	-	8.62	0.00	111	5	307,140
230	Rote Ndao	0.34	28.25	2.25	16.29	34.50	68.74	-	9.28	2.25	78	5	125,035
231	Manggarai Barat	0.39	18.21	20.71	35.14	35.78	66.84	-	5.59	7.69	58	2	236,604
232	Sumba Tengah	0.08	31.93	18.46	36.37	88.25	64.20	-	20.82	3.08	22	2	65,606
233	Sumba Barat Daya	0.55	26.87	4.58	60.57	69.50	63.14	-	23.32	1.53	26	2	302,241
234	Nagekeo	0.52	12.08	8.85	15.78	35.77	63.89	-	4.57	0.88	136	3	135,419
235	Manggarai Timur	0.51	24.85	19.32	57.82	54.14	68.19	-	7.22	2.27	44	2	263,786
236	Sabu Raijua	1.23	31.02	0.00	78.16	50.65	68.01	-	20.38	0.00	30	2	75,048
Kalimantan Barat													
237	Sambas	0.42	8.74	20.44	15.06	35.78	67.4	38.6	12.79	5.64			
238	Bengkayang	0.32	9.90	15.22	3.90	42.05	62.31	-	14.61	0.54	96	3	505,444
239	Landak	0.12	8.01	20.97	10.87	27.88	69.61	-	12.71	0.00	210	6	224,407
240	Pontianak	0.28	14.18	14.10	25.29	39.52	66.35	-	9.35	3.21	90	4	340,635
241	Sanggau	0.58	6.30	7.46	3.89	39.20	67.66	-	11.51	0.00	236	4	241,003
242	Ketapang	0.69	4.71	16.57	29.70	29.47	69.39	-	12.81	0.00	145	6	422,658
243	Sintang	0.95	12.85	12.45	15.84	34.72	68.37	-	14.90	10.44	94	4	446,849
		0.64	10.09	23.59	31.41	34.99	69.04	-	15.08	15.72	57	5	377,190

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 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
244	Kapuas Hulu	0.71	11.11	15.60	16.72	25.89	67.17	-	12.13	4.96	132	3	231,512
245	Sekadau	1.12	6.93	29.89	28.90	33.89	67.71	-	11.77	1.15	79	4	186,266
246	Melawi	0.91	13.70	31.95	45.01	36.96	68.29	-	17.34	4.73	54	4	185,449
247	Kayong Utara	0.27	10.87	16.28	18.22	34.07	66.30	-	18.62	0.00	91	3	99,495
248	Kubu Raya	0.40	6.04	54.70	2.19	43.55	66.83	-	16.91	0.00	68	4	518,803
Kalimantan Tengah													
249	Kotawaringin Barat	1.28	5.44	10.64	1.83	45.39	71.79	-	6.87	1.06	272	4	245,143
250	Kotawaringin Timur	1.76	6.85	14.05	15.96	58.24	69.92	-	3.55	6.49	125	4	385,863
251	Kapuas	0.17	6.19	38.63	10.19	59.31	71.11	-	4.09	11.59	69	4	339,262
252	Barito Selatan	1.08	6.26	22.11	17.73	41.69	68.47	-	1.28	0.00	154	4	126,300
253	Barito Utara	0.82	5.98	19.42	21.52	50.46	72.39	-	2.99	1.94	156	4	123,781
254	Sukamara	1.17	4.56	0.00	5.97	40.23	68.04	-	5.53	3.13	277	4	47,073
255	Lamandau	0.44	4.87	3.61	18.42	30.62	67.45	-	2.01	2.41	313	6	65,616
256	Seruyan	1.69	8.77	10.00	20.33	52.50	68.12	-	3.29	15.00	92	4	146,914
257	Katingan	0.48	6.55	11.18	12.54	49.99	67.72	-	1.02	6.21	144	4	150,314
258	Pulang Pisau	0.25	5.45	26.26	10.60	55.39	67.79	-	1.41	0.00	129	4	122,511
259	Gunung Mas	3.18	6.90	21.26	27.51	53.93	68.28	-	0.70	10.24	67	4	100,157
260	Barito Timur	0.58	8.83	3.88	4.21	44.64	68.00	-	3.11	0.00	220	5	101,054
261	Murung Raya	0.83	6.44	18.55	30.04	44.23	68.28	-	2.80	3.23	112	4	100,100
Kalimantan Selatan													
262	Tanah Laut	0.20	4.33	0.74	1.05	33.07	69.29	-	4.08	0.74	369	6	308,818
263	Kota Baru	0.47	4.73	5.45	4.93	42.58	66.45	-	4.95	5.45	207	4	303,459

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Rank: District Rank
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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
264	Banjar	0.36	2.84	7.93	1.49	45.85	66.18	-	6.03	0.69	237	4	527,997
265	Barito Kuala	0.15	5.12	24.38	3.87	48.48	63.04	-	9.90	0.00	109	3	286,075
266	Tapin	0.12	3.41	11.11	3.81	31.95	68.03	-	5.19	1.48	283	5	174,156
267	Hulu Sungai Selatan	0.18	6.67	4.05	2.55	32.19	64.87	-	5.81	0.00	255	3	219,211
268	Hulu Sungai Tengah	0.22	5.57	4.73	5.69	36.02	66.43	-	5.06	4.14	222	5	251,063
269	Hulu Sungai Utara	0.36	6.92	15.53	1.86	35.02	64.17	-	4.27	0.00	186	3	216,319
270	Tabalong	0.27	6.15	3.82	4.55	38.36	63.72	-	3.76	0.76	234	3	228,051
271	Tanah Bumbu	0.60	5.20	7.38	0.28	64.42	65.86	-	5.23	2.01	169	4	295,358
272	Balangan	0.18	6.17	3.18	3.39	39.91	62.50	-	7.13	0.00	219	3	117,248
Kalimantan Timur		0.65	6.38	8.58	4.02	20.53	71.78	27.52	3.62	4.09			
273	Paser	1.15	7.94	6.94	3.88	22.83	73.99	-	4.40	1.39	389	6	247,612
274	Kutai Barat	0.83	7.70	9.28	19.55	19.23	70.63	-	6.47	13.40	211	6	173,003
275	Kutai Kartanegara	0.57	7.52	7.17	3.63	20.12	68.39	-	4.20	2.11	364	6	674,464
276	Kutai Timur	1.35	9.06	4.44	9.50	24.63	69.17	-	3.61	2.96	328	6	279,718
277	Berau	0.86	4.83	8.18	8.52	19.51	70.73	-	3.60	1.82	381	6	193,415
278	Malinau	0.51	10.48	40.37	3.48	9.56	68.62	-	11.08	6.42	137	6	68,337
279	Bulungan	0.31	12.04	12.35	5.22	21.39	73.32	-	6.43	0.00	336	6	121,323
280	Nunukan	0.65	9.51	49.58	17.14	24.68	72.01	-	7.62	14.58	70	6	154,308
281	Penajam Paser Utara	0.40	7.70	1.85	2.82	21.83	71.94	-	6.23	0.00	385	6	152,121
282	Tana Tidung	0.98	10.21	20.69	6.68	24.88	72.76	-	11.58	10.34	215	6	17,079
Sulawesi Utara		0.23	8.5	3.05	2.06	30.11	72.62	34.83	1.08	3.16			
283	Bolaang Mongondow	0.09	8.91	1.50	2.90	32.30	72.06	-	3.20	3.50	338	5	220,093

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Health: Villages with distance from Health Facilities more than 5 kilometers (%)
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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
284	Minahasa	0.25	8.81	0.00	0.88	31.21	72.80	-	0.11	4.07	376	6	316,884
285	Kepulauan Sangihe	2.27	12.19	11.38	12.04	19.83	73.55	-	2.22	1.20	315	6	128,732
286	Kepulauan Talaud	0.99	10.27	2.61	2.24	29.19	72.57	-	1.90	3.27	367	6	85,171
287	Minahasa Selatan	0.20	10.08	0.00	0.54	22.98	72.76	-	1.05	9.04	378	6	198,901
288	Minahasa Utara	0.44	8.02	4.58	0.47	31.76	73.09	-	1.33	2.29	380	6	193,906
289	Bolaang Mongondow Utara	0.21	9.61	1.87	5.35	37.45	70.42	-	1.47	2.80	258	5	71,530
290	Siau Tagulandang Biaro	3.26	11.36	16.13	6.36	25.35	69.00	-	0.48	1.08	239	5	64,575
291	Minahasa Tenggara	0.20	16.10	1.39	0.10	27.23	70.34	-	0.86	1.39	324	5	101,761
292	Bolaang Mongondow Selatan	0.30	15.28	1.23	2.21	15.60	71.47	-	1.21	7.41	309	5	58,762
293	Bolaang Mongondow Timur	0.31	6.92	2.50	0.12	29.70	71.51	-	1.09	2.50	370	5	65,511
Sulawesi Tengah		0.34	14.32	8.76	11.9	42.27	67.21	41.06	5.13	2.47			
294	Banggai Kepulauan	3.28	16.30	2.78	24.19	21.37	64.85	-	6.02	1.39	114	3	176,869
295	Banggai	0.31	9.81	4.15	5.13	34.95	69.03	-	5.99	3.26	268	6	334,561
296	Morowali	0.46	15.92	12.78	12.96	56.94	65.95	-	5.20	4.51	73	4	214,091
297	Poso	0.33	18.22	4.12	6.99	39.37	65.52	-	4.11	0.00	166	3	226,389
298	Donggala	0.40	17.18	7.78	19.68	38.29	66.29	-	6.69	1.80	113	3	284,113
299	Toli-Toli	0.43	13.86	5.71	9.75	30.47	64.82	-	5.60	0.00	198	3	217,543
300	Buol	0.78	15.06	0.00	18.20	35.71	65.95	-	2.40	0.00	159	3	137,479
301	Parigi Moutong	0.27	17.03	4.28	13.39	50.85	66.02	-	7.18	1.17	106	4	428,359
302	Tojo Una-Una	0.30	20.61	24.14	15.95	44.33	64.22	-	5.37	3.45	64	3	141,906
303	Sigi	0.17	12.27	22.60	17.45	41.65	66.00	-	5.66	9.60	75	4	220,061

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Health: Villages with distance from Health Facilities more than 5 kilometers (%)

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
Sulawesi Selatan													
304	Kepulauan Selayar	0.63	14.23	15.91	10.13	15.75	68.08	-	10.88	0.00	202	5	124,553
305	Bulukumba	0.18	9.04	2.21	4.19	26.99	72.62	-	13.03	0.00	333	6	400,990
306	Bantaeng	0.10	10.45	0.00	7.33	12.53	74.59	-	19.22	0.00	347	6	179,505
307	Jeneponto	0.12	16.52	0.00	0.60	18.27	65.40	-	23.20	0.00	200	3	348,138
308	Takalar	0.33	10.42	4.00	1.46	21.15	70.30	-	15.01	0.00	295	6	275,034
309	Gowa	0.18	8.73	2.40	6.37	38.66	72.04	-	18.53	0.60	227	6	670,465
310	Sinjai	0.33	10.32	2.50	11.77	26.90	72.83	-	12.07	0.00	288	6	232,612
311	Maros	0.20	12.94	1.94	2.12	46.45	73.55	-	15.10	0.00	242	6	325,401
312	Pangkajene Dan Kepulauan	0.41	17.75	0.00	4.22	40.17	69.16	-	14.25	0.00	167	5	311,604
313	Baru	0.28	10.32	1.82	9.53	19.91	69.52	-	13.98	1.82	278	6	168,034
314	Bone	0.14	11.92	3.49	8.86	26.31	70.56	-	13.33	0.54	243	5	728,737
315	Soppeng	0.13	9.43	1.43	4.76	16.63	71.93	-	11.07	0.00	375	6	226,202
316	Wajo	0.10	8.17	1.70	5.83	28.37	72.11	-	17.04	0.00	332	6	389,552
317	Sidenreng Rappang	0.10	6.30	1.89	1.41	36.61	73.38	-	13.39	0.00	354	6	277,451
318	Pinrang	0.11	8.86	7.41	2.21	40.66	72.81	-	10.66	0.00	251	5	357,095
319	Emekekang	0.28	15.11	2.33	4.27	22.87	75.66	-	12.53	0.00	294	5	193,683
320	Luwu	0.23	15.10	14.10	7.71	37.37	74.68	-	10.99	5.73	158	5	338,609
321	Tana Toraja	0.34	13.81	17.61	11.93	36.15	74.28	-	11.90	0.63	157	5	224,523
322	Luwu Utara	0.17	15.52	12.29	7.44	38.86	72.03	-	9.91	0.00	178	5	292,765
323	Luwu Timur	0.25	8.38	0.78	7.34	42.21	71.29	-	7.47	0.00	302	6	250,608
324	Toraja Utara	0.41	16.53	5.30	10.36	38.36	73.66	-	15.99	0.00	174	5	220,304

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Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

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Sulawesi Tenggara													
325	Buton	0.89	15.25	2.89	8.63	17.36	69.38	-	21.15	0.83	183	5	261,119
326	Muna	0.63	15.32	1.68	11.11	17.82	66.66	-	16.37	1.26	190	3	276,817
327	Konawe	0.25	16.58	4.03	5.19	31.52	68.32	-	10.54	3.46	172	5	250,491
328	Kolaka	0.45	16.20	2.22	11.58	35.64	67.74	-	9.98	1.48	150	5	329,343
329	Konawe Selatan	0.39	12.45	4.67	6.79	21.82	68.24	-	8.43	3.30	254	6	275,234
330	Bombana	0.44	14.28	6.43	19.76	28.18	68.52	-	8.71	5.00	138	5	146,072
331	Wakatobi	1.79	17.40	8.00	3.34	34.64	68.60	-	10.60	0.00	240	6	94,953
332	Kolaka Utara	1.41	17.41	3.01	17.64	23.15	66.13	-	7.05	0.75	153	3	126,845
333	Buton Utara	0.49	17.53	6.59	33.64	28.36	69.32	-	12.12	3.30	87	5	56,631
334	Konawe Utara	0.71	10.62	7.48	11.97	31.04	67.93	-	8.66	15.65	134	6	53,657
Gorontalo													
335	Boalemo	0.09	21.79	4.65	21.11	43.61	68.64	-	5.16	1.16	105	4	137,476
336	Gorontalo	0.23	21.57	2.90	11.52	40.17	69.57	-	3.52	2.42	146	5	363,146
337	Pohuwato	0.19	21.47	0.95	8.33	52.85	68.17	-	3.65	0.00	142	4	500,622
338	Bone Bolango	0.61	17.19	5.45	9.33	47.41	69.28	-	1.29	0.00	165	4	146,773
339	Gorontalo Utara	0.24	19.16	7.32	13.74	43.52	67.37	-	3.99	1.63	139	4	107,092
Sulawesi Barat													
340	Majene	2.02	15.26	7.32	3.32	22.50	66.11	-	8.74	0.00	170	3	158,036
341	Polewali Mandar	0.37	18.02	7.78	9.16	22.19	65.62	-	15.13	1.80	122	3	409,648
342	Mamasa	0.29	13.92	39.23	18.58	61.25	71.48	-	11.73	7.18	56	4	146,292

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 Flit: Female Illiteracy (%)
 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Filt (%)	Health (%)	Rank	Priority	Population
343	Mamuju	0.25	6.81	15.15	22.29	38.60	69.08	-	11.49	1.01	130	5	358,527
344	Mamuju Utara	0.51	4.71	1.59	19.86	43.28	67.66	-	6.74	1.59	197	4	145,502
Maluku		1.26	19.27	27.11	18.88	32.76	67.88	40.57	2.85	12.41			
345	Maluku Tenggara Barat	1.30	29.75	21.52	37.86	15.84	64.62	-	0.09	2.53	63	2	109,768
346	Maluku Tenggara	1.49	25.06	21.84	29.49	28.05	68.47	-	2.92	1.15	71	2	100,154
347	Maluku Tengah	1.65	22.15	13.16	9.95	29.75	66.09	-	1.47	6.32	99	3	375,393
348	Buru	0.63	18.51	19.28	20.25	60.75	68.98	-	13.41	10.84	51	4	115,004
349	Kepulauan Aru	3.46	27.34	26.05	58.55	41.16	68.24	-	1.47	27.73	27	2	88,132
350	Seram Bagian Barat	1.78	24.63	16.30	16.63	36.76	66.88	-	2.89	7.61	60	2	171,129
351	Seram Bagian Timur	1.72	24.49	47.50	34.93	44.66	66.35	-	4.20	14.38	35	2	103,890
352	Maluku Barat Daya	0.56	29.25	46.15	55.68	18.38	64.59	-	1.15	20.51	32	2	72,981
353	Buru Selatan	0.74	17.05	45.68	31.20	22.05	67.85	-	12.94	28.40	40	2	56,368
Maluku Utara		0.85	7.64	16.72	14.04	39.91	66.97	41	3.63	9.62			
354	Halmahera Barat	0.82	9.78	19.41	9.04	26.28	65.23	-	3.56	13.53	110	3	103,128
355	Halmahera Tengah	0.47	17.44	8.06	21.62	34.50	67.78	-	6.08	0.00	126	5	44,885
356	Kepulauan Sula	2.72	9.16	25.64	32.89	41.11	66.01	-	4.38	14.10	55	2	135,737
357	Halmahera Selatan	1.23	6.04	27.34	24.98	47.43	66.30	-	5.32	9.77	65	4	206,873
358	Halmahera Utara	0.75	5.90	8.54	11.39	39.14	66.61	-	2.59	8.04	193	4	179,566
359	Halmahera Timur	0.37	16.43	9.62	8.60	52.45	66.28	-	5.27	8.65	82	4	77,878
360	Pulau Morotai	0.93	9.18	11.36	21.71	44.15	66.07	-	3.03	12.50	86	4	54,971

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
 Pov: People Below Poverty Line (%)
 Road: Villages with inadequate connectivity (%)
 Elec: Households without Access to Electricity (%)
 Water: Households without Access to Clean Drinking Water (%)
 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Filt: Female Illiteracy (%)

Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
	Papua Barat	2.54	27.14	21.31	18.83	33.46	69.14	44.64	6.59	26.23			
361	Fakfak	12.40	29.84	4.07	10.58	18.25	71.33	-	1.70	4.88	98	5	71,069
362	Kaimana	12.01	18.60	24.42	31.40	36.15	70.11	-	3.72	13.95	50	2	49,953
363	Teluk Wondama	3.93	39.43	22.08	58.80	41.35	68.06	-	8.85	12.99	28	2	28,221
364	Teluk Bintuni	2.84	40.33	45.80	11.11	27.55	68.90	-	11.14	33.61	24	2	56,167
365	Manokwari	1.77	28.45	3.13	15.53	31.22	68.73	-	10.01	26.88	52	2	201,936
366	Sorong Selatan	6.23	20.50	9.92	43.70	36.86	67.07	-	6.99	15.70	46	2	41,291
367	Sorong	1.52	35.48	26.95	14.59	43.18	68.65	-	7.52	28.37	38	2	73,642
368	Raja Ampat	2.24	21.16	18.18	28.88	33.15	67.07	-	1.57	9.92	61	2	45,078
369	Tambrauw	1.09	38.68	32.89	35.83	33.68	66.48	-	38.61	32.89	18	2	6,395
370	Maybrat	4.61	35.64	6.37	44.52	30.59	66.95	-	6.44	32.48	33	2	35,945
	Papua	1.63	31.52	57.11	54.38	55.61	69.13	40.08	39.84	37.04			
371	Merauke	0.32	12.33	27.98	9.86	54.04	63.85	-	5.45	1.19	88	4	213,075
372	Jayawijaya	0.79	41.81	47.29	69.91	68.49	66.86	-	61.15	28.31	15	2	223,443
373	Jayapura	3.37	17.58	11.81	6.68	40.55	67.74	-	5.12	11.11	95	4	119,117
374	Nabire	2.93	27.69	18.07	9.07	62.18	68.05	-	10.52	12.05	48	2	145,248
375	Kepulauan Yapen	2.36	29.32	30.30	39.64	19.36	69.10	-	6.54	13.94	47	2	88,611
376	Biak Numfor	7.50	30.28	9.85	5.25	40.80	67.06	-	1.41	9.85	59	2	134,917
377	Paniai	0.77	40.15	42.86	73.30	66.86	68.36	-	58.51	25.71	16	2	176,807
378	Puncak Jaya	3.73	39.92	49.34	93.71	64.03	67.86	-	76.55	72.19	7	1	115,015
379	Mimika	10.26	20.37	32.24	11.25	71.00	70.88	-	5.21	36.84	31	2	202,359
380	Boven Digoel	16.43	23.70	30.00	25.52	37.65	67.62	-	8.57	50.91	20	2	62,503

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
 Pov: People Below Poverty Line (%)
 Road: Villages with inadequate connectivity (%)
 Elec: Households without Access to Electricity (%)
 Water: Households without Access to Clean Drinking Water (%)
 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Flit: Female Illiteracy (%)
 Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 1 (cont.): Ranking of Districts based on the Individual Indicators and Composite Food Security Priority Group

No	District	NCPR (%)	Pov (%)	Road (%)	Elec (%)	Water (%)	Life (year)	Stunt (%)	Flit (%)	Health (%)	Rank	Priority	Population
381	Mappi	17.00	30.35	28.66	81.00	49.02	66.66	-	21.09	39.63	17	2	87,696
382	Asmat	34.39	33.84	29.72	91.04	71.45	67.34	-	33.68	34.43	14	1	81,696
383	Yahukimo	0.70	43.27	96.14	97.22	37.18	67.44	-	82.63	40.15	9	1	175,698
384	Pegunungan Bintang	3.78	37.23	93.50	91.29	70.77	66.24	-	79.57	64.98	5	1	72,269
385	Tolikara	2.72	38.00	85.23	97.68	60.64	66.24	-	75.58	71.78	6	1	134,646
386	Sarmi	3.55	17.72	17.27	21.50	59.15	66.58	-	15.41	38.18	36	2	36,638
387	Keerom	1.40	23.23	16.39	13.42	61.10	67.53	-	25.26	16.39	45	2	51,818
388	Waropen	0.91	37.27	38.75	34.71	50.82	66.24	-	2.76	40.00	21	2	26,081
389	Supiori	50.00	41.50	10.53	60.15	46.56	66.53	-	2.45	5.26	19	2	16,894
390	Mamberamo Raya	50.00	34.25	38.98	76.44	69.57	66.34	-	42.35	52.54	10	1	19,997
391	Nduga	50.00	39.69	99.60	97.97	65.16	66.02	-	88.07	39.92	3	1	95,229
392	Lanny Jaya	50.00	43.79	93.71	98.05	67.69	66.70	-	84.18	29.37	4	1	173,212
393	Mamberamo Tengah	50.00	39.59	55.93	86.18	70.55	66.62	-	85.96	0.00	8	1	45,370
394	Yalimo	50.00	40.33	60.79	69.15	42.63	66.78	-	61.41	3.96	13	1	56,668
395	Puncak	50.00	41.96	93.75	97.55	63.92	67.85	-	86.93	60.00	1	1	103,108
396	Dogiyai	50.00	32.25	72.15	67.85	47.46	67.44	-	32.93	29.11	12	1	93,028
397	Intan Jaya	50.00	42.03	97.44	98.28	47.18	66.87	-	89.38	44.87	2	1	43,182
398	Deiyai	50.00	47.52	46.67	57.50	67.99	66.64	-	70.18	16.67	11	1	76,889

Note:

NCPR: Normative Consumption to Net Per Capita Production Ratio
 Pov: People Below Poverty Line (%)
 Road: Villages with inadequate connectivity (%)
 Elec: Households without Access to Electricity (%)
 Water: Households without Access to Clean Drinking Water (%)
 Life: Life Expectancy (year)

Stunt: Stunting Children < 5 years (%)
 Flit: Female Illiteracy (%)

Health: Villages with distance from Health Facilities more than 5 kilometers (%)
 Rank: District Rank
 Priority: District Priority
 Population: Population number on 2010

Annex 2

**Principal component analysis, cluster analysis and discriminant analysis:
analyzing relationships among food security indicators**

Annex 2. Principal Component Analysis, Cluster Analysis and Discriminant Analysis: analyzing relationships among food security indicators

A domain of statistics called multivariate analysis offers several techniques for multi-dimensional data analysis in order to capture the essence of the relationship among various indicators of food security. Principal Component Analysis (PCA), Cluster Analysis and Discriminant Analysis are the multivariate analysis used for analyzing relationship among food security indicators and identifying districts with higher vulnerability to food insecurity.

1. Principal component analysis (PCA)

The objective of PCA is to identify and describe the underlying relationships amongst the variables by creating new indicators (called ‘factors’ or ‘principal components’) that capture the essence of the associations between variables. A single PCA can be applied to food security indicators in general (covering food availability, access, utilization).

Suppose one has several variables relevant to food security, PCA is essentially a process of data reduction. A series of variables measuring a particular category (e.g., food access) are optimized into principal components capturing the essence of the relationships among initial variables. Each principal component is thus a new indicator that represents the “best” summary of the linear relationship among the initial variables. PCA yields as many principal components as there are initial variables. However, the contribution of each principal component in explaining the total variance found amongst districts will progressively decrease from the first principal component to the last. As a result, a limited set of principal components explain the majority of the matrix variability and principal components with little explanatory power can be removed from the analysis. The result is data reduction with relatively little loss of information.

In general, the score of principal component (PC_j) is defined as weighted linear combination of the original indicator.

$$PC_j = a_{1j}X_1 + a_{2j}X_2 + \dots + a_{pj}X_p$$

The number of principal components selected depends on the cumulative percentage of variance explained by each principal component. Morrison (1976) suggests that cumulative percentage of variance should explain 75% or more of total variance.

2. Cluster analysis

Cluster analysis is a multivariate analysis method to group the objects (districts) into relatively homogeneous groups called ‘clusters’ by measuring the distance between data points. The final result of the analysis is to obtain the clusters with similar characteristics of districts.

3. Discriminant analysis

Discriminant analysis is used to evaluate the results of grouping in the cluster analysis by means of discriminant function that generates a function that can be used to distinguish an object (district) into the given population based on observations of the district indicators.

Priority districts are determined using above three multivariate analysis techniques. The detailed analysis procedures are described as below.

1. Data preparation

- All indicators were first made unidirectional – the larger the value, the higher the vulnerability.
- The data was then standardized using the Z-score. Z-scores are computed by subtracting the mean of an indicator from the individual value pertaining to a district and then dividing it by the standard deviation of the indicator. The Z-score value could be both positive as well as negative; the mean should be always ‘zero’ and the standard deviation of the Z-scores should be always ‘one’.

2. Determine the number of principal components by PCA

- The PCA was run with the Z-scores. As Table 1 below shows, the first Principal Component (PC1) has significant contribution in describing the variance of information in the original data (48.6 percent), followed by second Principal Component (PC2) (14.5 percent) and third Principal Component (PC3) (8.5 percent). The cumulative percentage of variance reaches a satisfactory level (91.2 percent) when 6 main components were involved.

Table 1: Eigen analysis of the Correlation Matrix

Eigenvalue	43,754	13,009	0.7662	0.6901	0.5995	0.4742	0.3629	0.2429	0.1880
Proportion	0.486	0.145	0.085	0.077	0.067	0.053	0.040	0.027	0.021
Cumulative	0.486	0.631	0.716	0.793	0.859	0.912	0.952	0.979	1.000
Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
NCPR_Z	0.322	-0.245	-0.192	-0.232	-0.746	0.210	0.337	-0.156	0.085
Poverty_Z	0.376	0.053	-0.152	0.027	0.074	-0.795	0.312	0.215	0.227
Road_Z	0.406	-0.132	0.062	0.097	0.194	0.453	-0.073	0.596	0.448
Electric_Z	0.437	-0.019	0.023	0.068	0.075	0.071	0.084	0.255	-0.849
Water_Z	0.258	0.247	0.853	-0.024	-0.278	-0.131	-0.191	-0.089	0.067
Life2_Z	0.150	0.615	-0.177	-0.723	0.163	0.133	-0.024	-0.004	0.023
Health_Z	0.388	-0.134	0.105	0.082	0.497	0.176	0.307	-0.656	0.104
Illitera_Z	0.378	-0.171	-0.312	-0.002	-0.052	-0.153	-0.803	-0.244	0.021
Stunt_Z	0.124	0.658	-0.260	0.634	-0.203	0.157	0.036	-0.109	0.059

3. Grouping of components by cluster analysis

As a result of cluster analysis, 6 clusters were formed. Cluster 1 includes 55 districts, Cluster 2 includes 69 districts, Cluster 3 includes 124 districts, Cluster 4 includes 89 districts, Cluster 5 includes 46 districts and Cluster 6 includes 15 districts. It should be noted that clusters do not indicate priority level at this stage of the process.

Table 2: Cluster Analysis of Observations

Variable	Number of observations	Within cluster sum of squares	Average distance from centroid	Maximum distance from centroid
Cluster1	55	105.3650	1.3346	2.1685
Cluster2	69	107.8770	1.1644	2.5966
Cluster3	124	264.1900	1.3338	4.7779
Cluster4	89	186.2400	1.3789	2.5857
Cluster5	46	286.8060	2.3469	4.2754
Cluster6	15	250.7790	3.9934	5.7510

Table 3: Cluster Centroids

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
PC1	-0.2306	-0.68426	-1.15643	-0.284346	2.18487	8.53979
PC2	1.24744	0.447636	-1.05675	0.278012	0.60662	-1.4071
PC3	-0.64358	-0.255335	-0.27935	0.943187	0.25311	-0.52878
PC4	-0.82551	0.617075	-0.0179	-0.131545	0.48215	-0.36181
PC5	0.19639	-0.200544	0.01711	-0.14347	0.58355	-0.87733
PC6	0.10967	0.022688	-0.3252	0.098556	-0.34961	0.2497

4. Determine the priority level of clusters

Cluster centroids are calculated for each principal component (PC1 to PC7) based on the result of cluster analysis. The first principal component (PC1) which accounts for the highest variance of the data (48.6 percent) was selected as a primary means of measuring the vulnerability level of the clusters. In other words, the larger cluster centroid of PC1 indicates higher vulnerability to food insecurity. Table 4 below shows the cluster centroids of PC1 in descending order.

Table 4: Cluster Centroid of Principal Component 1 (PC1) in descending order

Cluster	PC1 Score	Priority
6	8.53979	1
5	2.18487	2
1	-0.2306	3
4	-0.284346	4
2	-0.68426	5
3	-1.15643	6

5. Evaluate the result using discriminant analysis (cross validation)

Discriminant analyzes were performed to evaluate the results of grouping in the cluster analysis using cross validation method that will produced a discriminant function. The discriminant function can be used to determine unknown objects (districts). Table 5 shows the discriminant function of each priority group. Based on the discriminant function, the PC1 scores and district priority group will be also re-calculated. Table 6 summarizes the PC1 score and the number of districts for each priority groups based on cluster and discriminant analysis. Table 7 below shows the summary of classification with cross validation methods.

Table 5: The Discriminant function for each Priority Group

fP1	fP2	fP3	fP4	fP5	fP6	
-290.31	-194.94	-206.86	-172.53	-163.76	-140.75	
1.62	0.09	-0.09	-0.09	-0.07	-0.02	NCPR
0.94	0.79	0.35	0.33	0.36	0.25	POVERTY
0.46	0.35	0.26	0.30	0.24	0.20	ROAD
0.24	-0.06	-0.22	-0.22	-0.22	-0.22	ELECTRIC
0.51	0.42	0.28	0.47	0.30	0.22	WATER
9.29	9.34	10.47	9.32	9.02	8.73	LIFE2
0.70	0.26	0.00	0.01	0.04	0.02	HEALTH
0.57	-0.11	-0.01	-0.09	-0.07	0.02	ILLITERA
0.71	0.81	0.68	0.62	0.78	0.51	Stunting

Table 6: The PC1 score, the number of districts based on cluster and Discriminant analysis for each Priority Group

Priority	Cluster Analysis		Discriminant Analysis	
	PC1 Score	# Districts	PC1 Score	# Districts
1	8.540	15	8.865	14
2	2.185	46	2.349	44
3	-0.231	55	-0.256	52
4	-0.284	89	-0.226	84
5	-0.684	69	-0.650	85
6	-1.156	124	-1.175	119

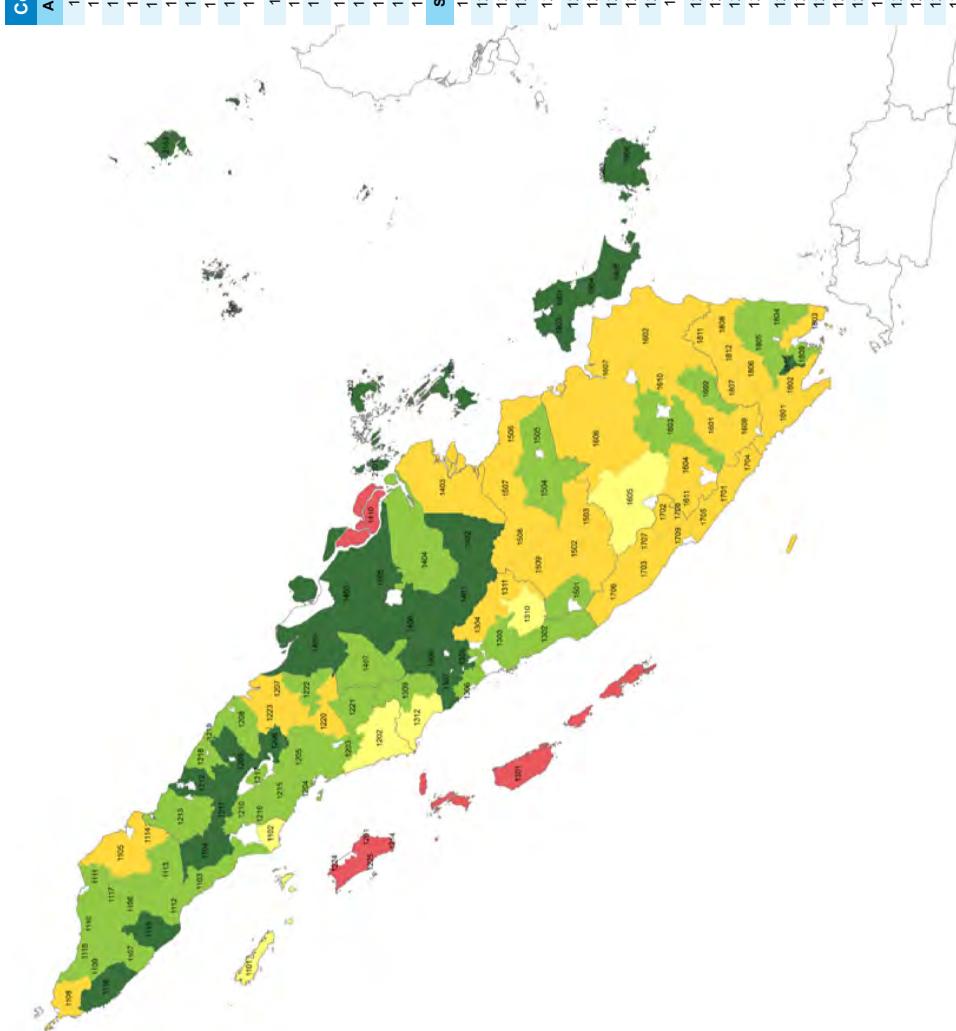
Table 7: Summary of Classification with Cross-validation

Put into Group	TRUE Group					
	1	2	3	4	5	6
1	14	0	0	0	0	0
2	1	38	3	1	1	0
3	0	1	47	1	2	1
4	0	2	4	74	2	2
5	0	4	1	8	61	11
6	0	1	0	5	3	110
Total N	15	46	55	89	69	124
N Correct	14	38	47	74	61	110

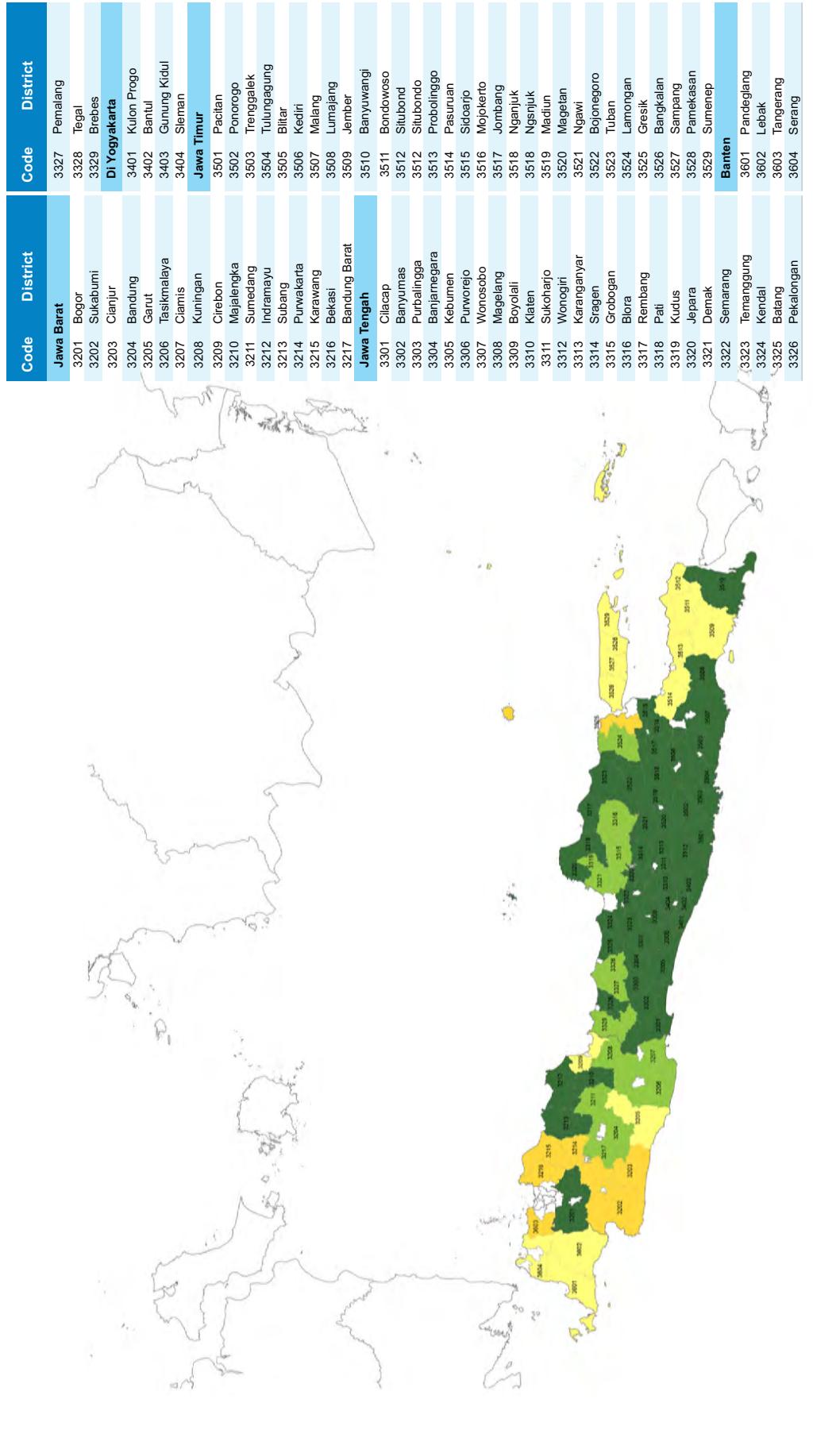
Annex 3

District Map of Indonesia

Annex 3.1
Map of districts in Sumatera islands

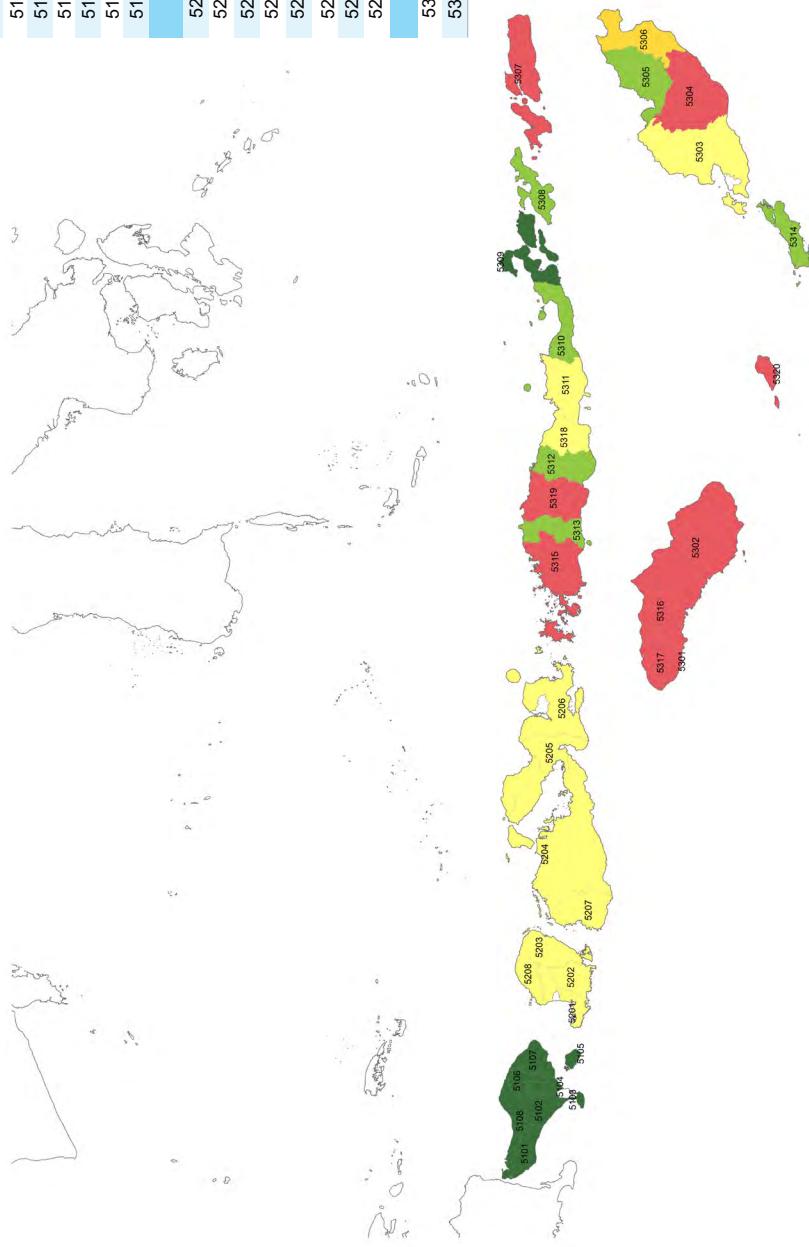


Annex 3.2 Map of districts in Java islands



Annex 3.3 Map of districts in Bali, NTB and NTT provinces

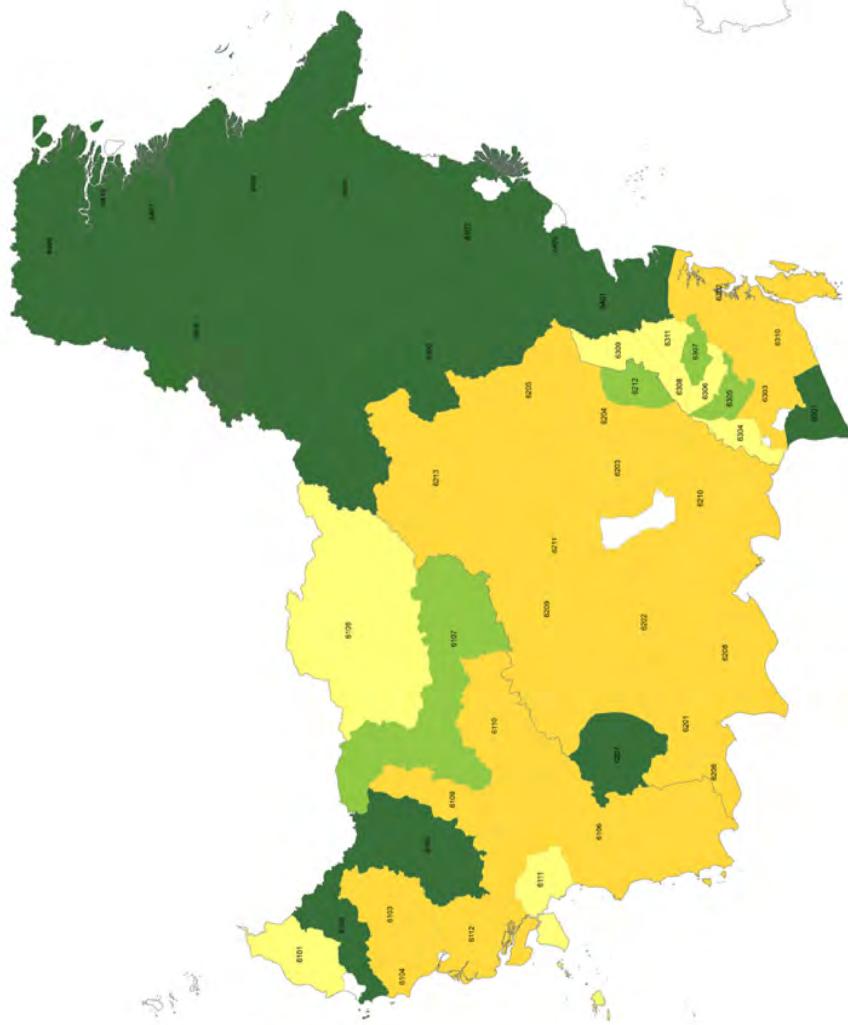
Code	District	Code	District
	Bali		Nusa Tenggara Timur
5101	Jembrana	5303	Kupang
5102	Tabanan	5304	Timor Tengah Selatan
5103	Badung	5305	Timor Tengah Utara
5103	Tabanan	5306	Belu
5104	Gianyar	5307	Alor
5105	Klungkung	5308	Lembata
5106	Bangli	5309	Flores Timur
5107	Karangasem	5310	Sikka
5108	Buleleng	5311	Ende
		5312	Ngada
		5313	Manggarai
5201	Lombok Barat	5314	Rote Ndao
5202	Lombok Tengah	5315	Manggarai Barat
5203	Lombok Timur	5316	Sumba Tengah
5204	Sumbawa	5317	Sumba Barat Daya
5205	Dompnu	5318	Nagekeo
5206	Bima	5319	Manggarai Timur
5207	Sumbawa Barat	5320	Sabu Raijua
5208	Lombok Utara		Nusa Tenggara Barat
		5301	Sumba Barat
		5302	Sumba Timur



Annex 3.4
Map of districts in Kalimantan islands



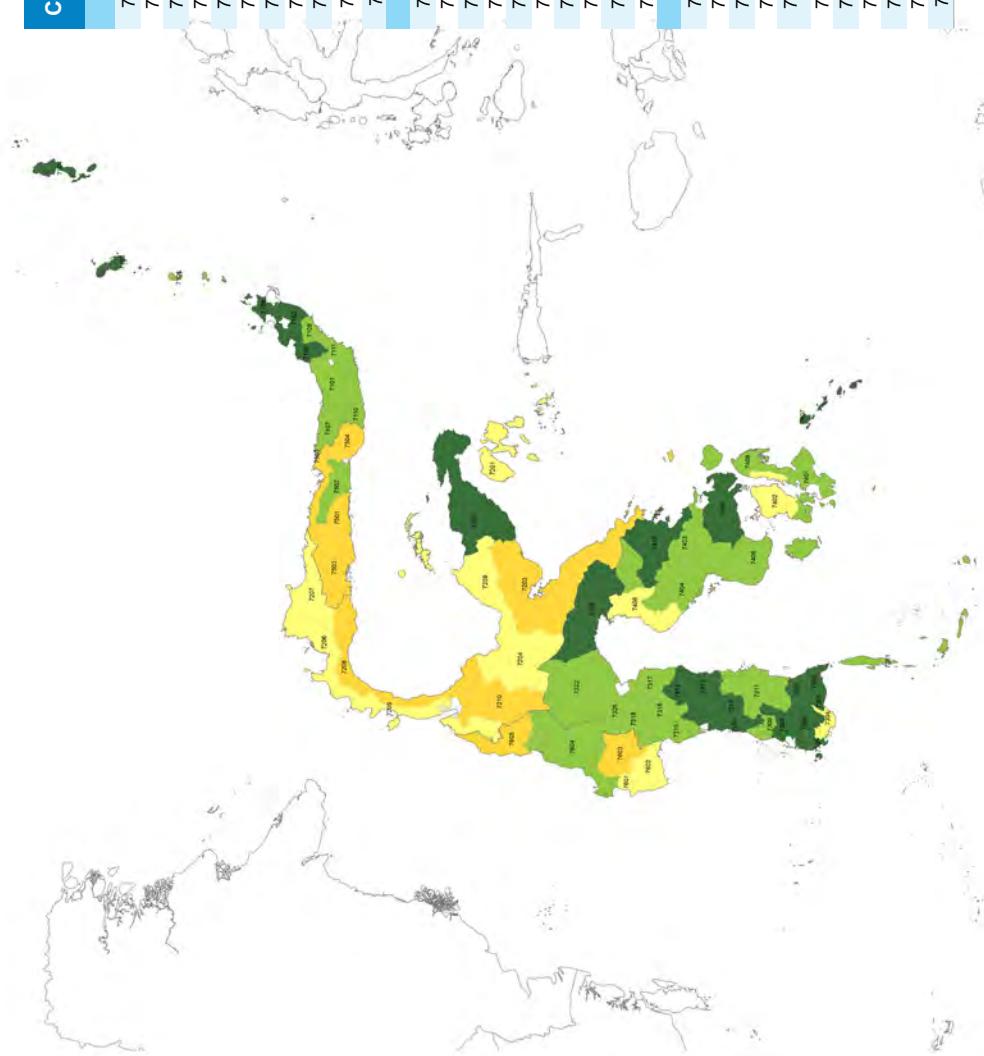
Code	District	Code	District
Kalimantan Barat			
6101	Sambas	6301	Tanah Laut
6102	Bengkayang	6302	Kota Baru
6103	Landak	6303	Banjar
6104	Pontianak	6304	Barito Kuala
6105	Sanggau	6305	Tapin
6106	Ketapang	6306	Hulu Sungai Selatan
6107	Sintang	6307	Hulu Sungai Tengah
6108	Kapuas Hulu	6308	Hulu Sungai
6109	Sekadau	6309	Tabalong
6110	Melawi	6310	Tanah Bumbu
6111	Kayong Utara	6311	Balangan
6112	Kubu Raya	Kalimantan Timur	
		6401	Paser
6201	Kotawaringin Barat	6402	Kutai Barat
6202	Kotawaringin Timur	6403	Kutai Kartanegara
6203	Kapuas	6404	Kutai Timur
6204	Barito Selatan	6405	Berau
6205	Barito Utara	6406	Maina
6206	Sukamara	6407	Bulungan
6207	Lamandau	6408	Nunukan
6208	Seruyan	6409	Penajam Paser Utara
6209	Katingan	6410	Tana Tidung
6210	Pulang Pisau		
6211	Gunung Mas		
6212	Barito Timur		
6213	Murung Raya		



Annex 3.5
Map of districts in Sulawesi islands

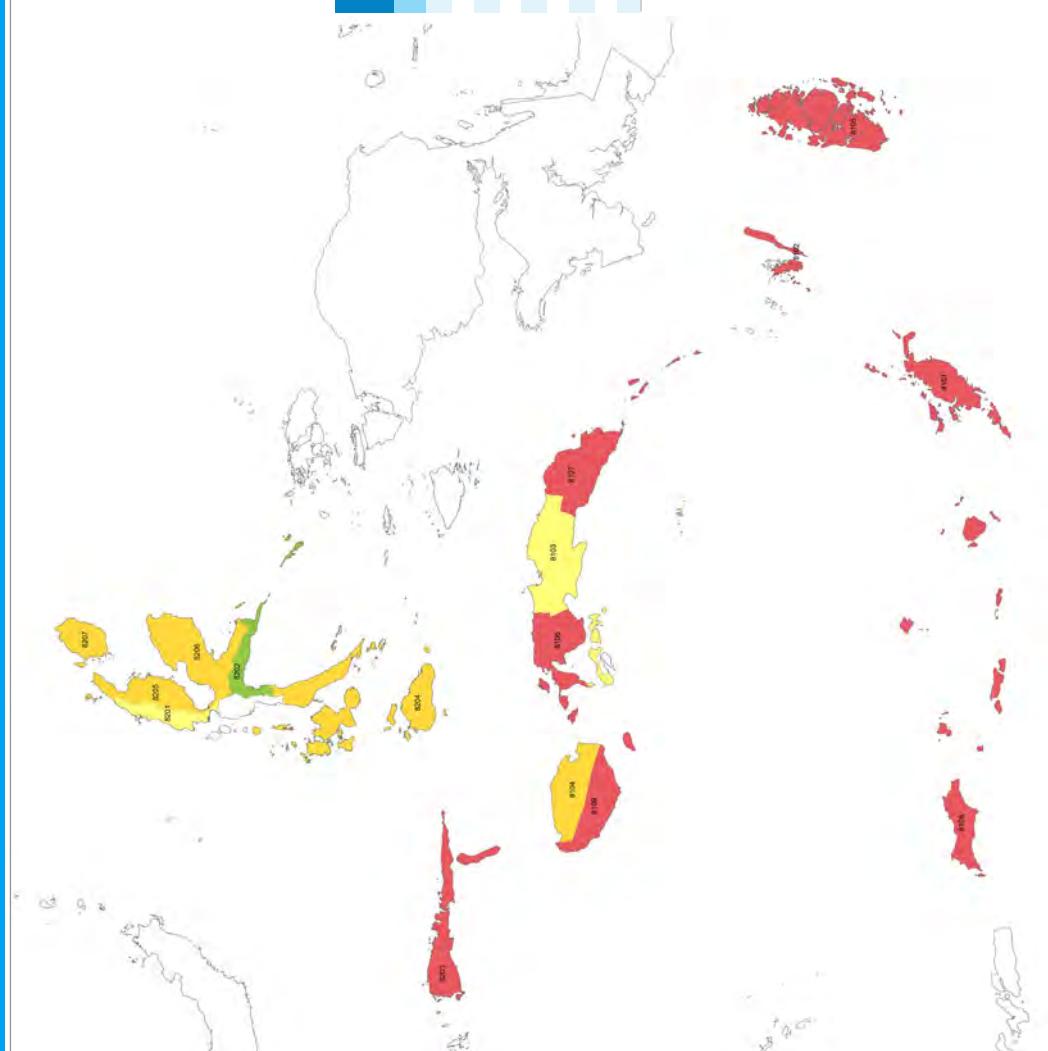


Code	District	Code	District
	Sulawesi Utara	7312	Soppeng
7101	Bolaang Mongondow	7313	Wajo
7102	Minahasa	7314	Sidenreng Rappang
7103	Kepulauan Sangihe	7315	Pinrang
7104	Kepulauan Talaud	7316	Enrekang
7105	Minahasa Selatan	7317	Luwu
7106	Minahasa Utara	7318	Tana Toraja
7107	Bolaang Mongondow Utara	7322	Luwu Utara
7108	Siau Tagulandang Biaro	7325	Luwu Timur
7109	Minahasa Tenggara	7326	Toraja Utara
7110	Bolaang Mongondow Selatan		Sulawesi Tenggara
7111	Bolaang Mongondow Timur	7401	Buton
	Sulawesi Tengah	7402	Muna
7201	Banggai Kepulauan	7403	Konawe
7202	Banggai	7404	Kolaka
7203	Morowali	7405	Konawe Selatan
7204	Poso	7406	Bombana
7205	Donggala	7407	Wakatobi
7206	Toli-toli	7408	Kolaka Utara
7207	Buol	7409	Buton Utara
7208	Parigi Moutong	7410	Konawe Utara
7209	Tojo Una-una		Gorontalo
7210	Sigi	7501	Boalemo
	Sulawesi Selatan	7502	Danau Limboto
7301	Kepulauan Selayar	7502	Gorontalo
7302	Bulukumba	7503	Pohuwato
7303	Bantaeng	7504	Bone Bolango
7304	Jeneponto	7505	Gorontalo Utara
7305	Takalar		Sulawesi Barat
7306	Gowa	7601	Majene
7307	Sinjai	7602	Polewali Mandar
7308	Maros	7603	Mamasa
7309	Pangkajene Dan Kepulauan	7604	Mamuju
7310	Barru	7605	Mamuju Utara
7311	Bone		

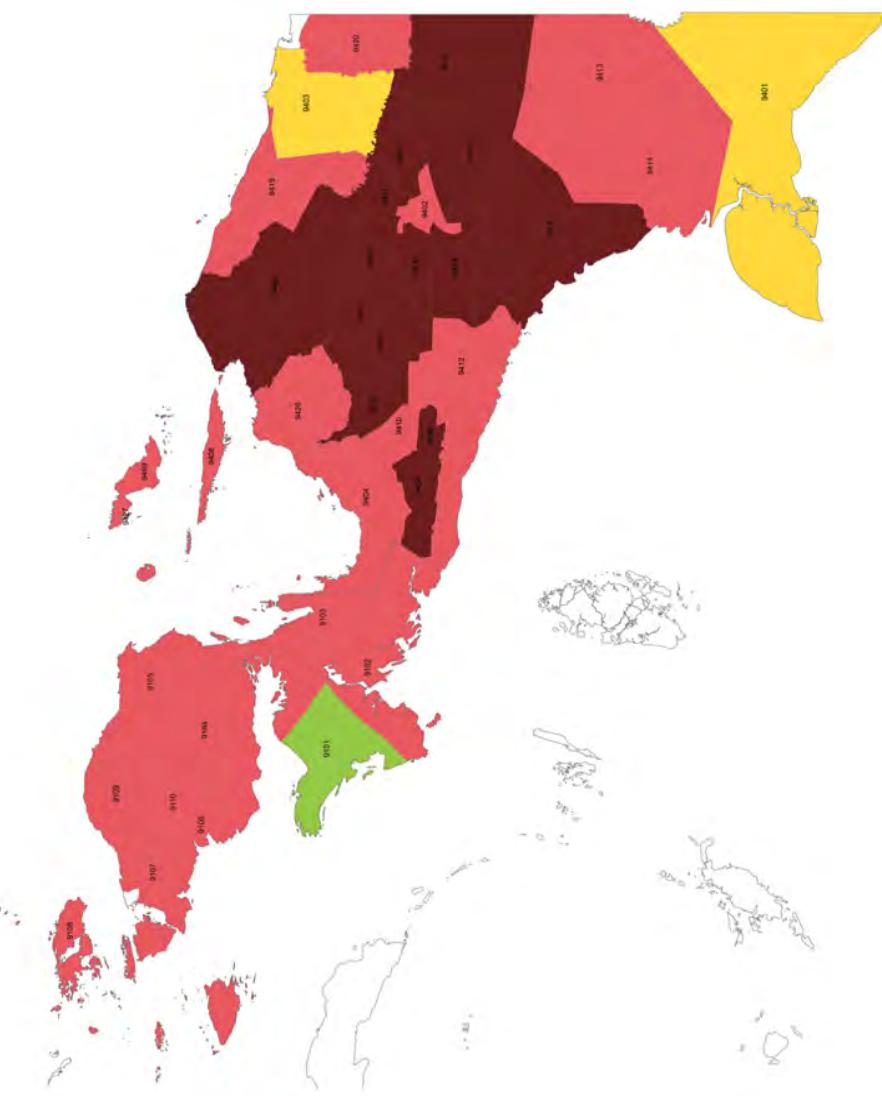


Annex 3.6
Map of districts in Maluku and Maluku Utara provinces

Code	District	Code	District
Maluku			Maluku Utara
8101	Maluku Tenggara Barat	8201	Halmahera Barat
8102	Maluku Tenggara	8202	Halmahera Tengah
8103	Maluku Tengah	8203	Kepulauan Sula
8104	Buru	8204	Halmahera Selatan
8105	Kepulauan Aru	8205	Halmahera Utara
8106	Seram Bagian Barat	8206	Halmahera Timur
8107	Seram Bagian Timur	8207	Pulau Morotai
8108	Maluku Barat Daya		
8109	Buru Selatan		



Annex 3.7 Map of districts in Papua and Papua Barat provinces





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