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Health Sector Decentralization and Indonesia's Nutrition Programs:

OPPORTUNITIES AND CHALLENGES

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HEALTH SECTOR DECENTRALIZATION AND INDONESIA'S NUTRITION PROGRAMS: OPPORTUNITIES AND CHALLENGES

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TABLE OF CONTENTS

I. INTRODUCTION

Malnutrition, which occurs to varying degrees in all provinces of Indonesia, is a significant and preventable risk factor affecting the quality of human resources. The effects of malnutrition range in severity from growth retardation, reduced resistance to illness, and learning impairment to severe disability and early mortality. In the last 25 years, Indonesia has made considerable progress through its efforts to reduce malnutrition. Nevertheless, certain nutrition problems persist through today.

In the past, Indonesia has mainly operated centrally designed and managed large scale nutrition projects. Some of the successful examples include the expansion of the Posyandu in the 1970s and the creation of the Bidan Di Desa program in the 1990s. Both of these programs led to gains in the nutritional status of children. Now, however, the national Ministry of Health no longer plays the role of front line provider of nutritional services. Instead it serves as an advisor to districts and provinces as the local governments now engage the local nutritional situations found throughout Indonesia.

Against the backdrop of gradual improvements in population nutrition, Indonesia's recent program of political decentralization poses new opportunities and challenges for the health sector in general and nutrition delivery in particular. There is considerable diversity in nutritional outcomes across provinces, and at district level within provinces, driven by local factors as well as average socioeconomic status. Under decentralization, local governments have become the focal point for health care provision. This shift is an opportunity to make public spending more responsive to the varying local conditions of malnutrition and disease.

However, the process of decentralization faces challenges from institutional issues evident in the past implementation of nutrition processes. These issues include the lack of coordination and suitability in government structures and bodies, inadequate skills of district level staff, and insufficient planning devoted to the process. The movement to decentralized, local-level programs may also be associated with the loss of economies of scale.

There is a tension between the need for nutrition programs to address increasing regional disparities and the possibility that local governments may not have adequate capacities or resources to recognize and address their local nutritional issues.

This policy concept paper is intended to assist the center navigate the tension between opportunities and challenges as activities are adapted to the decentralized national nutrition policy, and to help guide districts and provinces in the conduct of locally appropriate nutrition programs. This paper synthesizes the findings of an extensive study undertaken by the World Bank and presented in four annexes to this report. The annexes provide extensive data and analysis to shed light on the opportunities and challenges in the new institutional environment.

Annex A describes the current state of nutrition outcomes and service utilization in Indonesia today through the analysis of recent large scale household surveys. It indicates that whilst there has been gradual improvement in several national-level indicators, at the disaggregated level achievements have been unequal. Specifically, nutrition outcomes are poorer for individuals with lower socioeconomic and educational status.
Annex B also makes use of data from the large scale household surveys, and is the first of two annexes analyzing local diversity. It focuses on the diversity in nutrition outcomes and service use across Indonesian districts and provinces. Annex C begins with a review of the costs and effectiveness of existing nutrition programs such as growth monitoring and promotion, supplementary feeding, and vitamin A, iron, and iodine supplementation programs. The review of cost-effectiveness is extended to a careful analysis of the substantial regional heterogeneity in both the costs and effectiveness of delivery. The results in Annexes B and C are important for the decentralization program since regions vary in the nutritional conditions of local populations and the ability to service these populations. Consequently the cost effectiveness of these programs will vary within Indonesia.

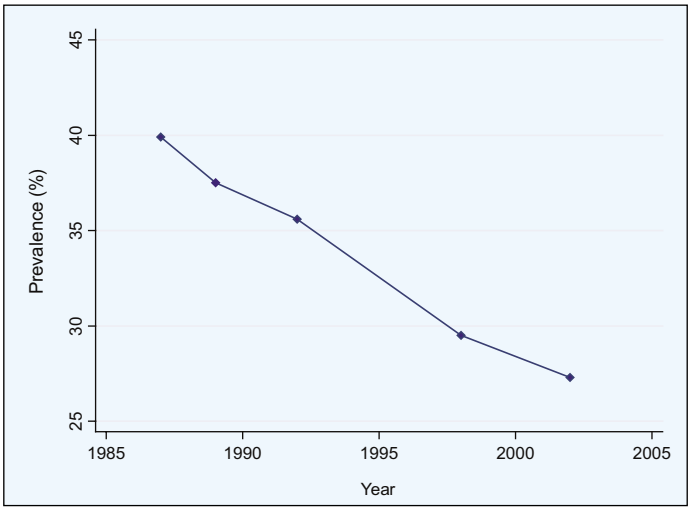
Annex D focuses on the challenges inherent in the institutional setting as it exists today, as well as the demands of the new decentralized service delivery environment. It concludes by discussing how the existing setting can be adapted to better serve the new environment.

The main sections of the paper below present a summary of the results and conclusions discussed in detail in the annexes. It begins with a review of the accomplishments and remaining nutrition challenges for Indonesia. It then turns to look at the regional diversity in Indonesia's nutrition challenges and asks which type of nutrition programs are most cost-effective. It concludes with an assessment of the existing institutional arrangement for nutrition service delivery, and discusses steps Indonesia can take to further improve population nutrition and health.

II. ACCOMPLISHMENTS AND REMAINING NUTRITION CHALLENGES FOR INDONESIA

Nutritional status in Indonesia has improved markedly over the past decades. In particular, Indonesia has achieved a large decrease in protein-energy malnutrition. Figure 1 below shows that the prevalence of underweight among children under-5 years was 27% in 2001, a reduction by about one third from prevalence in the late 1980s (Marks 2003). In addition, Indonesia is one of the first developing countries to identify micronutrient deficiency problems and launch successful micronutrient intervention programs (GOI 2003). By the early 1990s, severe vitamin A deficiency (VAD) declined to a level where it was no longer a public health problem (Helen Keller International, 1998). The total goiter rate (TGR) also declined from 28% in 1990 to 10% in 1998. In 14 iodine deficiency disorder (IDD) endemic districts, TGR decreased further from 44% in 1996-98 to 25% in 2003 (World Bank 2004). Thanks to improved availability of iodized salt, in part due to the IDD project, Indonesia now has the highest coverage of iodine fortified salt use in South East Asia (UNICEF 2005).

Figure 1.
Trend of underweight prevalence among children under-5 years, Indonesia

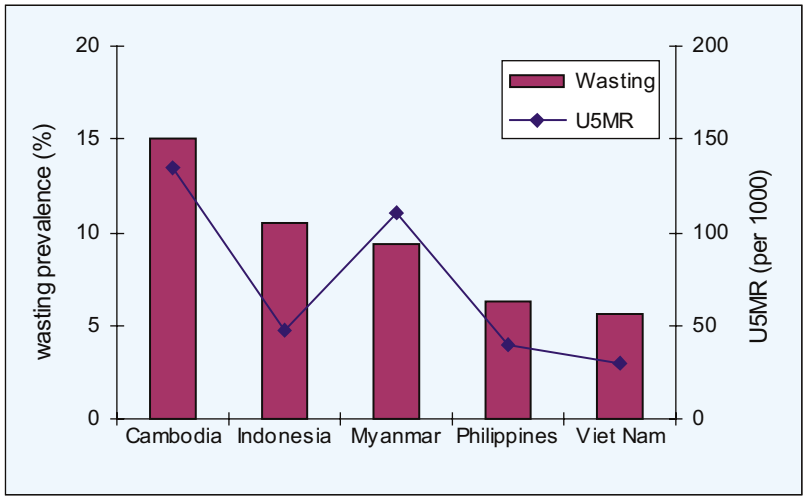


(Source: WHO Global Database on Child Growth and Malnutrition, SUSENAS 2001)

However, Indonesia still faces many challenges. Continuing improvement in nutrition has been threatened by the economic crisis in 1997/98, declining resources for nutrition, and increasing diversity in food intake. Indeed there has recently been a slight upsurge in the percentage of children underweight, partly due to the income shocks of the recent crisis. More than a quarter of children are still underweight, and about 33% and 11% of children are stunted (a long-term malnutrition indicator) or wasted (a short-term malnutrition indicator) in 2000, respectively. Regional comparisons show that prevalence of underweight and stunting in Indonesia is roughly similar with those in Myanmar, Philippines, and Viet Nam (UNICEF 2005). However, Indonesia has a high wasting prevalence relative to its under-five mortality rate in comparison (Figure 3), implying a more urgent problem of short-term malnutrition.

Figure 3.

Prevalence of wasting and Under-five mortality rate for selected Southeast Asian countries, 2000*



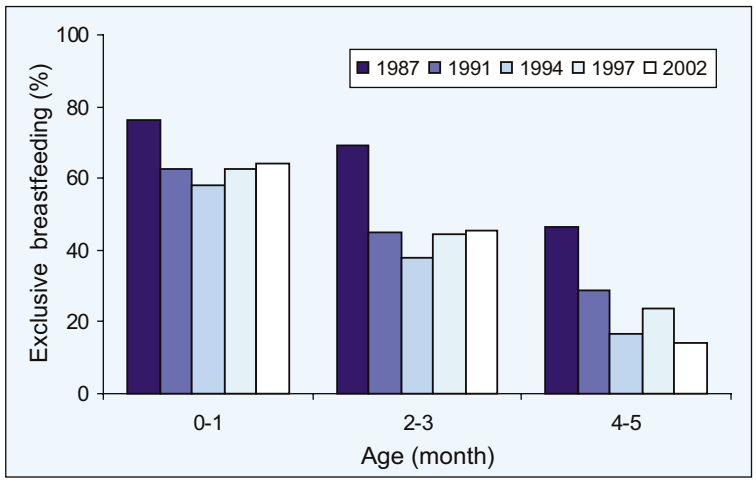
(SOURCE: UNICEF http://www.childinfo.org, accessed on March 18 2005, and Indonesian Family Life Surveys 2000)

** The wasting estimate for the Philippines is from year 2001.*

Efforts to promote exclusive breastfeeding appear to be flagging. The health benefits of breastfeeding for both mother and child are well documented, and WHO and UNICEF recommend that infants are exclusively breastfed for the first 6 months of life (WHO 2001). However, only 38% of children under-6 months of age had exclusive breastfeeding in Indonesia (BPS and ORC Macro 2003). Furthermore, exclusive breastfeeding rates have stagnated or decreased steadily since the late 1980s (Figure 4). Improvements in child nutrition can be realized through the continued promotion of exclusive breastfeeding and Indonesia should further utilize the village midwife program to carry out such promotion (Frankenburg 2003).

Figure 4.

Trends of exclusive breastfeeding rates by age group



(Source: ORC Macro, 2005. MEASURE DHS STATcompiler: http://www.measuredhs.com, accessed on March 18 2005)

Chronic energy deficiency (CED) among women is still a prevalent problem in Indonesia. Among women between 15 and 50 years, about 14% are estimated to have CED[1] in 2000. In particular, CED is more prevalent among younger women between 15 and 30, who are responsible for about 70% of child births (BPS and ORC Macro 2003), and is possibly an important risk factor for low birthweight. At the same time, overweight and associated chronic diseases have increased in Indonesia. About 21% of women between 15 and 50 were estimated to be overweight in 2000. The overweight prevalence is substantially higher for those in the 30s and 40s and for those in urban areas, indicating an emerging need for chronic disease prevention in these populations[2].

For micronutrients, about 19% of women 15-49 years and 53% of children 1-4 years still suffer from anemia[3]. In particular, nearly 70% of children between 12-23 months were estimated to have anemia. In terms of subclinical VAD, no national-level data are available. Severe clinical VAD is minimal in Indonesia, and population-level data on subclinical VAD is needed to properly monitor and evaluate vitamin A supplementation programs. Iodine deficiency remains prevalent in some parts of the country.

With respect to micronutrient programs, 80% of pregnant women received antenatal iron supplementation; 43% of post-partum women and 75% of children 6 to 59 months received vitamin A supplementation; and 85% of households consumed iodine fortified salt[4] (BPS and ORC Macro 2003).

Beyond national-level accomplishments and challenges, nutritional outcomes and service utilization vary greatly by socioeconomic background. Assuring equity of opportunity is a key role for government and inequalities in nutrition outcomes and service utilization will hopefully motivate new policy approaches. Women and children in socio-economically disadvantaged groups — those living in a rural area or a poor household, and with less education — have poorer outcomes and lower program utilization, indicating greater nutritional needs.[5]

Figure 5 shows the wealth gradient in selected nutritional outcomes, holding various demographic and socioeconomic characteristics constant. Women and children from the poorest quintile households are more likely to be malnourished — for both micronutrients and energy — compared to those in the three middle wealth quintiles, whereas women and children from the richest quintile are better off than those in the middle group.

[1] Measured by Body Mass Index below 18.5

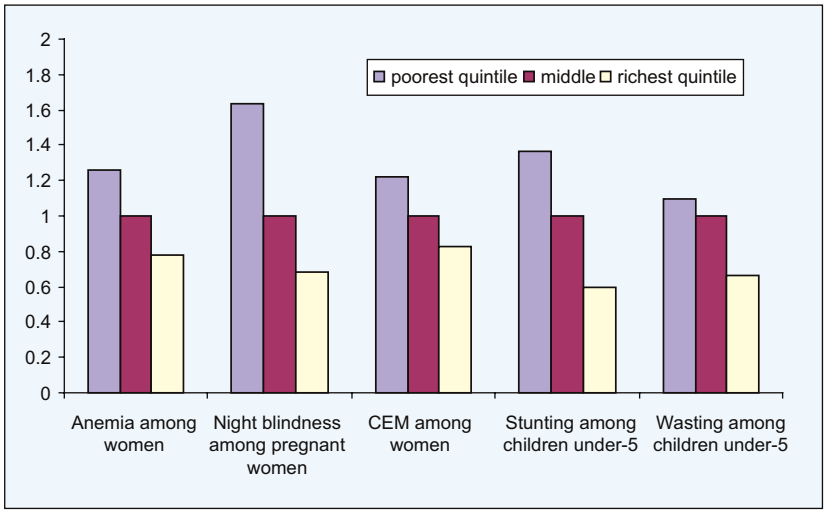
[2] The national health and household surveys conducted in 1995 and 2001 reported increasing cardiovascular disease-specific mortality rates among adults (GOI 2003).

[3] Source: Indonesian Family Life Survey 2000. Anemia refers to serum hemoglobin level below 11 g/dl (12g/dl for pregnant women).

[4] Iodized salt coverage was estimated using SUSENAS 2003.

[5] Two exceptions to the rural/poor disadvantage are exclusive breastfeeding and overweight prevalence.

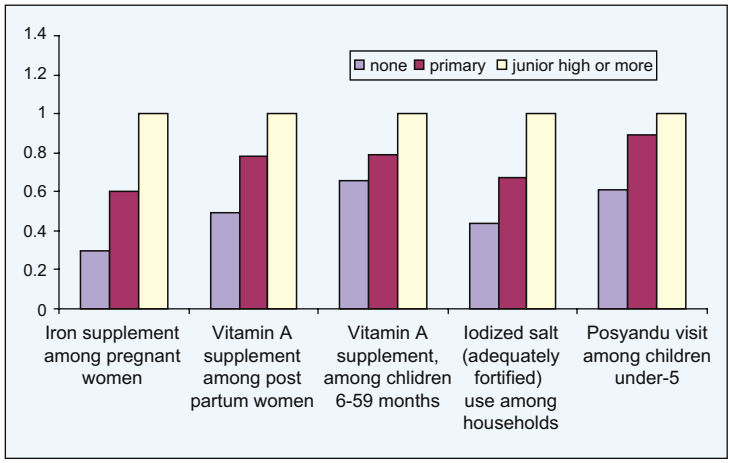
Figure 5.
Relative odds of selected nutritional problems by household wealth status



Results from multivariate analyses (Annex A). The reference group is the three middle quintiles. All disparities are statistically significant, except odds of night blindness for the richest quintile and odds of wasting among the poorest quintile.

Inequalities in service utilization by educational attainment are also evident (Figure 6). Compared to those who completed junior high school or more, women and children in lower educated groups are less likely to use a program even after controlling for household resources. Given the observed socioeconomic gradients, strategies targeting increases in service utilization and nutritional intake among the less educated and/or the poor are essential in order to sustain nutritional improvement in Indonesia.

Figure 6.
Relative odds of service utilization by educational attainment



Results from multivariate analyses (Annex A). The reference group is junior high school or more. All disparities are statistically significant.
† Mother's educational status
‡ Household head's educational status

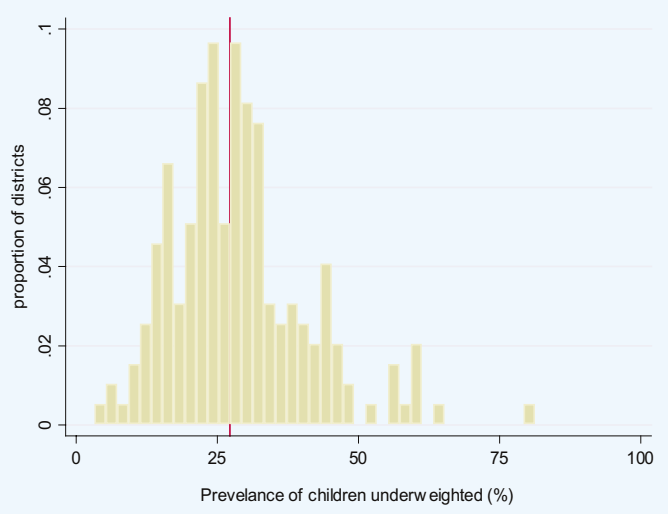
III. MULTI-DIMENSIONAL DIVERSITY IN INDONESIA'S NUTRITION CHALLENGES

As previously mentioned, Indonesia's recent program of political decentralization now poses new challenges and presents new opportunities for the health sector in general and nutrition delivery in particular. The share of local governments in total public health spending increased from 10% prior to decentralization to 50% in 2001. This shift in fiscal responsibility will hopefully make public spending more responsive to the local conditions of malnutrition and disease. However it may also cause increasing regional disparities if local governments do not have adequate capacities or resources to recognize and address local nutritional issues. Measuring and assessing district-level heterogeneity is a pre-requisite for guiding and coordinating local nutrition policies at the central and provincial level, and this study uses existing data sets to accomplish this task.

District Level Diversity in Nutrition Outcomes

Nutrition conditions vary widely across districts in Indonesia. A first step to inform nutrition policy makers at a local level is to understand variation in nutritional outcomes and service utilization across districts and provinces. This section presents the magnitude and patterns of this regional variation seen in large scale social surveys. Indonesia has 33 provinces and more than 440 districts and municipalities. There is significant variation in nutritional status across districts. For instance, the district-level prevalence of underweight[6] among children under-5 years ranged from 3% to 81%, while the national average was about 27% (Figure 7). In addition, although about 13% of women were estimated to have CED[7], this prevalence varied from 0% to 60% at the district-level. About 34% of districts had CED prevalence of 15% or higher.

Figure 7.
Distribution of district-level prevalence of children 0-4 years underweight (%)



(Source: SUSENAS 2001. Red line indicates the national average)

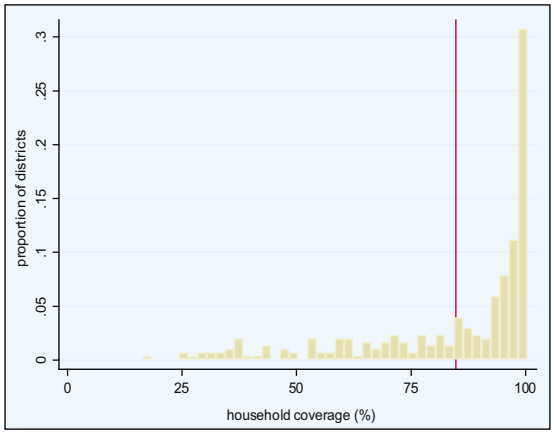
[6] Children whose weight-for-age is less than 2 standard deviation below median of a standard international distribution
[7] Women whose Middle Upper Arm Circumference is less than 23cm.

Similarly, although the national iodized salt coverage rate is about 82%, and 58% of districts reached coverage 90% or higher, coverage at the district level varied greatly from 17% to 100%. Variation is much greater for adequately fortified iodized salt use: compared to the national average of 66%, the district-level coverage ranged from 9% to 100%. About 21% of districts had coverage below 50%, while 24% of districts had coverage of 90% or higher (Figure 8). In addition, most provinces with low utilization of iodized salt are concentrated in eastern Java Island, Bali, and southern Sulawesi, where small-scale salt farming is prevalent. This indicates the need for interventions targeted to small-scale producers of salt or reorganization of the salt industry.

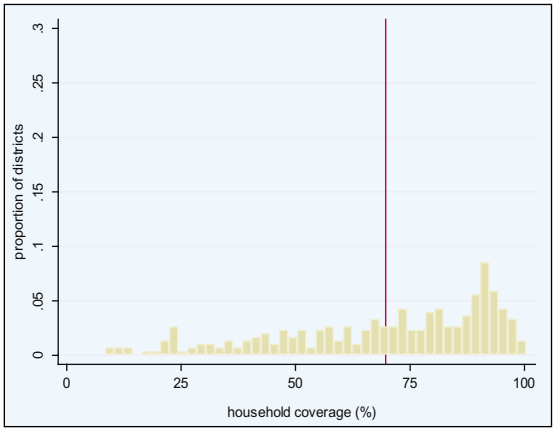
Figure 8.

Distributions of district-level coverage of iodine fortified salt (%)

a) Iodized salt



b) Adequately fortified iodized salt

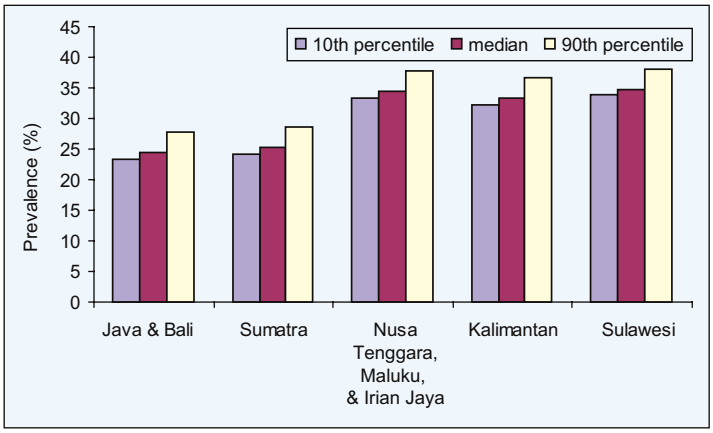


(Source: SUSENAS 2001. Red line indicates the national average)

A majority of this variation in nutritional outcomes and program utilization is explained by the socioeconomic characteristics of each district (See Table B2, Annex B, for more information on multivariate analyses). Districts with a higher percent of households living under the official poverty line were more likely to have a higher malnutrition prevalence among women and children, even after controlling for other district-level socioeconomic conditions such as income inequality, education, and urban/rural status (Figure 9).

Figure 9.

Predicted* district-level prevalence of underweight among children 0-4 years, by region and district poverty level (10th percentile, median, and 90th percentile of the district poverty distribution)



(Source: SUSENAS 2001)

Poverty level refers to percent of population living under the poverty line. Poverty levels are 1%, 6%, and 20% for the 10th percentile, 50th percentile, and 90th percentile of the district-level distribution, respectively.

* *Unweighted average of district-level mean was used for other variables (education, GINI coefficient, and residential area). More information on district-level multivariate analyses is available in Table B2 (Annex B).*

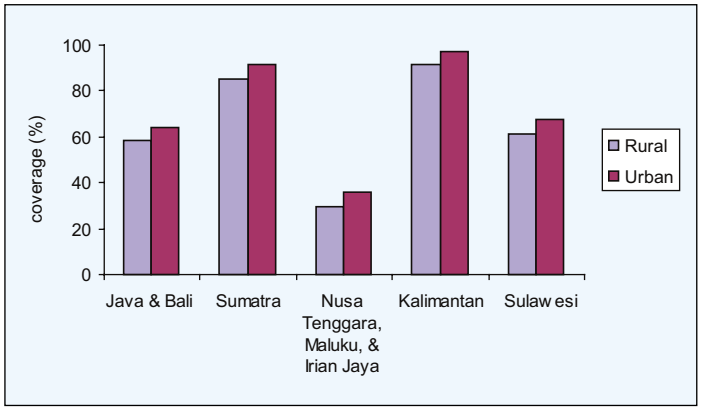
** *Differences by poverty level are statistically significant.*

*** *Differences between Sumatra and Java & Bali are not significant. Predicted probabilities in Nusa Tenggara, Maluku, and Irian Jaya, Kalimantan, and Sulawesi are higher than that in Java & Bali at a significant level.*

Households in urban districts are more likely to consume adequately fortified iodized salt than households in rural districts, even after controlling for socioeconomic characteristics (Figure 10). Districts with a higher proportion of adults who have completed primary education also had higher coverage of iodized salt use. However, even within similar socioeconomic level, districts tend to perform differently depending on the region. For example, districts in Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Irian Jaya had higher prevalence of underweight among children than districts in Java and Bali (Figure 9). Districts in Nusa Tenggara, Maluku, and Irian Jaya had lower coverage of iodized salt than those in Java and Bali (Figure 10).

Figure 10.

Predicted* district-level coverage of adequately fortified iodized salt among households, by region and district type



(Source: SUSENAS 2001)

* *Unweighted average of district-level mean was used for other variables (poverty level, GINI coefficient, and education). More information on district-level multivariate analyses is available in Table B2 (Annex B).*

** *Differences by residential area are statistically significant.*

*** *Differences between districts in Java & Bali and districts in Nusa Tenggara, Maluku, and Irian Jaya are statistically significant.*

Province Level Diversity in Nutrition Outcomes

Substantial variation in nutritional outcomes exists at the province-level as well. Relative differences across provinces exceed two fold for the prevalence of underweight, stunting, and wasting among children 0-4 years. The prevalence of wasting — an indicator of short-term malnutrition — ranged from 3% in Bali to 16% in South Sumatra[8]. Anemia prevalence among women also varied from 12% in West Sumatra to 32% in South Sumatra[9]. The majority of provincial variation in most nutritional outcomes can again be explained by socioeconomic characteristics across provinces. The prevalence of both energy malnutrition and anemia increase with the percent of households living under the poverty line (Figure 11-12).

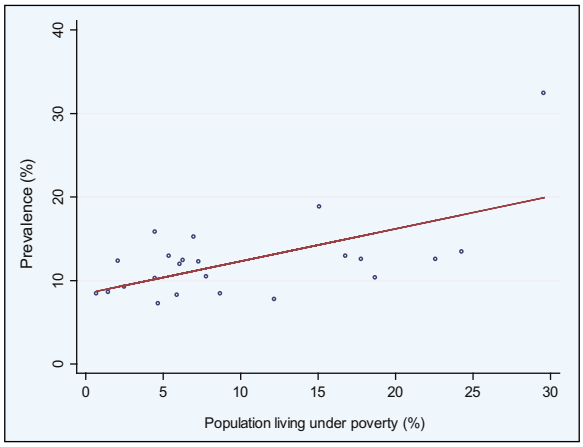
[8] Among 13 provinces included in the Indonesian Family Life Survey 2000

[9] Among 13 provinces included in the Indonesian Family Life Survey 2000

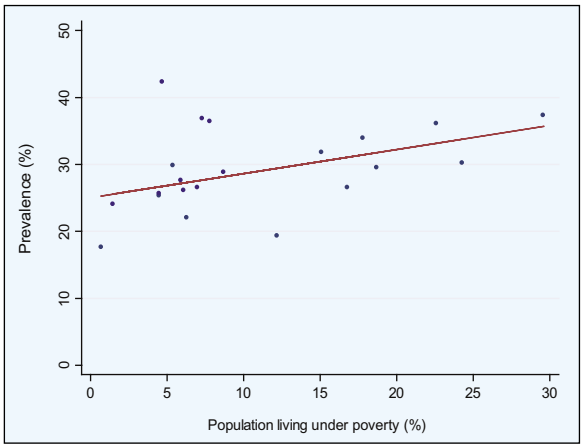
Figure 11.

Malnutrition prevalence and poverty at the province-level

a) CED among women 15-49 years



b) Underweight among children 0-4 years



Solid line is a fitted line from a simple linear regression (Source: SUSENAS 2001)

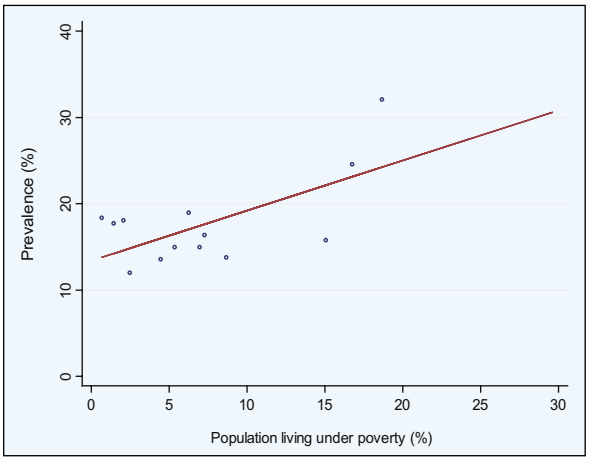
CED refers to women whose Middle Upper Arm Circumference less than 23 cm

Underweight refers to children whose weight-for-age is less than 2 standard deviation below median of a standard international distribution

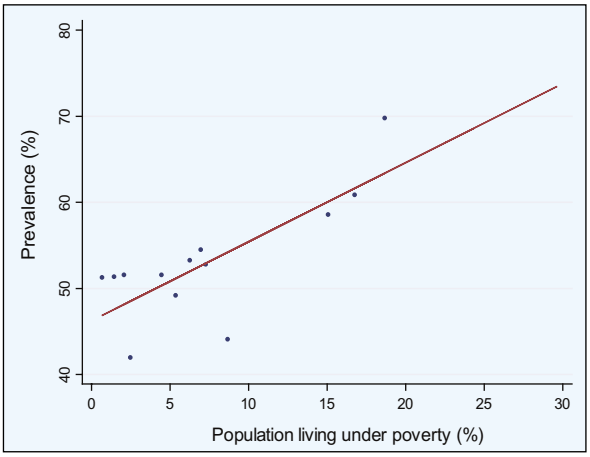
Figure 12.

Anemia prevalence and poverty at the province-level

a) Anemia among women 15-49 years



b) Anemia among children 1-4 years



Solid line is a fitted line from a simple linear regression (Source: Indonesian Family Life Survey 2000)

Anemia refers to serum hemoglobin level below 11 g/dl (below 12/g/dlf or pregnant women)

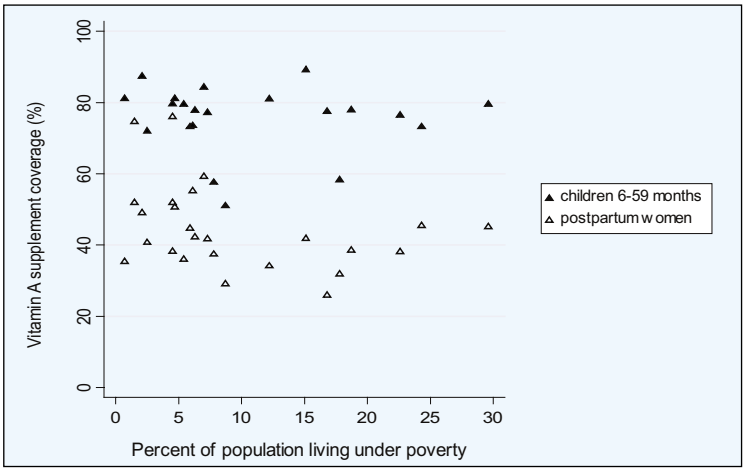
Province Level Diversity in Nutrition Service Utilization

Nutrition service utilization also varies across provinces. Antenatal iron supplementation coverage ranged from 58% in Central Kalimantan to 98% in DI Yogyakarta. Vitamin A supplementation among children 6 to 59 months varied from 51% to 80%. Adequately iodized salt use at home ranged from 19% in NTB to 96% in Jambi. However, the relationship between service utilization and provincial poverty levels varies

by program. Antenatal iron supplement coverage is negatively correlated with the provincial poverty level. For vitamin A supplementation, however, there was no clear coverage pattern by poverty indicating vitamin A supplementation programs were implemented to a similar extent across provincial poverty levels (Figure 13). In addition, as observed in the district-level, there was no clear relationship between Posyandu use among children 0-4 years and poverty at the province-level (result not shown). Finally, iodized salt use did not show a linear relationship with provincial poverty, but the scatter plot showed a rather unique convex shape, indicating relatively lower coverage in provinces with both low and high poverty (result not shown).

Figure 13.

Vitamin A supplement program coverage and poverty at the province-level



(Source: Demographic Health Surveys 2002/3)

Given the significant amount of variation in nutritional outcomes and service utilization across districts and provinces, a one size fits all approach to the nutrition policy will most likely not address the diverse problems in each district or province. More individually tailored programs for each local area (either a district, a group of districts, or province) based on local conditions should now be the model with decentralization. However, ensuring equity across the nation will be the challenge for decentralization. The analysis presented here confirms that the resource poor regions are those with the greatest nutritional needs. If the goal is to raise the nutritional status of every Indonesian, the central government may consider supporting socio-economically disadvantaged areas with more resources and/or technical support.

IV. WHICH TYPES OF NUTRITION PROGRAMS ARE MOST COST-EFFECTIVE?

The determinants of the most effective use of health funds are an important input into policy design. The cost-effectiveness review summarized here pays careful attention to the substantial regional heterogeneity in both the costs and effectiveness of delivery and to the determinants of such heterogeneity. Regions vary in the nutritional conditions of local populations as demonstrated above. This is a major cause for the observed heterogeneity in program cost effectiveness. Another important factor is district capacity

for implementing nutrition policy. Recognizing and understanding this heterogeneity in capacity is an important step in determining the effective conduct of policy in diverse settings.

Estimating the costs of actual nutrition interventions is a necessary first step for the assessment of cost-effectiveness. To get a better sense of the types and the range of costs borne by nutrition interventions, this study fielded and analyzed a cost survey of existing nutrition programs and activities. An activity-based costing framework was used for the survey design. Five districts were purposively sampled and visited in this study — one in the province of Lampung, one in Yogyakarta, two in East Java, and one in East Nusa Tenggara.
The survey focused on five main nutrition activities currently undertaken by the Government of Indonesia: (1) Child growth monitoring and promotion, (2) Supplementary feeding, (3) Vitamin A supplementation, (4) Iron supplementation, and (5) Iodine supplementation. Information was collected on the cost of implementing selected nutritional programs in each district. Respondent sources included staff members from both Posyandu and Puskesmas facilities in each district, selected at random. In addition, each District Health Department was visited by the surveyors as well as the Provincial Health Departments in the relevant provincial capitals and the National Department of Health in Jakarta.

The annual cost per recipient, child or woman — also known as total unit cost — in each of the five districts is summarized in Table 1. This cost includes variable, fixed, off-budget, and 'extra activity' components (see Table C3, Annex C). The annual cost per recipient varies substantially across the five districts. This should not be surprising since many factors that determine program costs vary across districts, such as the overall local price levels, the size and density of the catchment area served by the program, and the manner in which the program is managed.

Table 1.
Annual cost per recipient for the five selected programs, per person/year (in Rupiah)

Program	Kota Surabaya	Lumajang	Kupang	Gunung Kidul	Lampung Selatan
Vitamin A supplementation					
Infants 6-11months	2057	2513	1317	2315	1540
Children 12-59 months	1886	2455	1360	2894	3241
Post-partum mothers	3467	4603	2910	3298	3103
Iron supplementation					
Pregnant women	3139	3518	2899	2714	2804
Iodine supplementation					
School age children	-	1300	-	1200	-
Growth monitoring					
Children under 5 years	24220	22126	15317	20171	18473
Therapeutic feeding (Puskesmas)					
Children under 5 years	257049	215256	408234	191452	-
Complementary feeding (Posyandu)					
Children under 5 years	183264	188305	221882	207521	-

International estimates show that nutrition programs are amongst the most cost-effective health interventions available (World Bank 1993). However both the costs and effectiveness of any programs can vary widely according to the health conditions in a specific location and how the programs are

implemented. Because the district is now the focal point in Indonesia for decisions on health priorities, which programs are to be implemented and how these are supported, it is important to consider the cost-effectiveness (CE) of nutrition programs at the district-level. We use the cost information for the five districts described above to estimate CE for the nutrition programs at the district-level. Cost-effectiveness is measured in terms of Rupiah per DALY averted and summarized in Table 2 (Details of this approach are given in Annex C).

Table 2:
Estimated cost effectiveness of selected the nutrition interventions at district-level (in '000 Rupiahs/DALY averted)

Intervention	Target Population	District				
		Kota Surabaya	Lumajang	Kupang	Gunung Kidul	Lampung Selatan
Vitamin A supplementation	Children 6-59 months	158	235	126	232	306
Iron supplementation	Pregnant women	74	94	82	63	78
Growth monitoring & complementary feeding	Children 6-12 months	10536	10916	15466	11817	-

The range in CE across districts within intervention type is greatest for Vitamin A supplementation, with a ratio of 2.44:1 for the highest incremental cost per DALY averted to the lowest (235 in Lampung Selatan vs. 126 in Kupang). The corresponding ranges for iron supplementation and growth monitoring/ complementary feeding are 1.50 and 1.47 respectively. Surabaya ranks as the first or second most cost-effective district across the three interventions, that is the least cost per DALY averted, partly because Surabaya is an urban area and the population density reduces the cost of serving the catchment area. The other districts rank quite differently depending on the intervention. For example, Kupang is the most CE for vitamin A, but near the least CE for the others.

The three interventions are quite distinct in their relative CEs in the five districts, with no overlap between the ranges and a clear ranking in CE - iron supplementation is clearly the most CE, followed by vitamin A supplementation, then growth monitoring/ complementary feeding, in a ratio of 1:2.7:155.8. Compared to growth monitoring and complementary feeding, the two micronutrient supplementation programs are significantly more cost-effective. Due to varying methods of cost estimation, there are few other data with can be directly compared with the estimated absolute dollar amount per DALY averted[10]. However, WHO also estimated that vitamin A and iron supplementation programs were far more effective than the growth monitoring and complementary feeding program in the Southeast Asia region: 128, 230, and 3478 I$/DALY averted, respectively (WHO-CHOICE 2003)[11].

[10] Our cost survey only focused on the marginal cost of implementing a specific intervention. However WHO's costs included the cost of an overall health center visit. In addition, WHO included the cost of 3-month postpartum iron supplementation for iron supplementation while we restricted to cost within the antenatal period only (WHO-CHOICE 2003).

[11] International dollar (I$) is based on year 2000, and WHO's estimates are based on program coverage comparable to what observed in the five districts.

V. ASSESSING EXISTING INSTITUTIONAL ARRANGEMENTS OF NUTRITION SERVICE DELIVERY

Decentralization has raised significant questions regarding the relationships between different levels of government in Indonesia and the roles of key institutions and agencies in nutrition delivery. This section summarizes a systematic study, conducted in the spring of 2005, of the divisions of roles and responsibilities between levels of government and other institutions involved in nutrition program delivery. The work aims to provide a comparative institutional analysis across administrative levels and regions. Four districts from three provinces were purposively sampled for these case studies. They are Kota Surabaya and Lumajang in East Java, Gunung Kidul in Yogyakarta, and Kota Kupang in East Nusa Tenggara (see Annex D for details). These are among the same districts selected for the CE exercise and so will provide complementary information.

Our review identified five important institutional issues limiting Indonesia's response to nutrition problems. First, government structures and processes are unsuited to tackling nutrition problems in a large and diverse country in which the type and degree of nutrition problems also varies widely across districts. The most critical issue is the contested authority between the various levels of government in the wake of the initial decentralization and its continuing modification. The result of this contested authority is considerable variation across districts with no clear relationship between the local structure and the nature and extent of local nutrition problems. While this variation is particularly noticeable across districts, it is also apparent across provinces.
Additionally, the distribution of responsibilities within districts, and between districts and provinces, has become opaque or overlapping. Some districts still preserve an explicit nutrition section operating under the DHO; some have merged the nutrition section into more broadly defined health sections; and some do not have any nutrition related section or sub-section at all. A combination of these three varieties can be seen across the 38 districts in East Java. On the other hand all 16 districts in NTT have a nutrition section.

These opaque and overlapping responsibilities are, in part, due to the lack of a coordinating body, and each district or province has created redundant or duplicate roles and responsibilities. For example both the Bappeda and the SKPE in NTT are responsible for the collection of nutrition data. In addition, no section or sub-section covers all the roles and responsibilities necessary for nutrition policy and service delivery. For instance, health surveillance (including nutrition) is under provincial authority[12], but few PHOs have a defined role for surveillance.

These problems result in structures and staffing levels that are not clearly related to the nutrition and health problems of individual districts. In addition there currently appears to be limited possibility to make changes to provide approaches and structures more aligned to addressing the local issues.

The second institutional issue regards the overall low skill levels of district level staff. There is a mismatch between the required skills, especially for program planning and evaluation, and those available at the district and provincial levels. District staff who previously were expected to merely follow the central

instructions are now, suddenly, expected to plan, implement and evaluate nutrition programs, tasks for which they are ill-prepared. Equally important, there is an almost complete absence of in-service training for staff at all levels, especially at the district and provincial levels.

Third, as a result of the low level of human resources devoted to nutrition and the skills mismatch for those staff that are available, planning and implementation of nutrition programs is inadequate. Crucially, the lack of monitoring and evaluation at all levels means that the evidence base for program planning is very thin. The result is that the overall coverage and effectiveness of most nutrition programs is low.

Fourth, there are limited resources for nutrition programs. This occurs partly due to delays in the release of funds under new budget processes and partly to the low priority accorded to nutrition by district administrators and parliaments. There are indications that these resource issues may be, worse in those areas with the greatest nutrition problems, though more analysis is required on this subject.

And fifth, there is substantial variation in the collaboration with groups outside government at the district level. Collaboration at the central level is good, especially with national companies (e.g. Kimia Pharma, Indo Pharma and Gizindo) and national NGOs, especially the Indonesian Coalition for Fortification. Collaboration at the district and provincial levels is much more limited, a notable exception being the close coordination between the LPKS and Kota Surabaya.

[12] Based on PP No. 25/2000

VI. WHERE TO FROM HERE

As the first part of this paper shows, Indonesia has done well in controlling nutrition problems to date. For example, in the last decades protein-energy malnutrition has been reduced by a third, vitamin A deficiency has been controlled to the point where it is no longer a public health problem, and there have been important reductions in the extent of iodine deficiency. At the same time challenges remain — protein-energy deficiency is still important, anemia is widespread, important pockets of iodine deficiency remain, and new problems associated with lifestyle and nutrition are now important in some groups.

With significant old and new nutrition challenges remaining, the nutrition situation in Indonesia is characterized by considerable diversity. This diversity is manifest in variation between districts in the level of malnutrition and considerable variation between regions and with socioeconomic status and maternal education. But there are also equal levels of diversity between districts in program implementation, coverage and impact. And finally, there is considerable diversity in the way in which districts are now organized to combat malnutrition. One of the important results of this multi-dimensional diversity is variation in the cost-effectiveness of the main nutrition control programs at the district level.

In recent years Indonesia has undergone significant administrative changes, with decentralization of major resources and responsibilities to the district level being the most important institutional change in the last 50 years. However, contrary to expectations, decentralization has not so far resulted in local governments and programs that are more responsive to local conditions and variations in malnutrition. Further, there has been a loss in the ability to deal with inter-district issues. These are the same as the issues which affect all parts of the health system.

The challenge now is to address these remaining nutrition problems within the context of the new, decentralized Indonesia. The wide variation between districts in nutrition problems, their solutions and in the cost-effectiveness of current interventions, calls for locally differentiated approaches. The new decentralized structure contains the potential for the flexibility needed. To realize this potential the government now needs to:

- Reform government structures and processes so that they are suited to tackling nutrition in a large and diverse country. This will involve delineation of clear institutional roles at each level of government where the provinces and the center specialize in critical public nutrition functions and districts assume primary responsibility for nutrition sector performance in their jurisdictions using local staffing structures and interventions that are responsive to the local nutrition problems and capacity;

- Augment human resources so that there is a close match between the required skills and those available, particularly at the district and provincial levels. This will involve not only rationalization of staffing structures and roles, but also attention to pre-service and in-service training to ensure that the skills required for the various roles are available;

- Strengthen planning and implementation of nutrition programs. Apart from a renewed emphasis on training, this will involve collaboration with other levels of government, a range of government departments, universities and NGOs;

- Ensure adequate financial resources for nutrition programs, especially in the worst affected areas. Apart from continuing reform of government budget processes at all levels, this will involve active advocacy with the district authorities for increased resources for nutrition in accordance with a locally relevant evidence base that includes the nature and extent of the local problems and the local effectiveness of interventions;

- Promote collaboration at all levels with groups outside government in the design, delivery and evaluation of nutrition programs.

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ANNEX A.

OVERVIEW OF NUTRITIONAL SITUATION IN INDONESIA — OUTCOMES AND SERVICES

In Annex A, we examine (1) the overall nutritional situation in Indonesia and (2) inequalities in nutrition outcomes and service utilization by socioeconomic status and residential area.

Data

This overview involves the analysis of three major data sources including the National Socio-Economic Household Survey (SUSENAS) 2001 and 2003, the Indonesian Family Life Survey (IFLS) 2000, and the Indonesian Demographic and Health Survey (DHS) 2002/3. Although these surveys differ in sampling frames and questionnaire content, we maximize the available information by using a survey where that particular survey is strongest. This means that for a particular indicator the data source may vary, but in general a more recent and/or nationally representative survey is used when multiple sources are available (Table A1).

SUSENAS is a series of large-scale multi-purpose annual socioeconomic surveys initiated in 1963. It has included a nationally representative sample, typically of about 200,000 households since 1993. Each survey contains specialized modules covering about 60,000 households that are rotated over time to collect specific information such as health care and nutrition. SUSENAS 2001 and 2003 contained health modules which collected anthropometric measures: weight for children and mid-upper arm circumference for adult women. The large sample sizes facilitate estimations at a district-level, which is typically not possible in IFLS and DHS.

IFLS is a continuing longitudinal socioeconomic and health survey. It is based on a sample of households representing about 83% of the Indonesian population living in 13 of the 26 provinces in 1993: Sumatera Utara, Sumatera Barat, Sumatera Selatan, Lampung, Jakarta, Jawa Barat, Jawa Tengah, Yogyakarta, Jawa Timur, Bali, Nusa Tenggara Barat, Kalimantan Seletan, and Sulawesi Seltan. The first wave (IFLS1) was administered in 1993 to individuals living in 7,224 households, followed by subsequent surveys in 1997, 1998, and 2000. IFLS 2000, which covered 43,650 individuals, included information on serum hemoglobin level, the only serum biomarker available in our analysis, and various anthropometric measures for women and children.

Finally, DHS is a nationally-representative household survey on the areas of population, health, and nutrition. It is a standardized survey which has been conducted across more than 70 countries. Typically, women between 15 and 49 from sampled households are interviewed on various health and population issues. For children of these women between 0-4 years of age detailed maternal and child health care information — including nutrition — is obtained. In Indonesia, five surveys have been conducted since 1987. DHS 2002/3 is the latest survey with a sample size of 29,483 ever married women from 33,088 households.

Nutritional outcome and service utilization indicators

We focus on two broad areas of nutrition programs in this report: (1) prevention of micronutrient deficiency including iron, vitamin A, and iodine, and (2) growth monitoring and promotion. A brief overview of nutritional programs is presented in Box A1. For each program area, we examine both outcome and service utilization indicators. Definitions of the indicators employed are explained in detail in Table A1.

For micronutrient deficiency prevention programs, limited outcome indicators and relatively rich information on service utilization are available. Serum hemoglobin level is the only biologic indicator included. Night

blindness during pregnancy — which is relatively rare and symptomatic — is included, but no vitamin A deficiency measure among children is available at the national-level. No outcome indicator on iodine deficiency is included in our analysis.

Various anthropometric measures are available as outcome indicators for growth monitoring and promotion. For adult females, a Body Mass Index (BMI) below 18.5 and Mid-Upper Arm Circumference (MUAC) less than 23 cm are considered indications of malnutrition. A BMI of 25 or higher is considered overweight. For children, standardized Z-scores, or number of deviations below the median, are calculated based on weight, height, and age. Children whose Height-for-Age Z score is less than -2 are categorized as stunted, whose Weight-for-Age Z-score is less than -2 are underweight, and those with a weight-for-Height Z-score less than -2 are classed as isted.

Box A1. Brief overview of nutritional programs in Indonesia

In terms of micronutrient deficiency control there are three general strategies: (1) to target micronutrient supplements to endemic area or vulnerable populations, (2) to fortify micronutrients in the diet, and (3) to improve diets containing micronutrients. Indonesia pursues each of these strategies to at least a limited extent, however much of the focus in micronutrient deficiency control centers on supplementation programs. A major program for iron deficiency control is the antenatal iron supplementation program, which aims to cover all pregnant women who are reached through Community Health Centers and Posyandus. Distribution of iron syrup to children under-5 years has been implemented in the eastern part of the country since 1996. Fortification programs have not reached the population effectively. For vitamin A deficiency control, vitamin A capsules are distributed nation wide to children 6 to 59 months old in April and August, twice a year. Vitamin A supplements are distributed to postpartum women as well. Diet improvement through nutrition education is integrated into routine nutrition programs. Finally, universal salt iodization is the major intervention strategy for iodine deficiency control. In addition, iodized capsule distribution in iodine deficiency disorder endemic areas targets women of reproductive age and young children.

In terms of growth monitoring and promotion, the Posyandu program — originated from the UPGK (Family Nutrition Improvement Program) in the 1970s — is the main national community nutrition program and focuses on early child and maternal nutrition. Growth monitoring of young children by their mothers though monthly weighing at the village posyandu post is one of the major components. A growth monitoring chart is used to record weight and to identify target children for food supplementation (explained shortly below). The Posyandu also can provide nutrition education on infant ands child feeding, and is also used for vitamin A supplement distribution for women and children.

Another major program for growth monitoring and promotion is a supplementary feeding program. JSP-BK (Social Safety Net) is the largest program with several components including supplementary food, launched after the economic crises in 1998. Although target households are to be identified by using a household wealth classification system, supplementary food does not preferentially target the poor due to program complexity. In addition, supplementary food for children and pregnant women is typically implemented through Posyandu, and target children are identified using growth monitoring charts. A school feeding program has been implemented to the limited extent. More detailed information on each program is available elsewhere (GOI 2003).

Table A1.

Definitions and data sources for service utilization and outcome indicators by program area

Indicator	Definition	Data source
Iron Supplementation		
Service utilization		
Antenatal iron supplement	Percent of women who took antenatal iron supplement, based on the latest pregnancy within the last 5 years before the interview	DHS 2002
Hemoglobin level measured during pregnancy	Percent of women who checked hemoglobin level during pregnancy, based on the latest pregnancy within the last 5 years before the interview	IFLS 2000
Outcome		
Anemia prevalence, women 15-49 years	Percent of women 15-49 years with serum hemoglobin level below 11g/dl (for pregnant women, serum hemoglobin level below 12g/dl)	IFLS 2000
Anemia prevalence, children 1-4 years	Percent of children 1-4 years with serum hemoglobin level below 11g/dl	IFLS 2000
Anemia prevalence, children 5-14 years	Percent of children 5-14 years with serum hemoglobin level below 11g/dl	IFLS 2000
Vitamin A Supplementation		
Service utilization		
Post-partum vitamin A supplement	Percent of women who received a vitamin A dose in the first two months after delivery, among those who gave birth in the five years preceding the survey	DHS 2002
Vitamin A capsule received, children 6-59 months	Percent of children 6-59 months old who received vitamin A supplement within the last 6 months before the interview	DHS 2002
Vitamin A rich food intake, children 0-2 years	Percent of children 0-2 years who consumed vitamin A-rich fruits and vegetables (pumpkins, carrots, red sweet potatoes, green leafy vegetables, mangoes, papayas, and other locally grown fruits and vegetables that are rich in vitamin A) within the day or night before the interview	DHS 2002
Outcome		
Prevalence of night blindness during pregnancy	Percent of women who suffered from night blindness during pregnancy, based on the latest pregnancy in the five years before the interview	DHS 2002
Iodine Fortification		
Service utilization		
Iodized salt use at home	Percent of households using iodized salt for cooking	SUSENAS 2003
Iodized salt use at home, adequately fortified	Percent of households using adequately fortified iodized salt for cooking	SUSENAS 2003
Growth Monitoring and Promotion		
Service utilization		
Visited Posyandu (1 month), children 0-4 years	Percent of children 0-4 years who visited Posyandu within the last month before the interview	SUSENAS 2001
Visited Posyandu (2 months), children 0-4 years	Percent of children 0-4 years who visited Posyandu within the last two months before the interview	SUSENAS 2001
Complementary meal received at the Posyandu[13]	Percent of children who received feeding from Posyandu, among those who visited Posyandu within the last month before the interview	IFLS 2000

[13] IFLS 2000 measured the percent of children receiving complementary meals as a reward when visiting the Posyandu, not the "supplementary food for children and pregnant women" program which targets children with growth problems defined from a growth chart.

Weight measured at the Posyandu	Percent of children whose weight is measured at Posyandu, among those who visited Posyandu within the last month before the interview	IFLS 2000
Behavioral Outcome		
Exclusive breast feeding, children 0-3 months	Percent of children 0-3 months who are exclusively breastfed	DHS 2002
Exclusive breast feeding, children 0-5 months	Percent of children 0-5 months who are exclusively breastfed	DHS 2002
Protein rich food intake, children under 0-2 years	Percent of children 0-2 years who consumed protein rich food (meat, fish, shellfish, poultry, and eggs) within the day or night before the interview	DHS 2002
Outcome		
BMI <18.5, women 15-49 years	Percent of women 15-49 years whose Body Mass Index* is less than 18.5	IFLS 2000
BMI >=25, women 15-49 years	Percent of women 15-49 years whose Body Mass Index* is equal to or greater than 25	IFLS 2000
MUAC < 23 cm, women 15-49 years	Percent of women 15-49 years whose Mid-Upper Arm circumference is less than 23 cm	SUSENAS 2001
Stunting, children 0-4 years	Percent of children 0-4 years whose Height-for-Age Z-score is below 2	IFLS 2000
Underweight, children 0-4 years	Percent of children 0-4 years whose Weight-for-Age Z-score is below 2	SUSENAS 2001
Wasting, children 0-4 years	Percent of children 0-4 years whose Weight-for-Height Z-score is below 2	IFLS 2000

* Body Mass Index = body weight (kilograms)/height squared (meters)

1. OVERVIEW OF CURRENT NUTRITION SITUATION IN INDONESIA

Nutritional outcomes and service utilization levels at a national level are summarized by program area in Table A2.

Table A2.

Nutritional status and utilization of nutrition programs in Indonesia (%)

Indicator	National average*	SE	N**	Source
Iron Supplementation				
Service utilization				
Antenatal iron supplement	79.9	0.59	13349	DHS 2002
Hemoglobin level measured during pregnancy	43.8	1.12	2459	IFLS 2000
Outcome				
Anemia prevalence, women 15-49 years	18.8	0.43	10273	IFLS 2000
Anemia prevalence, children 1-4 years	53.0	1.04	2671	IFLS 2000
Anemia prevalence, children 5-14 years	18.9	0.55	6316	IFLS 2000
Vitamin A Supplementation				
Service utilization				
Post-partum vitamin A supplement	42.5	0.73	13349	DHS 2002
Vitamin A capsule received, children 6-59 months	75.4	0.61	13670	DHS 2002
Vitamin A rich food intake, children 0-2 years	67.4	0.85	8867	DHS 2002
Outcome				
Prevalence of night blindness during pregnancy	1.7	0.17	13349	DHS 2002
Iodine Fortification				
Service utilization				
Iodized salt use at home	84.8	0.10	204822	SUSENAS 2003
Iodized salt use at home, adequately fortified	69.7	0.13	204822	SUSENAS 2003
Growth Monitoring and Promotion				
Service utilization				
Visited Posyandu (1 month), children 0-4 years	39.8	0.33	28651	SUSENAS 2001
Visited Posyandu (2 months), children 0-4 years	56.0	0.33	28651	SUSENAS 2001
Complementary meal received at the Posyandu	71.1	1.22	1537	IFLS 2000
Weight measured at the Posyandu	98.6	0.30	1537	IFLS 2000
Behavioral Outcome				
Exclusive breast feeding, children 0-3 months	50.7	2.66	1057	DHS 2002
Exclusive breast feeding, children 0-5 months	37.7	2.09	1638	DHS 2002
Protein rich food intake, children under 0-2 years	55.7	0.90	8867	DHS 2002
Outcome				
BMI <18.5, women 15-49 years	14.3	0.38	10306	IFLS 2000
BMI >=25, women 15-49 years	20.7	0.45	10306	IFLS 2000
MUAC < 23 cm, women 15-49 years	13.1	0.14	76806	SUSENAS 2001
Stunting, children 0-4 years	33.2	0.81	3889	IFLS 2000
Underweight, children 0-4 years	27.2	0.45	11785	SUSENAS 2001
Wasting, children 0-4 years	10.5	0.53	3874	IFLS 2000

* Estimates based on IFLS 2000 are representative for only 13 provinces.

** Unweighted number of observations

Prevention of micronutrient deficiency

About 80% of pregnant women received antenatal iron supplements, although only 44% of pregnant women had serum hemoglobin level measured during pregnancy. However anemia prevalence is still moderately high in Indonesia. Among women between 15 to 49 years of age, 19% had anemia — a serum hemoglobin level below 11g/dl (below 12g/dl for those pregnant). Prevalence is slightly lower for women 15-19 years, but it is by and large similar across age groups (Table A3). More than half of children 1-4 years had low hemoglobin levels consistent with iron deficiency anemia. In particular, 70% of children 12-23 months old had anemia, while prevalence decreased with age (Table A3). About 19% of children 5-14 years had anemia.

Table A3.
Age patterns of selected outcome indicators (%)

Women

Indicator	Age group (years) 15-19	20-24	25-29	30-34	35-39	40-44	45-49
Prevention of micronutrient deficiency							
Anemia prevalence, women 15-49 years	16	19	18	19	20	19	22
Growth monitoring and promotion							
BMI <18.5, women 15-49 years	26	19	13	10	7	10	11
BMI >=25, women 15-49 years	6	11	16	25	30	34	32
MUAC < 23 cm, women 15-49 years	28	17	11	8	7	7	8

Children

Indicator	Age group (months) 0-11	12-23	24-35	36-47	48-60
Prevention of micronutrient deficiency					
Anemia prevalence, children 1-4 years	-	70	56	47	41
Growth monitoring and promotion					
Stunting, children 0-4 years	21	40	38	34	37
Underweight, children 0-4 years	12	29	34	31	30
Wasting, children 0-4 years	10	15	13	8	7

Regarding prevention of vitamin A deficiency, 43% of post-partum women received vitamin A supplementation during the post-partum period. Approximately 75% of children between 6 to 59 months received vitamin A supplements within 6 months before the survey, and 67% of children under age 3 years are reported to take vitamin-A rich fruits and vegetables in the last 24 hours.

There are no vitamin A deficiency (VAD) measures available for children under age 5 at the national-level, although community-level studies have estimated VAD levels. In a study conducted in rural Central Java in the early 1990s, while xeropthalmia is almost absent from the study sample (n=1437), 15% and 67% of children between 6-48 months had plasma retinol level less than 0.35 ?mol/L and 0.70 µmol/L, respectively[14] (Hadi 2000). In rural West Java in 1996, with 155 study observations, 54% of infants had plasma retinol level less than 0.70 µmol/L (Dijkhuizen 2001) Although severe clinical vitamin A deficiency (VAD) such as xeropthalmia has

[14] WHO identifies vitamin A deficiency as a public-health problem when prevalence of vitamin A deficiency (plasma retinol level less than 0.35 µmol/L) is 5% or higher (WHO 1982).

decreased significantly in Indonesia (HKI 1998), monitoring population-level prevalence of subclinical VAD will be essential for evaluating vitamin A supplementation.

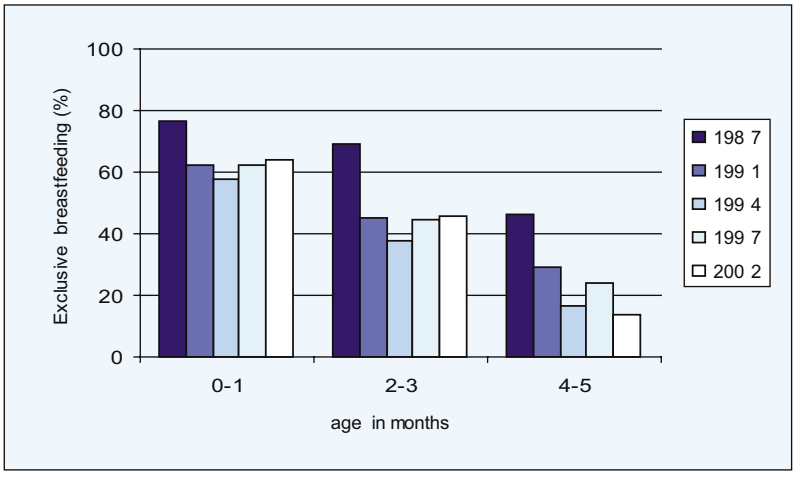
Regarding iodine fortification, about 85% of households used iodine fortified salt in 2003, significantly improved form 63% in 1997, thanks to increased availability of salt iodization that in part resulted from the World Bank funded IDD control project (World Bank 2004). However only 70% of households consumed adequately fortified iodized salt. In terms of measured outcomes, iodine deficiency disorder (IDD) has decreased from 28% in 1990 to 9% in 1998 (GOI 2003). In more recent data the total goiter rate, as assessed through the difficult to standardize palpation method, is 11% from the IDD evaluation survey in 2003, unchanged from the prevalence in 1998 (GOI 2003). Nevertheless, in 14 IDD endemic districts identified in 1998, the total goiter rate decreased from 44% in 1996-98 to 25% in 2003 (World Bank 2004).

Growth Monitoring and Promotion

About 40% of children under age 5 visited the Growth Education and Promotion Center - Posyandu - within a month before the survey. Among those who visited the Posyandu, 71% received a complementary meal and 99% had their weight measured. A protein rich diet for all children (Posyandu attendees and others) remains relatively uncommon. Only 56% of children under-3 years had protein rich food in the last 24 hours.

The international evidence for the benefits of exclusive breastfeeding is growing and WHO guidelines recommend that it be promoted (WHO 2001). However only 51% and 38% of children under 4 and 6 months of age, respectively, are exclusively breastfed. Furthermore exclusive breastfeeding rates among children 0-1 and 2-3 months declined between 1987 and 1991 and have stagnated since then. The rates among children 4-5 months decreased steadily overall (Figure A1). One Indonesian program that appears to effectively extend the exclusive breastfeeding period and improve nutritional status among children is the village midwife program (Frankenberg et al. 2004).

Figure A1.
Trends of exclusive breastfeeding rates by age group



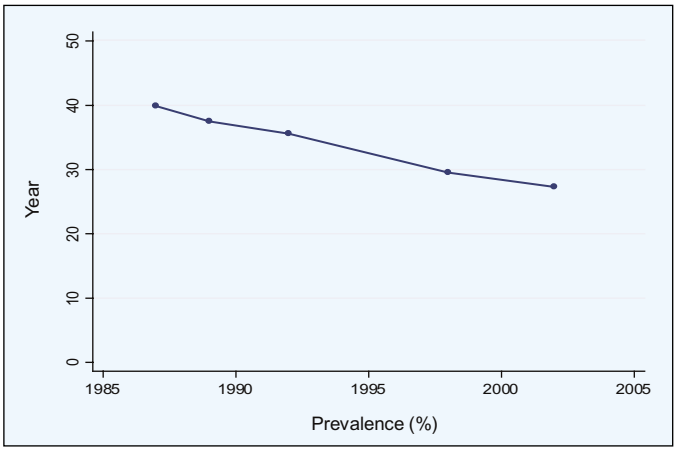
(Source: ORC Macro, 2005. MEASURE DHS STATcompiler. http://www.measuredhs.com, accessed on March 18 2005)

Anthropometric measures also highlight prevalent malnutrition in Indonesia. About 14% and 13% of women between 15 to 49 years had BMI lower than 18.5 and MUAC below 23 cm, respectively. In particular, malnutrition — measured by both BMI and MUAC — is more prevalent among younger women (Table A3). On the other hand, 21% of women are estimated to be overweight. Overweight prevalence is substantially higher for women in the 30s and 40s, indicating an emerging need for chronic disease prevention (Table A3).

The prevalence of underweight among children under 5 years was 27% in 2001, a reduction by about one third from the prevalence in the late 1980s (Figure A2). However, about 33% and 11% of children still suffered stunting (a long-term malnutrition indicator) and wasting (a short-term malnutrition indicator), respectively, in 2000.

Figure A2.

Trend of underweight prevalence among children under-5 years,

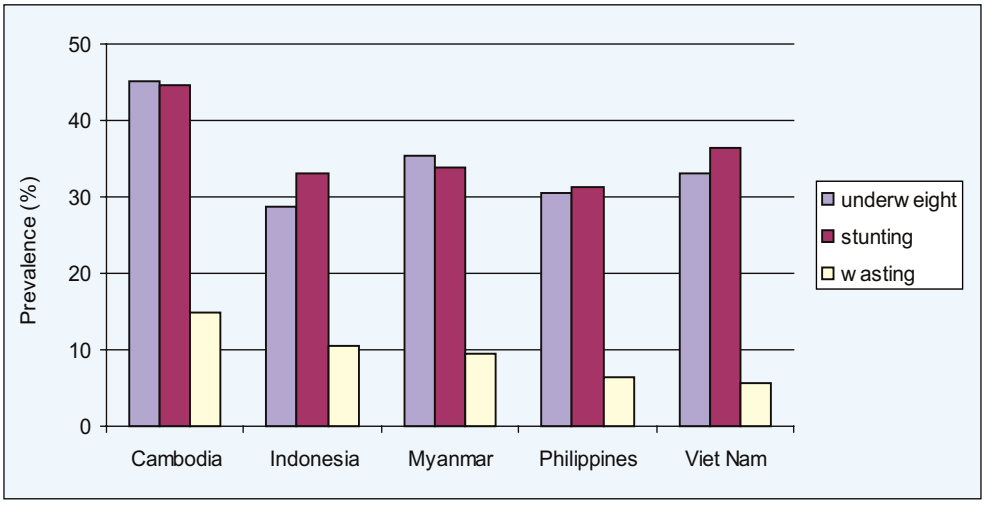


(Source: WHO Global Database on Child Growth and Malnutrition, SUSENAS 2001)

Regional cross-national comparisons shows that the prevalence of underweight and stunting prevalence in Indonesia is roughly similar with those in Myanmar, Philippines, and Viet Nam (Figure A3). However, Indonesia exhibits a high wasting prevalence relative to its under-five mortality rate (Figure A4), implying a more urgent problem of short-term malnutrition.

Figure A3.

Prevalence of malnutrition among children under-5 for some Southeast Asian countries, 2000

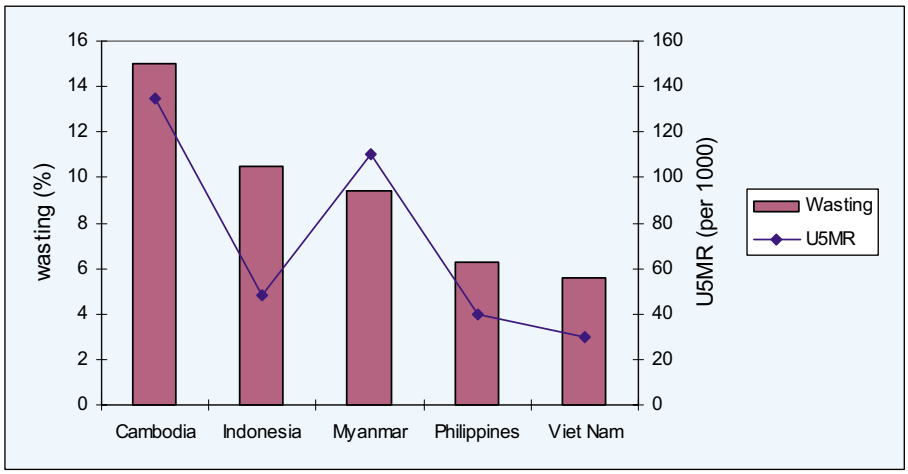


(SOURCE: UNICEF http://www.childinfo.org, accessed on March 18 2005, and SUSENAS 2001)

* The estimates for Indonesia and the Philippines are for year 2001.

Figure A4.

Prevalence of wasting, and Under-five Mortality Rate for some Southeast Asian countries, 2000*



(SOURCE: UNICEF http://www.childinfo.org, accessed on March 18 2005, and Indonesian Family Life Surveys 2000)

* The wasting estimate for the Philippines is from year 2001.

2. INEQUALITIES IN OUTCOMES AND PROGRAM UTILIZATION BY HOUSEHOLD CHARACTERISTICS

Beyond national-level accomplishments and challenges, understanding disparities in the nutritional situation by subpopulation is essential for developing effective strategies and ensuring equity across groups. In the rest of Annex A, we discuss differentials by socioeconomic condition (Annex B discusses differentials by geographic region). We focus on three socioeconomic characteristics: residential area (urban/rural), household wealth, and education. In general, the analysis shows that women and children in socio-economically disadvantaged groups — those living in a rural area, living in a poor household, and with less education — have greater nutritional needs than their counterparts.

Differentials in outcome and service utilization by residential area

In 2003, about 59% of households were in rural areas[15], and residential patterns of outcomes and service utilization by urban/rural status are summarized in Table A4. Overall, women and children in rural areas exhibit poorer nutritional outcomes as well as lower program utilization, compared with their counterparts in urban areas. Disparities by residential area are particularly noticeable for: night blindness during pregnancy and stunting prevalence among children 0 to 4 years. Differences in service utilization are also large for antenatal hemoglobin measurement, postpartum vitamin A supplementation, and complementary meal receipt among children who visited Posyandu. In particular, the difference in complementary meal receipt among Posyandu attendees (79% in urban vs. 65% in rural) suggests a differential in quality of service supplied by these facilities.

Two exceptions to the rural disadvantage are exclusive breastfeeding and overweight prevalence. Exclusive breastfeeding among children under 4 and 6 months is slightly higher in rural areas. Overweight prevalence among women is about 40% higher in urban areas (25% in urban vs. 17% in rural).

[15] The estimate is based on SUSENAS 2003 analysis results.

Table A4.
Differentials in nutrition outcome and service utilization by residential area

Indicator (%)	National average*		Residential area Urban	Rural	
Iron Supplementation					
Service utilization					
Antenatal iron supplement	79.9		82.8	74.5	†
Hemoglobin level measured during pregnancy	43.8	*	49.3	39.5	†
Outcome					
Anemia prevalence, women 15-49 years	18.8	*	18.1	19.4	
Anemia prevalence, children 1-4 years	53.0	*	54.0	52.2	
Anemia prevalence, children 5-14 years	18.9	*	17.8	19.7	
Vitamin A Supplementation					
Service utilization					
Post-partum vitamin A supplement	42.5		47.6	38.0	†
Vitamin A capsule received, children 6-59 months	75.4		80.2	71.3	†
Vitamin A rich food intake, children 0-2 years	67.4		70.1	65.0	†
Outcome					
Prevalence of night blindness during pregnancy	1.7		1.4	2.1	
Iodine Fortification					
Service utilization					
Iodized salt use at home	84.8		88.5	82.1	†
Iodized salt use at home, adequately fortified	69.7		74.8	66.1	†
Growth Education and Promotion					
Service utilization					
Visited Posyandu (1 month), children 0-4 years	39.8		40.6	39.3	
Visited Posyandu (2 months), children 0-4 years	56.0		55.4	56.5	
Complementary meal received at the Posyandu	71.1	*	78.7	64.7	
Weight measured at the Posyandu	98.6	*	98.7	98.5	
Behavioral Outcome					
Exclusive breast feeding, children 0-3 months	50.7		50.0	51.3	
Exclusive breast feeding, children 0-5 months	37.7		36.3	39.1	
Protein rich food intake, children 0-2 years	55.7		59.6	52.1	†
Outcome					
BMI <18.5, women 15-49 years	14.3	*	12.8	15.7	†
BMI >=25, women 15-49 years	20.7	*	24.7	17.2	†
MUAC < 23 cm, women 15-49 years	13.1		11.7	14.3	†
Stunting, children 0-4 years	33.2	*	26.7	38.3	†
Underweight, children 0-4 years	27.2		24.5	29.1	†
Wasting, children 0-4 years	10.5	*	10.1	10.7	

* Estimates based on IFLS 2000 are representative for only 13 provinces.

† An estimate is statistically different (p-value<0.05) between urban and rural areas (Standard errors are not shown in the table).

Differentials in outcome and service utilization by household resources

Two related types of household resource information are available: an asset and housing index from DHS and per capita household expenditure from IFLS and SUSENAS. Based on these continuous measures, household wealth or consumption quintiles are created[16], weighted for survey sampling-weights. Disparities in outcomes and program utilization by household wealth quintile are summarized in Table A5.

Overall, women and children in the lowest resource quintile had poorer nutritional outcomes as well as lower program utilization, compared to the middle quintiles. On the other hand, women and children in the highest resource quintile had better nutritional outcomes as well as higher program utilization than the middle. All

[16] The wealth quintile variable is included in the DHS dataset.

indicators showed 20% or higher relative differences between the lowest (poor) and the highest resource quintile (rich), but disparities between the poor and the rich are most marked for following outcomes:

- Anemia among women 15-49 years (15% in rich vs. 23% in poor),
- Night blindness during pregnancy (0.9% in rich vs. 3.1% in poor),
- BMI below 18.5 among women 15-49 years (11% in rich vs. 16% in poor),
- MUAC below 23 cm among women 15-49 years (10% in rich vs. 17% in poor),
- Stunting among children 0-4 years (20% in rich vs. 43% in poor), and
- Wasting among children 0-4 years (7% in rich vs. 12% in poor), and

Table A5.
Differentials in nutrition outcome and service utilization by household resource quintile

Indicator (%)	National average*	Household resource quintile** Lowest	second lowest	middle	second highest	highest
Iron Supplementation						
Service utilization						
Antenatal iron supplement	79.9	63.7	77.3 †	80.6 †	85.4 †	87.4 †
Hemoglobin level measured during pregnancy	43.8 *	40.8	40.9	41.0	49.2	51.1 †
Outcome						
Anemia prevalence, women 15-49 years	18.8 *	22.8	19.4	18.8 †	17.2 †	15.3 †
Anemia prevalence, children 1-4 years	53.0 *	56.3	58.6	57.4	42.8 †	43.7 †
Anemia prevalence, children 5-14 years	18.9 *	20.7	17.6	21.6	17.2	15.7 †
Vitamin A Supplementation						
Service utilization						
Post-partum vitamin A supplement	42.5	32.5	35.7	43.2 †	49.0 †	54.1 †
Vitamin A capsule received, children 6-59 months	75.4	62.7	75.8 †	78.3 †	82.8 †	80.6 †
Vitamin A rich food intake, children 0-2 years	67.4	61.7	65.0	67.4	71.7 †	72.2 †
Outcome						
Prevalence of night blindness during pregnancy	1.7	3.1	1.7	1.7	1.1 †	0.9 †
Iodine Fortification						
Service utilization						
Iodized salt use at home	84.8	78.4	83.3 †	85.8 †	87.4 †	89.1 †
Iodized salt use at home, adequately fortified	69.7	62.0	67.3 †	70.4 †	72.7 †	76.3 †
Growth Education and Promotion						
Service utilization						
Visited Posyandu (1 month), children 0-4 years	39.8	39.3	42.2 †	41.8	38.6	35.8
Visited Posyandu (2 months), children 0-4 years	56.0	56.0	58.7 †	57.5	55.5	50.2
Complementary meal received at the Posyandu	71.1 *	72.4	71.2	64.7	72.8	76.1
Weight measured at the Posyandu	98.6 *	98.2	98.5	99.5	98.1	98.9
Behavioral Outcome						
Exclusive breast feeding, children 0-3 months	50.7	54.5	58.2	52.6	52.2	31.7
Exclusive breast feeding, children 0-5 months	37.7	40.3	44.8	38.3	39.3	23.5
Protein rich food intake, children 0-2 years	55.7	48.4	49.3	54.7	62.9 †	64.3 †
Outcome						
BMI <18.5, women 15-49 years	14.3 *	16.2	17.5	13.8	13.1	10.7 †
BMI >=25, women 15-49 years	20.7 *	14.9	18.3	20.9 †	24.0 †	26.6 †
MUAC < 23 cm, women 15-49 years	13.1	17.1	14.3 †	12.7 †	11.0 †	9.6 †
Stunting, children 0-4 years	33.2 *	42.7	37.2	32.9 †	24.3 †	19.6 †
Underweight, children 0-4 years	27.2	29.4	28.5	28.0	25.5 †	20.6 †
Wasting, children 0-4 years	10.5 *	11.8 †	10.9 †	11.4 †	9.7 †	7.1 †

* Estimates based on IFLS 2000 are representative for only 13 provinces
** Quintiles are created using sampling-weight, based on an asset-housing condition index (DHS) and per capita expenditure (IFLS and SUSENAS). Household wealth quintiles are not fully comparable across indicators due to different wealth measures by data source. Data source for each indicator is listed in Table A1.
† An estimate is statistically different (p-value<0.05) from that in the lowest quintile (Standard errors are not shown in the table).

Relative differences in program utilization exceeded 25% or more for antenatal iron supplementation, postpartum vitamin A supplementation, and protein rich food intake for children. Interestingly, even though the poor had a greater prevalence of underweight, there is little to no difference by resource quintiles in terms of Posyandu usage, the receipt of a complementary meal, or measured weight at the Posyandu. In addition, exclusive breastfeeding and overweight prevalence are again two exceptions of the poor disadvantage. Overweight prevalence among women is about 80% higher among the rich (27% in the highest vs. 15% in the lowest quintile), indicating different needs for health education by wealth status.

Differentials in outcome and service utilization by education

In certain settings, education can be an important determinant of nutrition, independent of wealth. We categorize educational attainment into five levels: (1) no education or less than primary school completion; (2) primary school completion; (3) junior high school completion; (3) senior high school completion; and (5) college and more. For women's indicators, we obtained educational attainment for each woman. For indicators among children under 5 years, we used educational attainment of the mother (indicators from DHS 2002) or a household head (indicators from IFLS 2000 and SUSENAS 2001).

In 2003, about 31% of household heads had no education or did not complete primary education. Approximately 33%, 14%, 19%, and 5% of household heads completed primary school, junior high school, high school, and junior college or more, respectively[17]. Among mothers of children under 5 years, 20% did not finish primary education. About 36% of mothers completed only primary school. About 18%, 21%, and 6% of mothers completed junior high school, high school, and junior college or more, respectively[18]. Table A6 summarizes disparities in outcomes and service utilization by educational attainment.

By and large, women and children in lower educational categories show poorer outcomes and lower program utilization. Among outcome indicators, anemia in women and children, night blindness in women, and stunting and underweight in children show clear gradients in prevalence by educational attainment. Exclusive breastfeeding rate is highest among children whose mother completed primary school (higher than that among children whose mother did not complete primary school), and it decreased as mother's educational attainment increased. For women's anthropometric indicators and children's wasting, there are also concave shapes of malnutrition prevalence by education. Women who completed primary or junior high education have a higher prevalence of low BMI than women in lower or higher education categories (although this may be attributed to the secular increase in education among younger women). In addition, children whose mother completed primary or junior high education have a higher prevalence of wasting. These patterns are further examined using multivariate analyses below.

For all micronutrient program utilization rates, educational gradients are apparent — the more educated the mother, the more likely is the mother or child to receive the supplement. Differentials in children's food intake are relatively moderate, compared to those in micronutrient program use. For Posyandu use, the gradients are

[17] Educational attainment of a household head is analyzed using SUSENAS 2003.
[18] Mother's educational attainment is analyzed using DHS 2002/03.

less clear. Children from the three middle groups (children whose household head completed primary, junior high, or senior high school) utilized Posyandu more than children from both the lowest and highest education group.

Table A6.
Differentials in nutrition outcome and service utilization by educational attainment

Indicator (%)	National average*		Highest education completed ** Less than primary		Primary high		Junior high		Senior high		Beyond high	
Iron Supplementation												
Service utilization												
Antenatal iron supplement	79.9		61.1		77.6	†	82.3	†	88.6	†	91.8	†
Hemoglobin level measured during pregnancy	43.8	*	39.6		41.2		42.8		47.9		55.6	†
Outcome												
Anemia prevalence, women 15-49 years	18.8	*	21.7		19.6		16.5	†	17.5	†	14.5	†
Anemia prevalence, children 1-4 years	53.0	*	56.9		53.0		54.0		48.2	†	46.9	
Anemia prevalence, children 5-14 years	18.9	*	20.1		21.5		17.5		14.6	†	13.9	†
Vitamin A Supplementation												
Service utilization												
Post-partum vitamin A supplement	42.5		28.8		40.5	†	44.8	†	53.4	†	54.1	†
Vitamin A capsule received, children 6-59 months	75.4		62.1		76.3	†	79.2	†	81.1	†	82.9	†
Vitamin A rich food intake, children 0-2 years	67.4		64.2		64.4		69.7		71.5	†	72.9	
Outcome												
Prevalence of night blindness during pregnancy	1.7		2.9		1.7		1.7		1.1		0.8	
Iodine Fortification												
Service utilization												
Iodized salt use at home	84.8		76.5		86.0	†	90.0	†	91.1	†	93.4	†
Iodized salt use at home, adequately fortified	69.7		59.0		69.8	†	77.4	†	79.6	†	83.0	†
Growth Education and Promotion												
Service utilization												
Visited Posyandu (1 month), children 0-4 years	39.8		33.9		42.5	†	41.0	†	42.3	†	38.8	†
Visited Posyandu (2 months), children 0-4 years	56.0		50.1		59.6	†	57.6	†	57.2	†	53.7	
Complementary meal received at the Posyandu	71.1	*	67.2		68.1		70.8		80.0	†	75.9	
Weight measured at the Posyandu	98.6	*	99.7		98.5		97.1		98.6		99.0	
Behavioral Outcome												
Exclusive breast feeding, children 0-3 months	50.7		44.4		58.0		48.5		49.5		25.1	
Exclusive breast feeding, children 0-5 months	37.7		39.0		42.5		34.9		33.4		22.5	
Protein rich food intake, children 0-2 years	55.7		48.2		50.7		58.7	†	64.9	†	65.4	†
Outcome												
BMI <18.5, women 15-49 years	14.3	*	13.2		14.2		18.7	†	12.4		11.5	
BMI >=25, women 15-49 years	20.7	*	22.7		21.4		16.1	†	20.9		22.4	
MUAC < 23 cm, women 15-49 years	13.1		12.3		13.6		16.3		11.0	†	7.7	†
Stunting, children 0-4 years	33.2	*	40.5		34.7		33.5		26.3	†	19.0	†
Underweight, children 0-4 years	27.2		30.6		27.7		26.7		24.5	†	20.8	†
Wasting, children 0-4 years	10.5	*	10.7	†	11.7	†	11.8	†	9.2	†	6.9	†

* Estimates based on IFLS 3 are representative for only 13 provinces
** For children's indicators, education by a mother (DHS 2002) or a household head (IFLS 2000 and SUSENAS 2001) is used. Data source for each indicator is listed in Table A1.
† An estimate is statistically different (p-value<0.05) from that in a less than primary education category (Standard errors are not shown in the table).

Multivariate analysis of outcomes and utilization

Finally, we conduct multivariate weighted-regression analyses in order to examine adjusted differentials in indicators controlling for individual demographic and household socioeconomic characteristics. For most women's indicators, we adopt this specification:

$$Y_{ij} = \alpha_{ij} + \beta_{age}{}^{*}A_{ij} + \beta_{R}{}^{*}X_{ij} + \beta_{P}{}^{*}P_{i} + \varepsilon_{ij},$$

where Y is a particular binary outcome or utilization measure, A is age in years, X is a vector of covariates, and the P's are province-level dummy variables. The covariates in X are all binary variables: (1) rural area households — with a reference category of urban area; (2) the lowest quintile households and (3) the highest quintile households — with a reference category of the three middle quintile households; and (4) less than primary school completion and (5) the completion of only primary school — with a reference category of completing junior high school or more. The specification is estimated as a logistic regression.

For antenatal iron and postpartum vitamin A supplement, we included two age dummy variables instead of a continuous variable, age in year, in order to control for lower maternal health care utilization among younger and older women. The model is:

$$Y_{ij} = \alpha_{ij} + \beta_{age20}{}^{*}A_{age20} + \beta_{age35}{}^{*}A_{age35} + \beta_{R}{}^{*}X_{ij} + \beta_{P}{}^{*}P_{i} + \varepsilon_{ij},$$

where Y is logit of the particular binary utilization measure, A_{age20} is a binary variable for women younger than 20 years at the time of delivery, A_{age35} is a binary variable for women 35 or older at the time of delivery, X again is a vector of covariates same as in the previous model, and the P's are province-level dummy variables.

For children's indicators, we adopt the specification:

$$Y_{ij} = \alpha_{ij} + \beta_{age}{}^{*}A_{ij} + \beta_{sex}{}^{*}S_{ij} + \beta_{R}{}^{*}X_{ij} + \beta_{P}{}^{*}P_{i} + \varepsilon_{ij},$$

where Y is a particular binary outcome or utilization measure, A is age in months (in years for anemia), S is sex of a child, X is a vector of the same covariates as in a women's model, and Ps are a province dummy variable.

Finally, for household iodized salt use, we used a model;

$$Y_{ij} = \alpha_{ij} + \beta_{R}{}^{*}X_{ij} + \beta_{P}{}^{*}P_{i} + \varepsilon_{ij},$$

where Y is logit of the particular utilization measure, X is a vector of the same covariates as above, and P are province-level dummy variables.

Standard errors are adjusted for clustering at the provincial level. Statistical significance is indicated for p-value less than 0.05.

(a) Adjusted differentials in outcome indicators

Prevention of micronutrient deficiency

Adjusted odds ratios of outcomes in micronutrient deficiency prevention are summarized in Table A7. Women with lower socioeconomic status (living in rural areas, living in the lowest wealth quintile households, and less schooling) are more likely to be anemic. Women from the poorest wealth quintile are 26% more likely to have anemia while those living from the richest quintile are 22% less likely to have anemia compared to those in the three middle quintiles. Women's education is inversely associated with anemia.

Among children, female children between 1 to 4 years have 13% lower odds of having anemia than male children. Odds ratios by household wealth status among children are not statistically significant, while household head's education is negatively associated with the odds of being anemic. Interestingly, for children 1 to 4 years old, those in rural areas are 20% less likely to be anemic than children in urban areas.

Table A7

Odds Ratios of outcomes in micronutrient deficiency prevention, by individual and household socioeconomic characteristics: Multivariate regression analyses

Indicator	OR	SE*	p-value	N	source
Anemia, women 15-49 years					
Age (year)	1.01	0.00	0.00	10208	IFLS 2000
Rural	0.99	0.06	0.88		
Poorest quintile	1.26	0.09	0.01		
Richest quintile	0.78	0.09	0.00		
Less than primary school	1.19	0.06	0.01		
Primary school completed	1.13	0.05	0.02		
Anemia, children between 1-4 years					
Age (year)	0.67	0.03	0.00	2654	IFLS 2000
Female	0.87	0.04	0.00		
Rural	0.80	0.09	0.02		
Poorest quintile	1.08	0.17	0.66		
Richest quintile	0.71	0.19	0.06		
Less than primary school	1.29	0.08	0.00		
Primary school completed	1.14	0.20	0.52		
Anemia, children between 5-14 years					
Age (year)	0.79	0.01	0.00	6249	IFLS 2000
Female	0.92	0.08	0.34		
Rural	0.98	0.09	0.84		
Poorest quintile	1.07	0.11	0.55		
Richest quintile	0.98	0.16	0.88		
Less than primary school	1.44	0.12	0.00		
Primary school completed	1.57	0.07	0.00		
Night blindness, women 15-49 during pregnancy					
Age (year)	1.01	0.02	0.57	13344	DHS 2002
Rural	0.98	0.18	0.90		
Poorest quintile	1.63	0.24	0.04		
Richest quintile	0.68	0.52	0.46		
Less than primary school	1.63	0.20	0.02		
Primary school completed	1.05	0.28	0.86		

* Standard Error of the coefficient estimated from logistic regression analyses, adjusted for clustering on province. (Estimates include province dummy variables, not shown)

For antenatal night blindness, there are typical socioeconomic gradients. However, since the condition is rare (1.7% among women between 15 to 49 years), the magnitude of differentials are higher than those in other indicators. Women in the poorest quintile are 63% more likely to have night blindness than women in the middle quintiles. Women with less than primary education are 66% more likely to have night blindness, compared to women who completed junior high school or more.

Growth monitoring and promotion

Women of lower socioeconomic status are more likely to be malnourished (Table A8). Women in rural areas are 26% more likely to have a BMI less than 18.5. Women living in the poorest quintile households are 22% more likely to have MUAC less than 23 cm, compared to women in the middle three quintiles. Women living in the richest quintile are less likely to have malnutrition than women from the middle three quintiles (odds ratio 0.83 for MUAC and odds ratio 0.75 for BMI). For women with less than completed primary education, odds of having malnutrition increased by 26% (MUAC) and 34% (BMI), compared to women who completed junior high school or more.

On the other hand, women with higher socioeconomic status are more likely to be overweight. Women in urban areas are 54% more likely to be overweight. Women from the richest quintile households are 20% more likely to be overweight, while those living in the lowest quintile are 30% less likely to be overweight, compared to women in the three middle quintiles. The effect of educational attainment is not statistically significant once adjusted for all control variables.

Children from a lower socioeconomic status are more likely to be malnourished. Living in a rural area is associated with a 42% increased odds of being stunted. For children living in the richest quintile households, the odds of being underweight, stunted, and wasted are lower by 40%[19], 40%, and 34%, respectively, compared to children living in the three middle quintiles. On the other hand, for children living in the poorest quintile households, the odds of being underweight, stunted, and wasted are higher by 40%[20] and 37%, respectively. Children whose household head did not complete primary school are about 35% more likely to be underweight or stunted, compared to children whose household heads completed junior high school or more.

[19] Analysis with SUSENAS 2001 suggests 24% lower odds of underweight for the richest quintile.
[20] Odds of underweight for the poorest quintile is not significant using SUSENAS 2001.

Table A8.

Odds Ratios of outcomes in growth monitoring and promotion, by individual and household socioeconomic characteristics: Multivariate regression analyses

Indicator	OR	SE*	p-value	N	source
Women's nutritional status, between 15-49 years					
Thin: MUAC < 23 cm					
Age (year)	0.93	0.00	0.00	76806	SUSENAS 2001
Rural	1.10	0.08	0.22		
Poorest quintile	1.22	0.05	0.00		
Richest quintile	0.83	0.06	0.00		
Less than primary school	1.34	0.03	0.00		
Primary school completed	0.98	0.02	0.28		
Thin: BMI <18.5					
Age (year)	0.95	0.01	0.00	10235	IFLS 2000
Rural	1.26	0.04	0.00		
Poorest quintile	1.06	0.05	0.27		
Richest quintile	0.75	0.05	0.00		
Less than primary school	1.26	0.08	0.05		
Primary school completed	0.96	0.08	0.66		
Overweight/Obesity: BMI >=25					
Age (year)	1.07	0.00	0.00	10235	IFLS 2000
Rural	0.65	0.13	0.00		
Poorest quintile	0.70	0.10	0.00		
Richest quintile	1.20	0.07	0.01		
Less than primary school	0.87	0.10	0.19		
Primary school completed	1.14	0.07	0.06		
Children's nutritional status, between 0-4 years					
Underweight					
Age (month)	1.02	0.00	0.00	11119	SUSENAS 2001
Female	0.90	0.07	0.16		
Rural	1.10	0.05	0.07		
Poorest quintile	1.01	0.10	0.89		
Richest quintile	0.76	0.06	0.00		
Less than primary school	1.23	0.07	0.01		
Primary school completed	1.11	0.06	0.07		
Stunting					
Age (month)	1.01	0.00	0.00	3822	IFLS 2000
Female	0.99	0.06	0.86		
Rural	1.42	0.12	0.00		
Poorest quintile	1.37	0.05	0.00		
Richest quintile	0.60	0.16	0.00		
Less than primary school	1.36	0.07	0.00		
Primary school completed	1.18	0.09	0.07		
Wasting					
Age (month)	0.99	0.00	0.01	3808	IFLS 2000
Female	1.08	0.10	0.40		
Rural	0.99	0.17	0.97		
Poorest quintile	1.10	0.09	0.28		
Richest quintile	0.66	0.13	0.00		
Less than primary school	1.00	0.15	0.99		
Primary school completed	1.12	0.11	0.28		

* Standard Error of the coefficient estimated from logistic regression analyses, adjusted for clustering on province. (Estimates include province dummy variables, not shown)

(b) Adjusted differentials in service utilization indicators

Prevention of micronutrient deficiency

Adjusted odds ratios of service utilization in micronutrient deficiency prevention are summarized in Table A9. Differentials by residential area are not statistically significant in all three micronutrient programs (iron supplementation, vitamin A supplementation, and iodine fortification) implying that unadjusted differences observed in Table A4 are associated with wealth and educational gaps between urban and rural areas rather than an access gap across residential areas.

For both antenatal iron and postnatal vitamin A supplementation, women from the poorest quintile are less likely to receive supplementation (odds ratio 0.5 and 0.79 for iron and vitamin A, respectively) while those from the richest quintile are more likely to receive supplementation (odds ratio 1.14 and 1.24 for iron and vitamin A, respectively), compared to those in the three middle quintiles. Women's education is also positively associated with service use. For antenatal iron supplementation, younger (less than 20 at delivery) or older (35 and above at delivery) women are less likely to receive the supplementation.

For children's vitamin A supplementation, children from the poorest quintile are 43% less likely to receive the supplement than children in the middle group. However, children living in the richest quintile are also less likely to receive vitamin A supplementation. This is less of concern, since children in the richest quintiles are more likely to have vitamin A rich food and, probably, less likely to have vitamin A deficiency (though no evidence is currently available in Indonesia). Nevertheless, this suggests low participation in the vitamin A campaign among the richest households perhaps due to changing consumer preference resulting from low service quality or perhaps due to the Posyandu Revitalization Program, which differentially increased utilization among lower income households (Frankenberg, 2004).

Households with lower socioeconomic status (rural areas, the lowest wealth quintile, and less schooling of household head) are less likely to use iodine fortified salt. However, differentials by household wealth quintile are smaller than those observed in iron and vitamin A supplementation programs.

Growth monitoring and promotion

For Posyandu use among children under 5 years, the utilization patterns by socioeconomic characteristics are rather unique. There is no differential in visit by residential area. However, among those who visited Posyandu, children in rural areas are 52% less likely to receive a complementary meal than urban children, indicating possible supply and quality issues in rural areas. Children from the richest quintile are less likely to visit a Posyandu. Among those who visited a Posyandu, children from the poorest quintile are more likely to receive a complementary meal. Household head's educational attainment is negatively associated with Posyandu use, adjusted for other control variables.

Protein rich food intake among children under 3 years is positively associated with household socioeconomic status. Children from the poorest quintile are 26% less likely to take protein rich food, while those from the richest quintile are 27% more likely to take it compared to those in the three middle quintiles. Children whose mother did not complete primary education are less likely to have protein rich food than their counterparts, even after controlling for household resources.

Table A9.

Odds Ratios of outcomes in micronutrient deficiency prevention, by individual and household socioeconomic characteristics: Multivariate regression analyses

Indicator	OR	SE*	p-value	N	Source
Antenatal iron supplement receipt					
Age at delivery, below 20 years	0.67	0.12	0.00	13344	DHS 2002
Age at delivery, 35 and above	0.73	0.10	0.00		
Rural	1.01	0.10	0.89		
Poorest quintile	0.50	0.07	0.00		
Richest quintile	1.14	0.06	0.04		
Less than primary school	0.30	0.12	0.00		
Primary school completed	0.60	0.08	0.00		
Postnatal vitamin A supplement receipt					
Age at delivery, below 20 years	0.81	0.13	0.11	13344	DHS 2002
Age at delivery, 35 and above	0.88	0.07	0.08		
Rural	0.87	0.11	0.24		
Poorest quintile	0.79	0.07	0.00		
Richest quintile	1.24	0.08	0.01		
Less than primary school	0.49	0.06	0.00		
Primary school completed	0.78	0.06	0.00		
Vitamin A supplement receipt, children under 6-59 months					
Mean age (month)	1.00	0.003	0.53	13664	DHS 2002
Female	1.04	0.058	0.51		
Rural	0.78	0.135	0.07		
Poorest quintile	0.58	0.058	0.00		
Richest quintile	0.79	0.097	0.01		
Less than primary school, mother	0.40	0.146	0.00		
Primary school completed, mother	0.76	0.069	0.00		
Vitamin A rich food intake, children 0-2 years					
Mean age (month)	1.15	0.01	0.00	8864	DHS 2002
Female	1.17	0.06	0.01		
Rural	0.94	0.16	0.68		
Poorest quintile	0.77	0.13	0.04		
Richest quintile	1.12	0.10	0.27		
Less than primary school, mother	0.66	0.17	0.02		
Primary school completed, mother	0.79	0.08	0.00		
Household has iodized salt, any level					
Rural	0.62	0.14	0.00	204822	SUSENAS 2003
Poorest quintile	0.80	0.05	0.00		
Richest quintile	1.24	0.10	0.03		
Less than primary school, household head	0.37	0.07	0.00		
Primary school completed, household head	0.65	0.06	0.00		
Household has adequately iodized salt					
Rural	0.67	0.06	0.00	204822	SUSENAS 2003
Poorest quintile	0.84	0.03	0.00		
Richest quintile	1.22	0.08	0.01		
Less than primary school, household head	0.44	0.05	0.00		
Primary school completed, household head	0.67	0.03	0.00		

* Standard Error of the coefficient estimated from logistic regression analyses, adjusted for clustering on province. (Estimates include province dummy variables, not shown)

Table A10.

Odds Ratios of service utilization in growth monitoring and promotion, by individual and household socioeconomic characteristics: Multivariate regression analyses

Indicator	OR	SE*	p-value	N	Source
Posyandu visit, children under 5 years					
Mean age (month)	0.97	0.00	0.00	28651	SUSENAS 2001
Female	1.05	0.03	0.09		
Rural	1.04	0.07	0.51		
Poorest quintile	0.92	0.05	0.10		
Richest quintile	0.78	0.07	0.00		
Less than primary school, household head	0.61	0.06	0.00		
Primary school completed, household head	0.89	0.03	0.00		
Supplementary food receipt from Posyandu, conditional on Posyandu visit					
Mean age (month)	1.03	0.01	0.00	1519	IFLS 2000
Female	1.08	0.10	0.46		
Rural	0.48	0.19	0.00		
Poorest quintile	1.38	0.09	0.00		
Richest quintile	0.92	0.29	0.79		
Less than primary school, household head	0.74	0.14	0.03		
Primary school completed, household head	0.66	0.07	0.00		
Protein rich food intake, children 0-2 years					
Mean age (month)	1.12	0.01	0.00	8864	DHS 2002
Female	1.04	0.05	0.44		
Rural	0.97	0.07	0.71		
Poorest quintile	0.74	0.11	0.00		
Richest quintile	1.27	0.05	0.00		
Less than primary school, mother	0.50	0.11	0.00		
Primary school completed, mother	0.66	0.06	0.00		

* Standard Error of the coefficient estimated from logistic regression analyses, adjusted for clustering on province. (Estimates include province dummy variables, not shown)

ANNEX B.
REGIONAL HETEROGENEITY IN NUTRITION OUTCOMES AND SERVICES

In the context of decentralization where local governments have increasing influence over public nutrition policy, it is essential to look beyond national mean outcomes and to understand the magnitude and patterns of variation across districts and provinces.

1. District-level heterogeneity

In this annex we first examine district-level estimates for five selected indicators using SUSENAS 2001: (1) mid-upper arm circumference among women 15 to 49 years; (2) underweight among children under 5 years; (3) iodized salt use at home; and (4) Posyandu visit among children under 5 within a month prior to the survey. Information from a total of 328 districts are available from SUSENAS 2001, but only districts with 25 or more un-weighted observations are included in analyses in order to minimize the influence of measurement error. Table B1 summarizes population weighted district-level estimates and presents heterogeneity across districts.

Table B1.
Summary of district-level estimates of selected indicators for outcomes & service utilization (%)

Indicator	Median	Mean*	SD	Min	Max	Number of districts**	Median number of observations within a district**
Outcome							
MUAC <23cm among women 15-49 yrs	12	13	8	0	60	316	190
Underweight among children 0-4 yrs	28	29	12	3	81	197	45
Service utilization							
Iodized salt use	94	84	20	17	100	306	606
Iodized salt use, adequately fortified only	75	70	23	9	100	306	606
Posyandu visit among children 0-4 years†	38	40	19	0	100	280	78

Source: SUSENAS 2001
* Unweighted average of district-level estimates
** Districts with unweighted observations less than 25 are excluded.
† Posyandu visit within 1 month prior to the survey

About 13 % of women between 15-49 years exhibit a MUAC less than 23 cm at the national level. However, district-level estimates ranged from 0 % (Malinau, Bulingan, and Nunukan in East Kalimantan; Selayar in South Sulawesi; and Dumai in Riau) to 60 % in T.T. Utara in Nusa Tenggara Timur. About 34% and 7 % of districts have prevalence over 15 % and 25 % respectively (Figure B1). There is even greater heterogeneity across districts for underweight among children 0-4 years. While the national prevalence is about 27 %, district-level estimates ranged from 3 % in Tabanan, Nusa Tenggara Barat to 81 % in Barito Selatan, Kalimantan Tengah. About 39 % of districts have a prevalence of 30 % or higher (Figure B2).

In addition, clusters of districts show high malnutrition prevalence for both women and children. Districts were categorized into 3 equal-size groups based on ranking of malnutrition prevalence: low, moderate, and high prevalence group, and about 30 districts have high malnutrition prevalence for *both* women and children (Table B2). Looking over this list, it is quite apparent that poor nutrition outcomes are clustered in a handful of regions, most notably NTT with pockets in NTB, South Sulawesi, and East and Central Java.

Figure B1.

Distribution of district-level estimates of percent of women 15-49 years with MUAC < 23 cm.

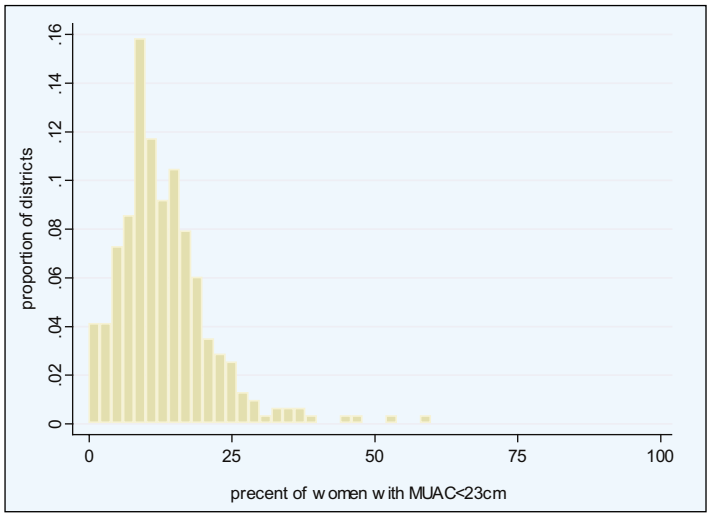
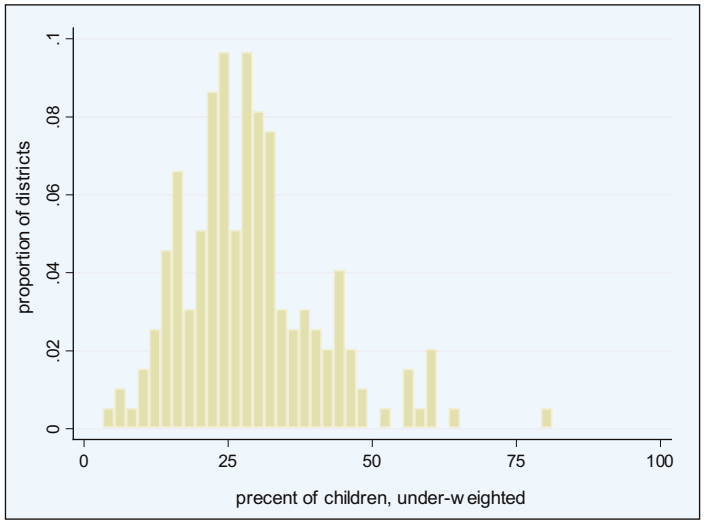


Figure B2.

Distribution of district-level estimates of percent of children 0-4 years with underweight



Turning now to the consumption of iodized salt, while 82 % of households at the national level consume iodized salt, the coverage within each district varies greatly from 17 % to 100 %. About 10 % of districts have a coverage below 50 %, while 58 % of districts have a coverage of 90 % or higher. Heterogeneity is even greater for adequately fortified iodized salt use. Compared to the national average of 66 %, the district-level coverage ranges from 9 % to 100%. About 21 % of districts have a coverage below 50 %, while 24 % of districts have 90 % or higher (Figure B3).

We can also look at the extent of geographic clustering of districts with low rates of iodization coverage as seen in Figure B5. In this figure we sort districts by iodization coverage into three equal sized groups (tertiles) depending on whether the districts have low, medium, or high coverage rates. Most of the lowest tertile districts are concentrated in eastern Java, Nusa Tenggara, and southern Sulawesi (Figure B4), where small-scale salt farming occurs. This indicates the need for programs that address iodization issues among small-scale salt producers.

Finally, Posyandu use also shows significant variation across districts. At the national level, about 40 % of children under-5 years visit Posyandu within a month before the survey. However, district-level estimates vary from 0 % to 100 %. Posyandu utilization rates are below 25 % in about a quarter of districts, whereas about 7 % of districts have the utilization rates higher than 70 %. Posyandu utilization shows a more widely spread distribution pattern compared to three indicators above, as well as no clear geographic pattern.

Figure B3.

Distribution of district-level estimates of percent of households using adequately fortified iodized salt

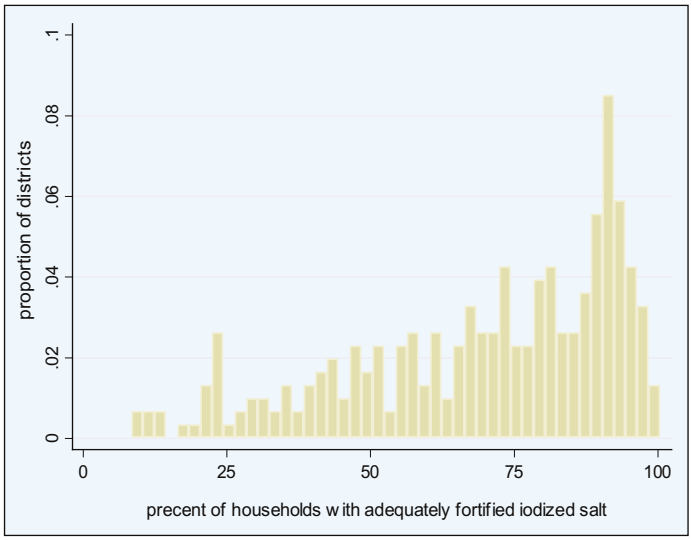


Figure B4.

Distribution of district-level estimates of percent of children 0-4 years utilizing Posyandu

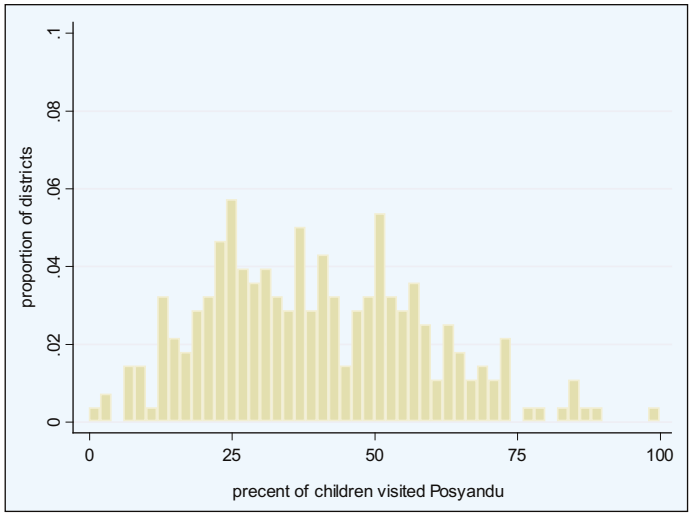


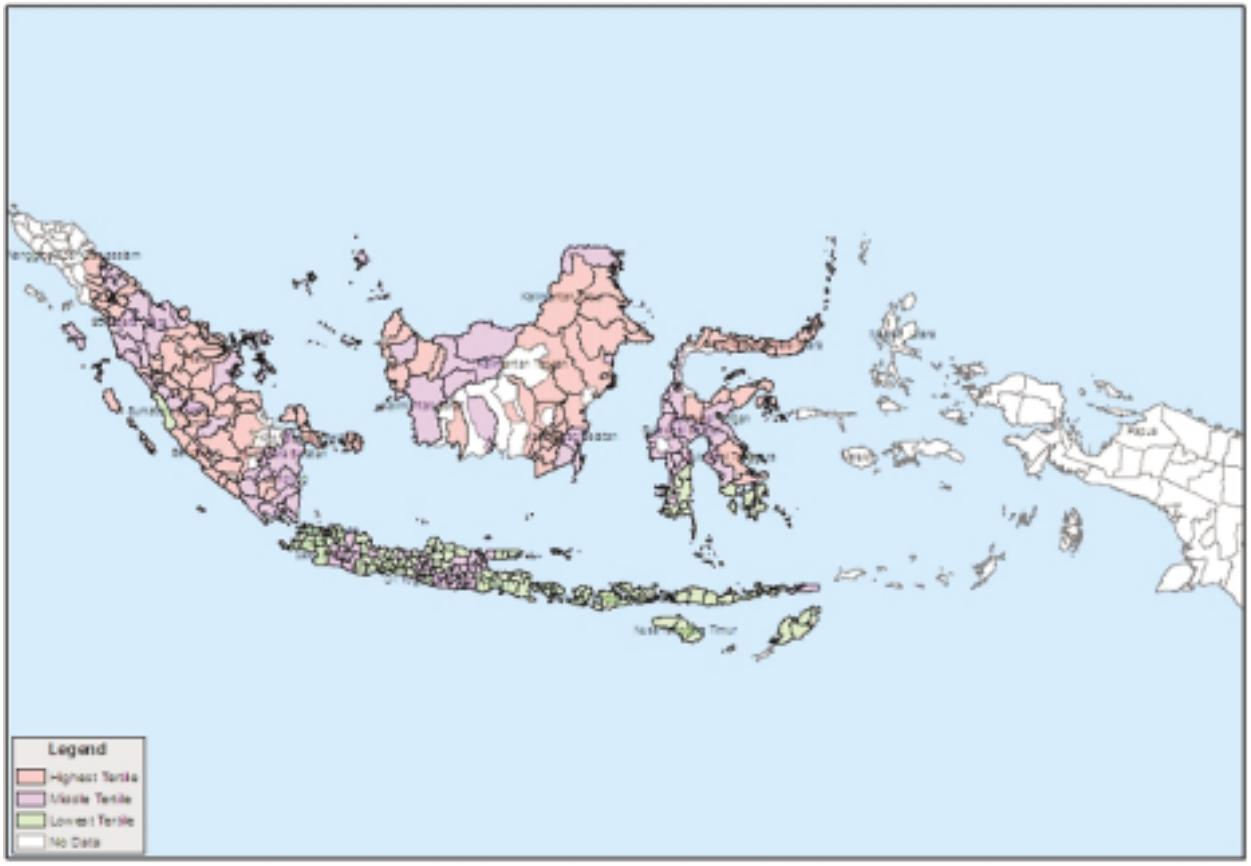
Table B2.
Districts with high malnutrition prevalence* for both women and children

Province	District	Prevalence (%)	
		Children	Women
Riau	INDRAGIRI HILIR	43.9	21.4
South Sumatra	MUSI RAWAS	44.5	16.2
Lampung	LAMPUNG UTARA	34.9	16.2
West Java	BEKASI	33.1	15.8
Central Java	GROBOGAN	32.4	16.9
Central Java	JEPARA	48.8	18.2
Central Java	KENDAL	31.9	21.2
East Java	PROBOLINGGO	33.8	20.7
East Java	GRESIK	33.3	20.8
East Java	SAMPANG	64.7	18.8
East Java	PAMEKASAN	38.9	16.8
Banten	PANDEGLANG	36.4	20.3
Banten	SERANG	36.3	16.5
West Nusa Tenggara	LOMBOK TENGAH	32.7	22.0
West Nusa Tenggara	LOMBOK TIMUR	31.8	18.0
West Nusa Tenggara	DOMPU	44.6	29.2
East Nusa Tenggara	SUMBA BARAT	59.7	27.7
East Nusa Tenggara	KUPANG	41.1	35.4
East Nusa Tenggara	T.T. SELATAN	60.6	53.3
East Nusa Tenggara	T.T. UTARA	48.0	60.0
East Nusa Tenggara	BELU	40.0	46.5
East Nusa Tenggara	ALOR	56.0	45.9
East Nusa Tenggara	KUPANG	32.9	34.6
West Kalimantan	KAPUAS HULU	46.2	19.5
Central Kalimantan	BARITO SELATAN	80.6	17.6
Central Sulawesi	DONGGALA	42.6	15.9
South Sulawesi	GOWA	43.2	18.8
South Sulawesi	MAMUJU	36.0	20.4
South Sulawesi	PARE-PARE	46.7	15.9
Southeast Sulawesi	MUNA	45.3	21.2

* Districts in the highest tertile based on prevalence ranking. Only 197 districts with malnutrition prevalence for both women and children were included.

Figure B5.

District quartiles based on the rate of adequately fortified iodized salt use at home



Outcome and service utilization patterns by selected socio-economic characteristics at the district-level

We further examine outcome and service utilization patterns by socioeconomic characteristics at the district-level. We accomplish this by conducting multivariate regression analysis in order to examine differentials in outcome and service utilization indicators, adjusted for selected socioeconomic characteristics. All control variables are district-level weighted averages of selected characteristics as measured in the SUSENAS 2001. In order to reduce the influence of data points that may be unduly influenced by mismeasurement, we include districts where the unweighted number of observations for an outcome or service utilization indicator is 25 or higher. The simple estimation model employed is the following:

$$Y = \alpha + \beta_U{*}U + \beta_P{*}P + \beta_{GINI}{*}GINI + \beta_E{*}E + \beta_R{*}R + \varepsilon$$

where Y is an outcome or service utilization indicator measured in proportionate terms, U is a dummy variable for urban districts, P is the proportion of district households living under the official poverty line, GINI is the GINI coefficient of inequality based on observed inequality in household consumption, E is the proportion of adults 15-59 years who did not complete primary education, and R is a regional dummy variable. We divide districts into five regions: (1) Sumatra Island, (2) Java Island and Bali, (3) Nusa Tenggara, Maluku, & Irian Jaya, (4) Kalimantan, and (5) Sulawesi. The combined region of Java and Bali is used as a reference group in analyses. Standard errors are adjusted for clustering on region. Statistical significance is defined for p-value less than 0.05.

Malnutrition among women (MUAC < 23cm) and children (underweight) have a significant positive association with poverty: districts with more poor people witnessed greater malnutrition (Table B3). Districts that are more unequal also tend to have a higher proportion of stunted children. Adjusted for other control variables, there is no significant difference in women's and children's malnutrition between urban and rural districts. However there are strong regional differences in mean nutrition outcomes. Prevalence of women's malnutrition is lower in Sumatra, Kalimantan, and Sulawesi than in Java and Bali, while it is higher in Nusa Tenggara, Maluku, and Irian Jaya. Underweight prevalence among children 0-4 years is higher in Kalimantan, Sulawesi, and Nusa Tenggara, Maluku, and Irian Jaya, compared to that in Java and Bali. The current specification is admittedly parsimonious and additional indicators, such as public nutrition program expenditure information, would be valuable for further examination of district-level differentials in malnutrition.

Table B3.

Differentials in outcome and service utilization at the district-level, by selected socioeconomic characteristics: Multivariate linear regression analyses

	coefficient	standard error	p-value	N	R-squared
Proportion of women 15-49 year with MUAC <23cm					
Urban district	0.017	0.015	0.257	253	0.29
Proportion of population under poverty line	0.202	0.080	0.013		
Gini coefficient	-0.091	0.135	0.501		
Proportion adults without primary education	0.002	0.091	0.980		
region: Sumatra	-0.059	0.011	0.000		
region: Nusa Tenggara, Maluku, & Irian Jaya	0.096	0.035	0.006		
region: Kalimantan	-0.030	0.015	0.046		
region: Sulawesi	-0.037	0.013	0.006		
Constant	0.156	0.041	0.000		
Proportion of children 0-4 years underweight					
Urban district	-0.001	0.032	0.972	165	0.22
Proportion of population under poverty line	0.231	0.110	0.036		
Gini coefficient	-0.510	0.264	0.055		
Proportion adults without primary education	-0.099	0.189	0.603		
region: Sumatra	0.009	0.023	0.684		
region: Nusa Tenggara, Maluku, & Irian Jaya	0.101	0.037	0.007		
region: Kalimantan	0.091	0.036	0.013		
region: Sulawesi	0.105	0.035	0.004		
constant	0.377	0.084	0.000		
Proportion of households using adequately fortified iodized salt					
Urban district	0.062	0.027	0.024	253	0.59
Proportion of population under poverty line	0.163	0.161	0.314		
Gini coefficient	-0.115	0.274	0.676		
Proportion adults without primary education	-0.625	0.177	0.000		
region: Sumatra	0.270	0.021	0.000		
region: Nusa Tenggara, Maluku, & Irian Jaya	-0.287	0.041	0.000		
region: Kalimantan	0.331	0.022	0.000		
region: Sulawesi	0.034	0.044	0.437		
constant	0.702	0.085	0.000		
Proportion of children 0-4 years visited Posyandu					
Urban district	-0.033	0.044	0.447	222	0.23
Proportion of population under poverty line	0.109	0.144	0.448		
Gini coefficient	0.007	0.352	0.983		
Proportion adults without primary education	-0.395	0.239	0.099		
region: Sumatra	-0.201	0.031	0.000		
region: Nusa Tenggara, Maluku, & Irian Jaya	0.037	0.078	0.632		
region: Kalimantan	-0.115	0.034	0.001		
region: Sulawesi	-0.154	0.037	0.000		
Constant	0.551	0.110	0.000		

Turning to iodized salt use, we see it is significantly higher in urban districts. The proportion of adults without primary education completion shows a strong negative association with iodized salt use, indicating a potential gap in reaching low socio-economic households. Again, there is a significant regional gap. Districts in Sumatra and Kalimantan have higher iodized salt used than districts in Java and Bali, while those in Nusa Tenggara, Maluku, and Irian Jaya have lower use. This is consistent with the observation that regions containing small-scale salt producers exhibit the lowest rates of iodized salt use.

Finally, for Posyandu use among children 0-4 years, there is no significant differential by socioeconomic characteristics, except perhaps for districts that had a high proportion of adults without primary education. However, districts in Sumatra, Kalimantan, and Sulawesi have significantly lower Posyandu usage.

2. Province-level heterogeneity

For a wider range of nutrition indicators we explore province-level heterogeneity using DHS 2002/3 and IFLS 2000 as well as Susenas 2001. The small sample sizes at the district-level restrict this analysis only to indicators at the province level. IFLS 2000 provided information on 13 out of 26 provinces prior to the new administrative area change in 2001. DHS 2002/3 included 26 out of 30 provinces. A weighted average for each province is calculated using the relevant sampling-weight. Table B4 summarizes province-level estimates and presents heterogeneity across provinces. Detailed results of provincial estimates and data sources are presented by indicator in Table B5.

A wide range of provincial level heterogeneity is observed. Absolute differences in indicators (highest provincial estimate — lowest provincial estimate) range from 6 percentage points in weight measurement among children visiting Posyandu to 78 percentage points in adequately fortified iodized salt use at home. Relative differences exceed 3 fold in 8 indicators:

- prenatal hemoglobin level measurement
  (18 % in South Sumatra vs. 66 % in South Sulawesi);
- anemia prevalence among children 5-14 years
  (9 % in North Sumatra vs. 34 % in South Sumatra);
- adequately fortified iodized salt use at home
  (19 % in West Nusa Tenggara vs. 96 % in Jambi);
- Posyandu visit among children under 5 years
  (18 % in North Sumatra vs. 55 % in East Nusa Tenggara);
- exclusive breastfeeding among children under 4 months
  (22 % in DKI Jakarta vs. 80 % in North Sulawesi);
- exclusive breastfeeding among children under 6 months
  (15 in DKI Jakarta % vs. 62 % in South Sulawesi);
- women's MUAC less than 23 cm
  (7 % in North Sulawesi vs. 32 % in East Nusa Tenggara); and
- isting among children under 5 years
  (3 % in Bali vs. 16 % in South Sumatra)

Provincial performance varies substantially across Indonesia, yet the ranking of provinces does not consistently identify the same underperforming provinces. For example, provinces in Kalimantan, Sulawesi, and Nusa Tenggara typically show a high prevalence of protein energy malnutrition for women and children, while those

in Sumatra have generally lower prevalence (Figure B3)[21]. The same regional pattern, however, does not hold for micronutrient supplementation program coverage. Provinces in Sumatra with low malnutrition prevalence in fact show relatively low coverage of micronutrient programs (Figure B5)[22].

Table B4.

Summary of province- level estimates (%) of outcome and service utilization indicators

Indicator	Median	Mean*	SD	Min	Max	Number of provinces
Iron Supplementation						
Service utilization						
Prenatal iron supplementation received †	79	77	11	58	98	26
Hemoglobin level measured during pregnancy†	45	43	12	18	66	13
Outcome						
Anemia prevalence, women 15-49 years**	16	18	5	12	32	13
Anemia prevalence, children 1-4 years**	51	53	7	42	70	13
Anemia prevalence, children 5-14 years**	16	18	7	9	34	13
Vitamin A Supplementation						
Service utilization						
Post-partum vitamin A supplementation received ‡	41	42	9	26	59	26
Vitamin A capsule received, children 6-59 months	77	76	9	51	89	26
Vitamin A rich food intake, children 0-2 years (1-day recall)	66	66	6	57	80	26
Outcome						
Prevalence of night blindness during pregnancy †	2	2	1	0	6	26
Iodine Fortification						
Service utilization						
Iodized salt use at home	97	86	18	36	100	29
Iodized salt use at home, adequately fortified	89	75	22	19	96	29
Growth Education and Promotion						
Service utilization						
Visited Posyandu within last month, children under 5	32	36	11	18	55	27
Visited Posyandu within last 2 months, children under 5	50	52	11	32	73	27
Supplementary food received at the Posyandu ††	63	66	16	37	93	13
Weight measured at the Posyandu ††	98	98	2	95	100	13
Behavioral Outcome						
Exclusive breast feeding, children under 4 months	52	53	15	22	80	26
Exclusive breast feeding, children under 6 months	37	39	13	15	62	26
Protein rich food intake, children 0-2 years (1-day recall)	58	58	8	40	70	26
Outcome						
Body Mass Index <18.5 (Thin), women 15-49 years	15	15	3	10	18	13
Body Mass Index >=25 (Overweight), women 15-49 years	19	20	4	14	27	13
Mid-Upper Arm Circumference < 23 cm, women 15-49 years	12	13	5	7	32	27
Stunting (Height-for-Age), children under 5 years	35	36	8	24	56	13
Underweight (Weight-for-Age), children under 5 years	28	29	6	18	42	27
Isting (Weight-for-Height), children under 5 years	10	10	3	3	16	13

* Unweighted average of provincial estimates
** Anemia refers to serum hemoglobin level below 11g/dl, except for pregnant women (serum hemoglobin level below 12g/dl).
† Latest pregnancy within the last 5 years, among women between 15 to 49
‡ Latest delivery within the last 5 years, among women between 15 to 49
†† Among children who visited Posyandu

[21] A total of 26 provinces are ranked based on sum of a women's malnutrition prevalence (percent of women 15-49 years with MUAC less than 23 cm) rank and a children underweight prevalence (percent of children 0-4 years whose Weight-for-Age Z-score is below 2) rank. Then provinces are categorized into tertiles: the higher the rank, the higher malnutrition prevalence.

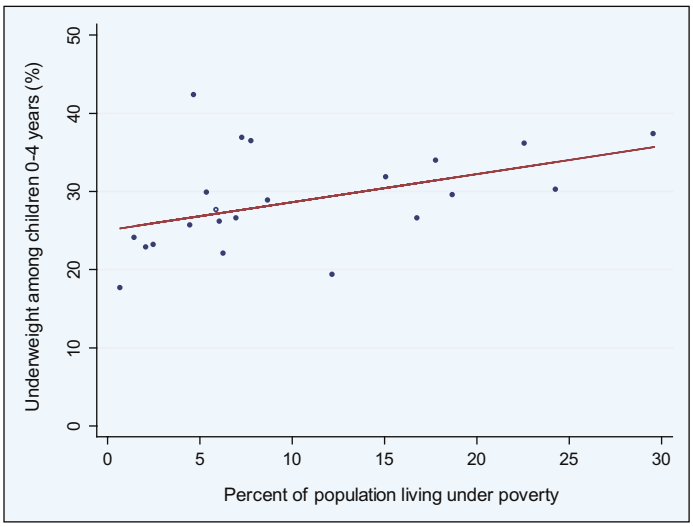
[22] For the micronutrient program, a total of 26 provinces are ranked based on sum of a children's vitamin A supplementation coverage rank and a prenatal iron supplementation coverage rank: the higher rank the higher program coverage. Then provinces are categorized into tertiles: the higher the rank, the higher coverage.

Outcome and service utilization by socio-economic characteristics at the province-level

We further explore outcome and service utilization patterns by poverty level at the province-level. Figures B6-B7 show scatter plots of malnutrition and anemia prevalence by the percent of households living below the poverty line[23]. Both malnutrition and anemia prevalence show a significant positive association with poverty at the province-level[24].

Figure B6.

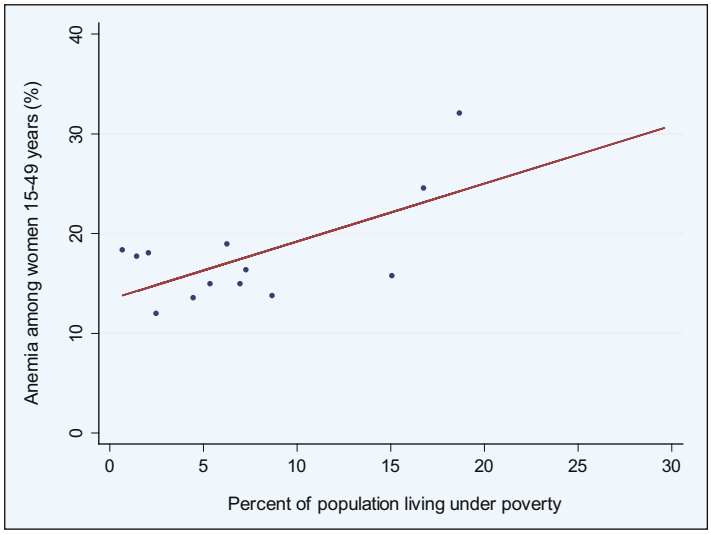
Scatter plot of children underweight and poverty at the province-level



(Solid line is a fitted line from a linear regression: slope = 0.36 (p-value = 0.027), R-squared = 0.21, N = 23)

Figure B7.

Scatter plot of anemia among women and poverty at the province-level



(Solid line is a fitted line from a linear regression: slope = 0.58 (p-value = 0.017), R-squared = 0.42, N = 13)

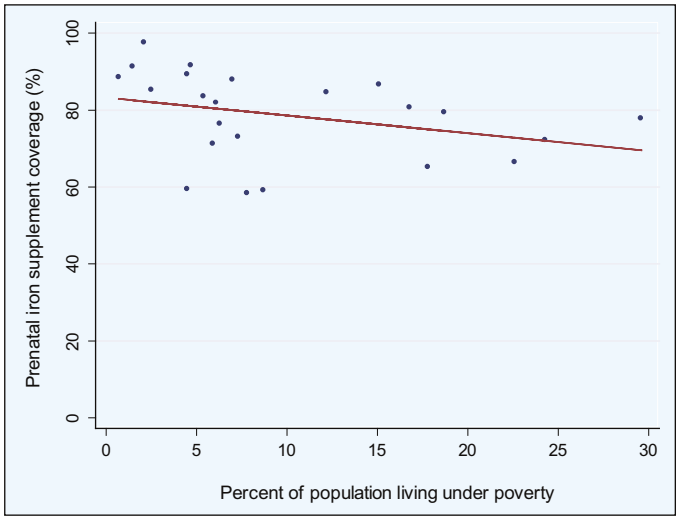
[23] As in the district-level analysis, proportion of households living below the poverty line is estimated using SUSENAS 2001.

[24] Variation in age distributions is a potentially important factor contributing to district- or province-level heterogeneity, since malnutrition and anemia prevalence is highly correlated with age (Table A3, Annex A). However, due to small age-district specific or age-province specific sample sizes, we are not able to estimate age-specific prevalence of malnutrition or anemia. Nevertheless, our preliminary analyses showed fairly comparable age distributions between 15 to 49 years across districts, and we believe district-level or province-level prevalence estimates are reasonably comparable.

On the other hand, service utilization patterns by province poverty level vary by program. For prenatal iron supplementation, there is a marginally significant negative relationship between the utilization rate and poverty (Figure B9). For vitamin A supplementation, however, there is no clear coverage pattern by province poverty levels (Figure B10), indicating vitamin A supplementation programs are implemented to a similar extent across provincial poverty levels. Iodized salt use did not show a linear relationship with provincial poverty, but the scatter plot shows a rather unique convex shape, indicating relatively lower coverage in provinces with both low and high poverty (Figure B11).

Figure B9.

Scatter plot of prenatal iron supplement coverage and poverty at the province-level



(Solid line is a fitted line from a linear regression: slope = -0.46 (p-value = 0.126), R-squared = 0.11, N = 23)

Figure B10.

Scatter plot of vitamin A supplement coverage and poverty at the province-level

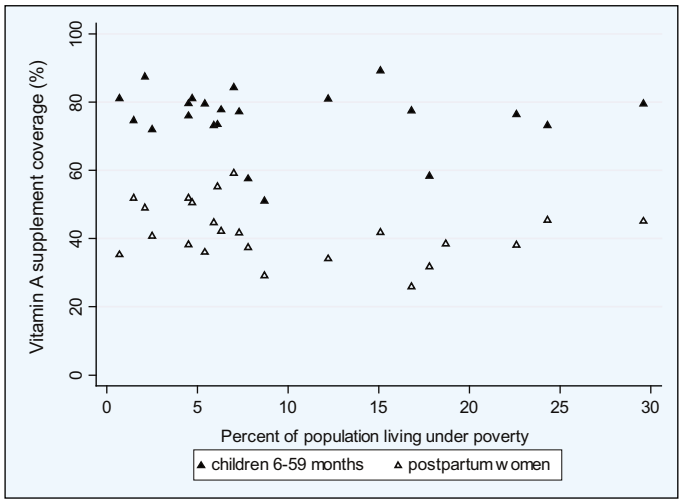
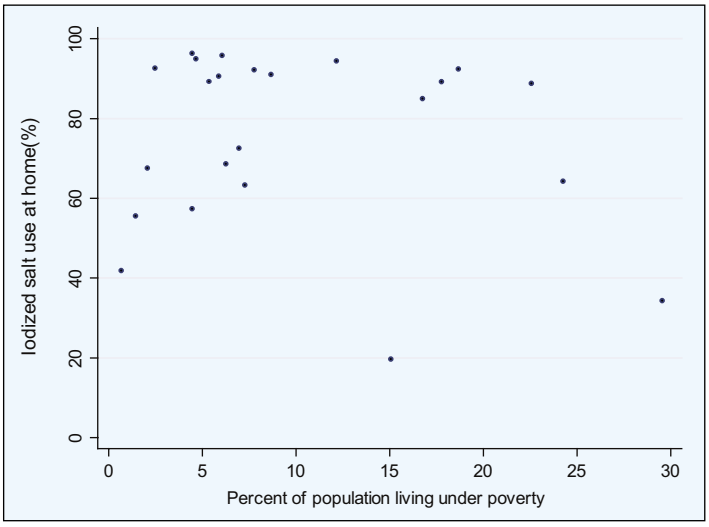


Figure B11.

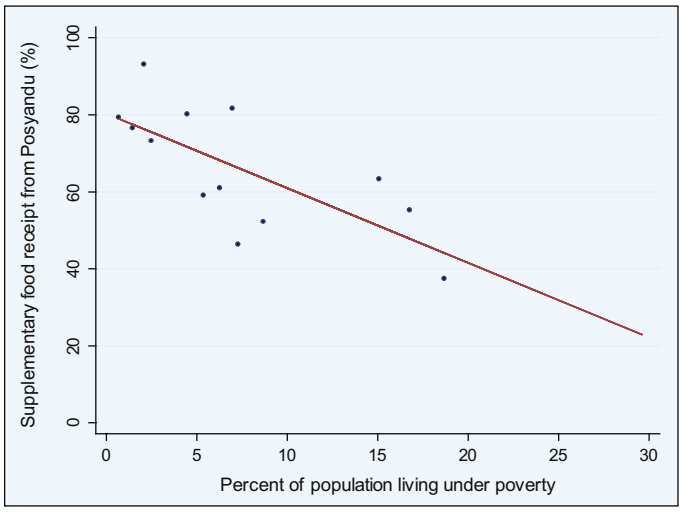
Scatter plot of iodized salt use and poverty at the province-level



Finally, while there is no clear relationship between Posyandu use among children 0-4 years and poverty at the provincial level (result not shown), there is a significant negative association between poverty and complementary meal receipt among those children who attended Posyandu (Figure B12). This implies provinces with higher poverty are less likely to have supplementary food at Posyandu, thus missing the full opportunity to treat malnutrition among children.

Figure B12.

Scatter plot of poverty and complementary meal receipt among children 0-4 years who attended Posyandu at the province-level



(Solid line is a fitted line from a linear regression: slope = -1.94 (p-value = 0.006), R-squared = 0.51, N = 13)

Table B5.

Province-level estimates (%) of outcome and service utilization indicators

Program	Indicator	National average*	North Sumatra	West Sumatra	Riau	Jambi	South Sumatra	Bengkulu	Lampung	Bangka Belitung	DKI Jakarta	West Java
Iron Supplementation												
	Service utilization											
	Prenatal iron supplementation received Ù	**79.9**	59	85	71	59	79	85	81	66	91	76
	Hemoglobin level measured during pregnancy Ù	**43.8** *	35	48	-	-	18	-	40	-	49	45
	Outcome											
	Anemia prevalence, women 15-49 years***	**17.1** *	14	12	-	-	32	-	25	-	18	19
	Anemia prevalence, children 1-4 years***	**53.0** *	44	42	-	-	70	-	61	-	51	53
	Anemia prevalence, children 5-14 years***	**18.9** *	9	11	-	-	34	-	31	-	15	22
Vitamin A Supplementation												
	Service utilization											
	Post-partum vitamin A supplementation received á	**42.5**	29	41	45	52	38	34	26	29	52	42
	Vitamin A capsule received, children 6-59 months	**69.5**	51	72	73	76	78	81	78	71	75	78
	Vitamin A rich food intake, children under 3 years (1-day recall)	**36.9**	68	59	68	59	70	71	69	58	76	64
	Outcome											
	Prevalence of night blindness during pregnancy Ù	**1.7**	2.8	3.9	1.8	1.8	0.7	1.7	1.3	4.7	0.4	1.6
Iodine Fortification												
	Service utilization											
	Iodized salt use at home	**84.8**	99	100	97	100	99	100	96	99	73	88
	Iodized salt use at home, adequately fortified	**69.7**	91	92	90	96	92	94	85	92	55	68
Growth Education and Promotion												
	Service utilization											
	Visited Posyandu within last month, children under 5	**39.8**	18	31	38	*32*	29	30	38	*21*	35	48
	Visited Posyandu within last 2 months, children under 5	**56.0**	32	45	53	*51*	45	47	53	*38*	54	64
	Supplementary food received at the Posyandu ÙÙ	**71.1** *	52	73	-	-	37	-	55	-	76	61
	Weight measured at the Posyandu ÙÙ	**98.6** *	95	96	-	-	98	-	95	-	99	98
	Behavioral Outcome											
	Exclusive breast feeding, children under 4 months	**49.9**	44	35	35	76	55	65	67	36	22	53
	Exclusive breast feeding, children under 6 months	**37.1**	28	26	26	61	37	44	56	27	15	40
	Protein rich food intake, children under 3 years (1-day recall)	**30.5**	56	59	61	44	63	58	52	55	69	54
	Outcome											
	Body Mass Index <18.5 (Thin), women 15-49 years	**14.3** *	10	11	-	-	17	-	12	-	15	13
	Body Mass Index >=25 (Overweight), women 15-49 years	**20.7** *	24	24	-	-	18	-	14	-	27	20
	Mid-Upper Arm Circumference < 23.0cm, women 15-49 years	**13.1**	8	9	8	10	10	8	13	18	9	12
	Stunting (Height-for-Age), children under 5 years	**33.2** *	41	38	-	-	40	-	35	-	24	29
	Underweight (Weight-for-Age), children under 5 years	**27.2**	29	23	28	25	30	19	27	26	24	22
	Wasting (Weight-for-Height), children under 5 years	**10.5** *	7	8	-	-	16	-	11	-	10	11

* Estimates based on IFLS 3 are representative for only 13 provinces.
*** Anemia refers to serum hemoglobin level below 11g/dl, except for pregnant women (serum hemoglobin level below 12g/dl).
† Latest pregnancy within the last 5 years, among women between 15 to 49
‡ Latest delivery within the last 5 years, among women between 15 to 49
†† Among children who visited Posyandu
(Standard error not shown)

Central Java	DI Yogyakarta	East Java	Banten	Bali	West Nusa Tenggara	East Nusa Tenggara	West Kalimantan	Central Kalimantan	South Kalimantan	East Kalimantan	North Sulawesi	Cenrtal Sulawesi	South Sulawesi	Southeast Sulawesi	Gorontalo	Makalu	North Makalu	Irian Jaya	Data source
89	98	88	59	88	87	78	66	58	84	82	92	65	73	72	78	-	-	-	*DHS 2002*
39	55	47	-	44	45	-	-	-	28	-	-	-	66	-	-	-	-	-	*IFLS 2000*
14	18	15	-	18	16	-	-	-	15	-	-	-	16	-	-	-	-	-	*IFLS 2000*
51	51	54	-	51	58	-	-	-	49	-	-	-	53	-	-	-	-	-	*IFLS 2000*
16	13	20	-	18	16	-	-	-	14	-	-	-	12	-	-	-	-	-	*IFLS 2000*
38	49	59	34	35	42	45	38	37	36	55	51	32	42	45	55	-	-	-	*DHS 2002*
80	87	84	70	81	89	80	76	58	80	74	81	58	77	73	84	-	-	-	*DHS 2002*
72	80	72	69	66	66	59	68	64	62	63	64	67	68	57	57	-	-	-	*DHS 2002*
1.4	1.0	0.7	1.5	0.7	1.8	5.9	3.1	0.3	4.2	3.8	1.1	1.7	2.0	1.0	3.8	-	-	-	*DHS 2002*
78	90	85	82	60	36	46	99	100	99	100	100	99	77	78	98	48	84	99	*SUSENAS 2003*
57	67	72	59	42	19	34	89	92	89	96	95	89	63	64	91	39	67	91	*SUSENAS 2003*
54	55	43	27	32	30	55	27	39	31	41	53	43	25	39	23	-	-	30	*SUSENAS 2001*
69	73	60	43	50	47	70	44	62	44	57	69	58	43	48	40	-	-	48	*SUSENAS 2001*
80	93	82	-	79	63	-	-	-	59	-	-	-	46	-	-	-	-	-	*IFLS 2000*
99	100	100	-	100	97	-	-	-	99	-	-	-	95	-	-	-	-	-	*IFLS 2000*
48	39	41	51	42	66	62	44	43	62	39	80	61	72	72	62	-	-	-	*DHS 2002*
36	23	31	34	26	60	38	30	33	45	34	49	49	62	58	40	-	-	-	*DHS 2002*
45	70	57	55	64	51	40	53	69	67	63	65	66	65	56	59	-	-	-	*DHS 2002*
15	17	15	-	13	17	-	-	-	17	-	-	-	18	-	-	-	-	-	*IFLS 2000*
19	19	23	-	19	15	-	-	-	18	-	-	-	16	-	-	-	-	-	*IFLS 2000*
16	12	15	12	8	19	32	12	10	13	12	7	13	12	13	9	-	-	17	*SUSENAS 2001*
32	29	33	-	33	56	-	-	-	43	-	-	-	39	-	-	-	-	-	*IFLS 2000*
26	23	27	29	18	32	37	36	36	30	26	42	34	37	30	36	-	-	-	*SUSENAS 2001*
11	11	10	-	3	6	-	-	-	12	-	-	-	9	-	-	-	-	-	*IFLS 2000*

ANNEX C.
COST-EFFECTIVENESS OF NUTRITION PROGRAMS

1. Cost of nutrition programs

In order to better understand the cost of nutrition delivery and the cost-effectiveness (CE) of existing nutrition services, the World Bank recently collected information on the cost of nutritional service delivery in five Indonesian districts. These five districts were purposively selected in order to capture reasonable diversity in geography and socioeconomic levels: Surabaya and Lumajang in East Java, Kupang in East Nusa Tenggara, Gunung Kidul in Yogyakarta, and Lampung Selatan in Lampung. Except Kota Surabaya, all districts are primarily rural. An overview of the socio-economic characteristics of each district is presented in Table C1.

Table C1.
Socioeconomic characteristics of five districts for the cost-effectiveness analysis

Socioeconomic characteristics	Kota Surabaya	Lumajang	Kupang	Gunung Kidul	Lampung Selatan
Population distribution by residential area					
Urban	100.0	20.6	2.0	4.9	13.1
Rural	0.0	79.4	98.0	95.1	86.9
Household head's sex					
Male	85.4	84.5	88.3	83.7	92.0
Female	14.6	15.5	11.7	16.3	8.0
Household head's education					
Less than primary education completion	8.5	49.0	46.7	48.0	40.3
Primary education completed	23.4	35.0	33.2	29.4	35.5
Distribution of household resources, using consumption quintile at the national-level					
Lowest	4.7	39.4	54.5	35.7	37.8
Second lowest	8.7	25.8	17.3	24.7	25.8
Middle	16.4	18.2	11.7	21.6	19.7
Second highest	27.9	10.8	9.9	13.3	11.4
Highest	42.2	5.7	6.5	4.8	5.2

(Source: SUSENAS 2003)

The cost survey focused on five programs: (1) Vitamin A supplementation for children and women, (2) Iron supplementation for pregnant women, (3) Iodine supplementation for school children, (4) Growth monitoring for children under-5 years, and (5) Feeding programs. Program activities and target populations are summarized in Table C2.

Table C2.
Main activities by program

Program	Activity
Vitamin A supplementation	
Infants 6-59 months	Distribution of high dose vitamin A in Posyandu Distribution of high dose vitamin A door to door by cadres
Postpartum women	Distribution of high dose vitamin A through midwives Distribution of high dose vitamin A door to door by cadres/ Iron supplementation
Pregnant women	Distribution of Iron supplementation through cadres/midwives Distribution of Iron supplementation door to door by cadres/ midwives
Iodine supplementation	
School age children	Distribution of Iodine syrup at school.
Growth monitoring	
Children under 5 years	Weight measurement and record in a growth chart Consultation on child growth by the cadre based on child's growth chart
Therapeutic feeding from Puskesmas	
Children under 5 years	Distribute the supplementary food from the government to the undernourished U-5 children of poor family
Complementary feeding from Posyandu	
Children under 5 years	Distribute the complementary food from the government to the U-5 children of poor families who visit to Posyandu

In August 2004, two trained interviewers familiar with nutrition programs and government accounting practices collected information on the cost of implementing the selected five nutritional programs in each district. Respondent sources included staff from the Posyandu and Puskesmas in each district, selected at random. In addition each District Health Department was visited by the surveyors as well as the Provincial Health Departments in the relevant provincial capitals and the National Department of Community Health and Nutrition in Jakarta.

Cost information was collected separately for each nutrition activity. Reported program delivery costs were classified into four broad categories: (1) variable or recurrent costs (such as for various supplies and the costs for meetings, reports, and staff monitoring); (2) fixed costs (such as for equipment and initial staff training); (3) off-budget cost (which attempts to value donated services such as volunteer times); and (4) the cost of additional relevant extra activities that vary across districts.

Table C3 depicts the annual cost per child or woman by district for each program. There are several points to be discussed. First, the unit cost for a particular program varies greatly across the 5 districts. For vitamin A supplementation, relative differences between lowest and highest estimates are 1.9 fold, 2.4 fold, and 1.6 fold for infants 6-11 months, children 12-59 months, and pregnant women, respectively. Growth monitoring cost for children under-5 years also varies by 1.6 fold, and therapeutic feeding cost varies by 2.1 fold. This should not be surprising since many factors that determine program costs vary across districts, including the local price levels and the size and density of the catchment area served by the program.

Another point to note is that the off-budget costs, largely made up by the opportunity costs of volunteer services, makes up a substantial component of total costs for micronutrient distribution programs. In particular, the proportions of off-budget cost range from 58% in Lumajang to 81% in Kupang for postpartum vitamin A

supplementation. Similarly, for prenatal iron supplementation, proportions of off-budget cost range from 58% in Lumajang and 83% in Lampung Selatan. This suggests that cost estimates based on budget only may lead to significant overestimation of cost-effectiveness for some programs.

Table C3.

Program cost for the five selected programs, per person/year (in Rupiah)

Program	Kota Surabaya	Lumajang	Kupang	Gunung Kidul	Lampung Selatan
Vitamin A supplementation					
Infants 6-11months					
Variable	980	1948	823	1450	710
Fixed	144	103	112	105	104
Off-budget	725	462	382	760	727
Extra activity	208	0	0	0	0
TOTAL	2057	2513	1317	2315	1540
Children 12-59 months					
Variable	1016	1748	877	1608	1597
Fixed	144	103	112	107	104
Off-budget	517	603	371	1179	1541
Extra activity	208	0	0	0	0
TOTAL	1886	2455	1360	2894	3241
Post-partum mothers					
Variable	835	1933	541	1158	472
Fixed	84	3	12	47	44
Off-budget	2547	2668	2356	2094	2587
TOTAL	3467	4603	2910	3298	3103
Iron supplementation					
Pregnant women					
Variable	621	1081	523	627	647
Fixed	84	3	12	75	70
Off-budget	2433	2433	2364	2013	2087
TOTAL	3139	3518	2899	2714	2804
Iodine supplementation					
School age children					
Variable	-	1300	-	1200	-
TOTAL	-	1300	-	1200	-
Growth monitoring					
Children under 5 years					
Variable	16146	16564	12708	17718	15783
Fixed	6247	4578	1827	1584	1435
Off-budget	1507	921	782	869	1255
Extra activity	321	63	0	0	0
TOTAL	24220	22126	15317	20171	18473
Therapeutic feeding (Puskesmas)					
Children under 5 years					
Variable	241240	196115	402774	188868	-
Fixed	6309	9641	1901	1584	-
Off-budget	9500	9500	3558	1000	-
TOTAL	257049	215256	408234	191452	-
Complementary feeding (Posyandu)					
Children under 5 years					
Variable	175455	177339	219108	204843	-
Fixed	6247	9653	1902	1584	-
Off-budget	1563	1313	873	1094	-
TOTAL	183264	188305	221882	207521	-

Finally, in comparison to unit costs in selected low income Asian countries (Horton, 1999)[25] [26], average unit cost of vitamin A supplementation program among five districts (0.22 USD per infant 6-11 months and 0.26 USD per child 12-59 months) appears to be at a similar level (0.20 USD per child under 3 years). However, postpartum vitamin A supplement cost is relatively higher in the study districts (0.39 USD per pregnancy vs. 0.10 USD per pregnancy), although the cost is still modest. On the other hand, average cost for prenatal iron supplement is significantly lower in the study districts (0.34 USD per pregnancy) compared to 2.50 USD per pregnancy.

2. Nutrition program effectiveness

International estimates show that nutrition programs can be amongst the most cost-effective health interventions available (World Bank 1993). However both the costs and effectiveness of any program can vary widely according to the health conditions in a specific location and how the program is implemented. Annex B of this report addresses the substantial regional heterogeneity in nutrition conditions and the extent of successful nutrition program delivery. With decentralization, it is important to consider the cost-effectiveness of nutrition programs at the district level since now districts are the focal point for decisions on health priorities — which programs are to be implemented and how these are supported. This section uses the cost information for the five districts described above to estimate cost-effectiveness (CE) for the nutrition programs at the district level.

The study applies an adapted version of the Generalized CE Analysis framework developed by WHO, a standardized approach that can be applied to all interventions in different settings (WHO-CHOICE 2003). It evaluates the CE of interventions relative to a ìnullî scenario in which no interventions are made. The approach has been used to derive global and regional estimates for a broad range of health interventions, with the detailed assumptions underlying the modeling published on the internet to enable analysts to update and modify the estimates as more appropriate data becomes available.

The impact of the interventions is assessed using a population model to simulate the lifespan of individuals in a population, allowing individuals to be categorized into one of three mutually exclusive health states. Population health is expressed as the number of healthy years lived, while differences due to the interventions are estimated in terms of DALYs (disability adjusted life-years) averted. Use of the same metric to describe the health impact of interventions for different diseases and risk factors allows direct comparison across different types of interventions and different health conditions.

WHO has defined 'Epidemiologic sub regions', grouping countries into 14 regions according to mortality profile. Indonesia is grouped with Thailand and Sri Lanka in SEAR B, described as 'low child mortality, low adult mortality'. As outlined in Table C4, a population model and aggregated disease profile has been developed to describe the disease experience and estimate the maximal attainable impact of health interventions for the region. The coverage of the nutrition interventions in each of the five study districts (estimated from SUSENAS 2003) has been used to estimate actual health impact in each district. This is combined with the cost data described earlier to estimate the CE of selected nutrition programs in the five districts. Unfortunately health impact estimates

[25] Countries included in the estimates are Bangladesh, Cambodia, China, India, Laos, Nepal, Pakistan, Sri Lanka, and Viet Nam (Horton, 1999).

[26] Cost comparison is in 1999 USD (1USD=7813Rp), adjusted for inflation (14.8 % between 1999 and 2004) (Source: BPS Statistics Indonesia, 2005. Monthly Indonesia's Consumers Price Indices and Inflations, 1999 - 2005. http://www.bps.go.id/sector/cpi/table3.html, accessed on August 15, 2005).

were available for only six of the eight interventions for which cost data were collected (Table C5). To estimate CE these data were collapsed into three interventions in order to reconcile the collected cost data with the available effectiveness information: (1) vitamin A supplementation for children 6-59 months, (2) prenatal iron supplementation, and (3) growth monitoring and complementary feeding for children 6-12 months[27].

Table C4:
Data elements used in the CE modeling and their sources.

Model elements	Variables	Assumptions	Sources
Population model for the risk factor	Total population size Population mortality rate Population fertility rate	WHO regional-level age and sex specific estimates are applicable to the study districts.	GBD 2000 Database, SUSENAS 2003
	Health state valuation	WHO regional-level age, sex and disease specific estimates are applicable to the study districts	WHO 2002
'Observed' epidemiology for the risk factor	Incidence, case-fatality, remission, prevalence, duration, co-morbidities	Determined using DISMOD II equations, based on WHO-region specific data	GBD 2000 Database
Intervention effects	Effect	WHO region specific estimates of the attributable burden for the nutrient are applicable to the study districts. They were estimated by recent meta-analyses, assumed to be the maximal attainable health effect with an optimal program.	Ezzati et al 2004
	Coverage	—	SUSENAS 2003, IFLS 2000, DHS2002.
Intervention costs	Variable, fixed, off-budget, extra activities	—	Primary data collected, 2004

Table C5:
Nutrition interventions considered

Program	Interventions being implemented	Cost data collected	Health impact (effectiveness) estimates available
Vitamin A supplementation	Vitamin A supplementation, infants 6-11 months	Y	Combined 6-59 months only
	Vitamin A supplementation, children 12-59 months	Y	Combined 6-59 months only
	Vitamin A supplementation, post-partum mothers	Y	N
Iron supplementation	Iron supplementation, pregnant women	Y	Y
Iodine supplementation	Iodine supplementation, school aged children	Y	N
Growth monitoring, children under 5 years		Y	Only combined with complementary feeding, 6-12 months
Complementary feeding, children under 5 years		Y	6-12 months only
Therapeutic feeding, children under 5 years		Incomplete	For underweight children 6-12 months

[27] Growth monitoring was combined with complementary feeding in children under-5 years, as generally is the case in Posyandu services.

Table C6 describes the estimated health impact (effectiveness) of the three nutrition interventions in the five districts, expressed in DALYs averted. It is a function of district population, maximal health impact, and program coverage, and there are a few contrasts and patterns to note. First, the maximal potential impact[28] is greatest for vitamin A supplementation, followed by iron supplementation. The potential impact of growth monitoring and complementary feeding is significant but relatively much less than other two interventions. Second, while supplementation coverage for both vitamin A and iron is generally high across districts, the growth monitoring and complementary feeding reached only about half of the children. This coverage gap by program results in a significant difference in the estimated actual effect across programs. For example in Surabaya, the ratio of the estimated actual effect of vitamin A vs. growth monitoring and complementary feeding is about 5.5 (3090 vs. 561), while the ratio of the maximal potential effect is about 3.2 (3395 vs.1058). Finally, the estimated actual effect is greatly affected by population size and it is difficult to directly compare across districts due to a wide range of population size (from 0.3 million in Kupang to 2.7 million in Kota Surbaya).

Table C6:
Estimated actual effect of the nutrition interventions at district level

Intervention	District	District Population	DALYs averted/ yr, maximal effect [a]	Coverage [b] (%)	DALYs averted, actual effect, average 1 yr [c]
Vitamin A supplementation, 6-59 months					
	Surabaya	2,692,638	3,395	91	3,090
	Lumajuang	1,000,260	1,261	79	996
	Kupang	332,840	420	81	340
	Gunung Kidul	686,732	868	92	799
	Lampung Selatan	1,195,376	1,507	75	1,130
Iron supplementation, pregnant women					
	Surabaya	2,692,638	2,647	94	2,488
	Lumajuang	1,000,260	983	83	816
	Kupang	332,840	327	78	255
	Gunung Kidul	686,732	675	96	648
	Lampung Selatan	1,195,376	1,175	80	940
Growth monitoring & complementary feeding, children 6-12 months					
	Surabaya	2,692,638	1,058	53	561
	Lumajuang	1,000,260	393	52	204
	Kupang	332,840	131	41	54
	Gunung Kidul	686,732	270	52	140
	Lampung Selatan	1,195,376	470	49	230

[a] Based on 100% program coverage in a population with SEAR B age/ sex profile and prevalence of deficiencies.
[b] Assumes that coverage for age sub-groups applies to overall age group (eg 6-12 mo versus 13-59 mo).
[c] Actual effect = (Maximal effect x coverage)

The cost and health impact data are combined in Table C7 to give CE estimates. As might be expected from the ranges across districts in the data used to derive these estimates, the cost per DALY averted varies widely across districts for each intervention and the relative CE for each intervention is quite different. The district-level variation in CE is greatest for Vitamin A supplementation, with a ratio of 2.44:1 for the least cost-effective district to the most, in Lampung Selatan and Kupang, respectively. The corresponding ranges for iron

[28] With the methods used, maximal DALYs averted are a direct fraction of population size, with a different fraction for each intervention ('intervention effects' in Table C4)

supplementation and growth monitoring and complementary feeding are 1.50 and 1.47 respectively. Surabaya generally ranks as the first or second most cost-effective district across the three interventions, that is the least cost per DALY averted. The other districts rank quite differently depending on the intervention. For example, Kupang is the most cost-effective for vitamin A supplementation, but near the least for the other interventions.

In addition, the three interventions are quite distinct in their relative CEs, with no overlap between the ranges and a clear ranking in CE: iron supplementation is clearly the most cost-effective (31 I$ /DALY averted), followed by vitamin A supplementation (84 I$ /DALY averted), then growth monitoring and complementary feeding (4813 I$ /DALY averted). Although vitamin A supplementation has the highest maximal potential effect (Table C6), prenatal iron supplementation is estimated to be most cost-effective intervention due to the relatively smaller but higher risk target group.

Table C7:
Estimated cost-effectiveness of the nutrition interventions at district level

Intervention	District	District Population in age group [a]	Average cost/ beneficiary/ year [b] (Rupiah)	DALYs averted, actual effect, average 1 yr	Cost / DALY averted (Rupiah)	Cost / DALY averted [c] (International $, 2004)
Vitamin A supplementation, children 6-59 months						
	Surabaya	256,366	1,905	3,090	158,051	62
	Lumajuang	95,235	2,461	996	235,315	93
	Kupang	31,690	1,355	340	126,294	50
	Gunung Kidul	65,384	2,830	799	231,585	91
	Lampung Selatan	113,812	3,054	1,130	307,594	122
	Average				**211,768**	**84**
Iron supplementation, pregnant women						
	Surabaya	58,700	3,139	2,488	74,059	29
	Lumajuang	21,806	3,518	816	94,012	37
	Kupang	7,256	2,899	255	82,491	33
	Gunung Kidul	14,971	2,714	648	62,703	25
	Lampung Selatan	26,059	2,804	940	77,733	31
	Average				**78,200**	**31**
Growth monitoring & complementary feeding, children 6-12 months						
	Surabaya	28,488	207,484	561	10,536,193	4162
	Lumajuang	10,582	210,431	204	10,915,592	4312
	Kupang	3,521	237,199	54	15,466,253	6109
	Gunung Kidul	7,266	227,692	140	11,817,215	4668
	Lampung Selatan	12,647	-	230	-	-
	Average				**12,183,813**	**4813**

[a] Based on district total population (Susenas 2003) and SEAR B population age/ sex profile (6-11 mo = 0.01058 of total; 6-59 = 0.09521 of total; pregnant = 0.0218).
[b] For vitamin A calculated using cost per beneficiary weighted (11% infant cost; 89% 12-59 cost); for growth monitoring & complementary feeding, costs of individual services are added; otherwise costs as reported in Table C3.
[c] Exchange rate: International Dollar 1 = Rp. 2531.526 (Source: IMF)

Unfortunately, there are few other data with which to directly compare these results. WHO-CHOICE's CE estimates for the Southeast Asia Region are 128, 230, and 3478 (I$ /DALY averted) for vitamin A supplementation, iron supplementation, and complementary feeding and growth monitoring, respectively [29] (WHO 2003). Part of the discrepancy is explained by the difference in cost measurement. Our cost survey focused on marginal cost of a specific intervention only, whereas WHO's cost included the cost of an overall health center visit. In addition, WHO included the cost of a 3-month postpartum iron supplementation for iron supplementation while we restricted the cost to within the prenatal period only.

Horton (1999) estimated CE in terms of the cost per death averted for interventions focusing on protein energy malnutrition (PEM), iron, and vitamin A supplementation in the Asian region. A considerable diversity across countries was suggested: the highest vs. lowest ratios were 10.8, 18.9 and 6.5, respectively. As expected these cross national ranges are greater than the inter-district ranges we observe for Indonesia. In contrast to the findings presented in the tables above, the cost per death averted was highest for iron interventions, in some cases more than 80 times of the cost for PEM and vitamin A. The estimates in Horton's analysis will be more highly influenced by population age/sex profiles and prevalence of disorders than this study, where these were constrained to be similar for all districts[30].

We further explore any association between CE and population characteristics across the five districts. Figure C1 shows the scatter plot of CE and coverage by program. Even though there are a maximum of five data points, we see a negative relationship between CE and coverage for prenatal iron supplementation and growth monitoring. We did not observe any significant association between CE and target population size or wealth profile.

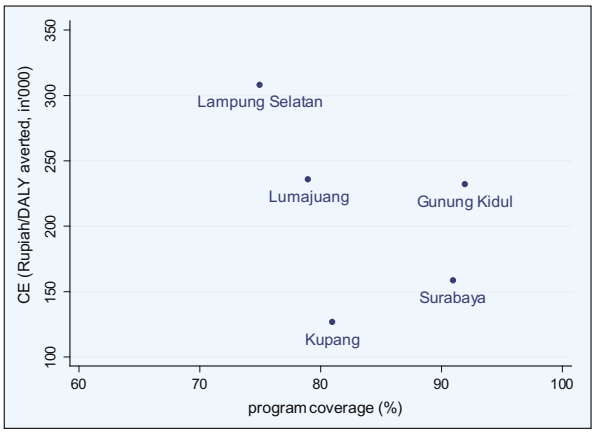
Our findings are preliminary and we intend to refine these analyses by assessing how sensitive the estimates are to each set of assumptions, and to include discounting of costs and benefits. Nevertheless, the findings already have important implications related to decentralization. The cost-effectiveness of nutrition interventions is likely to range by a factor of about 1.5 to 2.5 across districts, depending on the intervention. Any national estimate of CE will mask this considerable regional heterogeneity. Vitamin A supplementation programs are the most variable in CE across districts. In addition, iron supplementation programs are the most CE across all districts, followed by vitamin A supplementation and growth monitoring/ complementary feeding being the least CE.

[29] International dollar computations (I$) are based on year 2004. WHO results employ a program coverage estimate comparable to what observed in the five districts: 80% for vitamin A and iron supplementation and 50 % for complementary feeding and growth monitoring.
[30] District-level prevalence was available for only underweight among children under-5 years.

Figure C1.

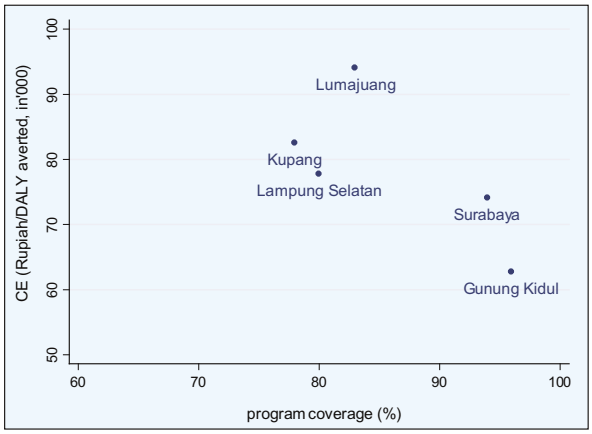
Scatter plot of the cost-effectiveness and coverage by program

a) Vitamin A supplementation for children 6-59 months



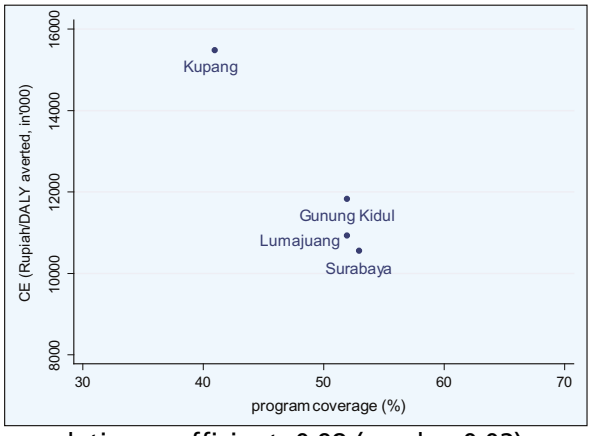
correlation coefficient -0.44 (p-value 0.46)

b) Iron supplementation for pregnant women



correlation coefficient -0.71 (p-value 0.18)

c) Growth monitoring and complementary feeding for children 6-12 months



correlation coefficient -0.98 (p-value 0.02)

ANNEX D.

INSTITUTIONAL ANALYSIS: VARIATION IN NUTRITIONAL CAPACITIES ACROSS REGIONS

This annex involves a systematic review of the division of roles and responsibilities between levels of government and other institutions involved in nutrition program delivery. This review is achieved through the summary of detailed case studies conducted in different regions in Indonesia. Four districts from three provinces were purposively sampled for these case studies. They are Kota Surabaya and Lumajang in East Java, Gunung Kidul in Yogyakarta, and Kota Kupang in East Nusa Tenggara. These are among the same districts selected for the cost-effectiveness analysis in Annex C and so will provide additional information.

This review is conducted with a focus on the effect of decentralization, the most important institutional change in Indonesia in the last 50 years, on the delivery and effectiveness of nutrition services. Decentralization poses significant and still unresolved questions regarding the relationships between different levels of government in Indonesia and the roles of key institutions and agencies in nutrition delivery. Role differentiation and improved management capacity are important open issues today that will eventually need to be addressed. Although a possible future that rationalizes institutional roles is one where the provinces and the center specialize in critical public nutrition functions and districts assume primary responsibility for nutrition sector performance in their jurisdictions, the current situation is quite different. Understanding this current situation in some detail is a crucial step in the rationalization of roles and responsibilities of nutrition delivery.

The annex is divided into three sections. First we compare institutional responsibilities across administrative levels and regions. Other institutions involved in nutrition delivery are then briefly reviewed. Finally the current strengths and weaknesses of each institution, and how these strengths and weaknesses should affect the course of the reform process, are discussed.

I. COMPARATIVE ANALYSIS OF INSTITUTIONAL RESPONSIBILITIES ACROSS ADMINISTRATIVE LEVELS AND REGIONS

In this section, we examine three aspects of institutional functioning at the central, provincial, and district level: (1) the institutional structure; (2) the defined institutional responsibilities; and (3) structural and related issues that inhibit the institution from fulfilling these responsibilities. Information on structure and responsibilities was obtained from official documents governing each institution: the Peraturan Pemerintah (PP) (government regulation) at the central level and the Peraturan Daerah (PD) (local government regulation) at the province- or district-level.

A. Institutional Structure

The new autonomy granted to local governments in 2001, resulted in diverse institutional structures with respect to nutrition policy and services. This variation is particularly noticeable across districts although it is also apparent across provinces. Some districts still preserve an explicit nutrition section in the local government; some have merged the nutrition section into more broadly defined health sections; and some do not have any nutrition related section or sub-section at all. All three of these situations can be seen across the 38 districts in East Java. (On the other hand all 16 districts in NTT have a nutrition section.)

At the province-level, each of the Provincial Health Offices (PHO) in East and Central Java and East Nusa Tenggara has a nutrition section. In NTT there are actually two sections responsible for nutrition programs: the Improvement in Nutrition Section and the Food and Nutrition Alertness Section (SKPG). These two sections are under the coordination of different divisions and there is overlap between the two in their functions and responsibilities.

B. Institutional responsibilities

A review of the defined institutional responsibilities indicates that the differentiation of nutrition roles between the planning and health departments seen at the central level is echoed at the province and district levels. The planning department (Bappenas at the central level and the Bappeda at the provinces and districts) generally takes responsibility for overall policy and planning, and hence budgeting, while the health department (Depkes at the central level and Dinkes at the local level) is the technical arm of the government in the health sector. The health department formulates technical standards, provides technical assistance, and evaluates nutrition policies. In addition to these technical responsibilities, the provincial health offices (PHO) are also charged with coordinating nutrition policies across the districts within their purview. The district health offices (DHO), on the other hand, play less of a specific technical role and instead focus their efforts on implementing the family and community nutrition programs in their local areas and otherwise operationalizing the policy directives they receive from above.

In practice, the roles and responsibilities of the different levels are not sufficiently differentiated and clear in the minds of the relevant public officials. One result of the decentralization process is that the province has lost much of its authority over the districts — districts now often ignore requests from the centre and the province, something that was not possible in the past. As a result, provinces and the centre frequently have little idea of the status of program implementation. This is particularly true for programs that do not receive deconcentration funds.

Another important effect of decentralization is that local nutrition sections have changed their roles and responsibilities, resulting in considerable diversity across districts and provinces. As there is less pressure to coordinate programs across districts and no one body has the authority to direct such coordination, each department in each district or province has set out its own roles and responsibilities. These roles and responsibilities frequently duplicate or overlap with those of another section or department. For example, in NTT, a small province with only a limited number of well trained staff, the PHO has two sections which deal with nutrition — one for 'Improvements in Nutrition' which is charged with delivering programs and producing reports on activities, and a second group, the 'Food and Nutrition Alertness' section which is responsible for monitoring all aspects of nutrition and implementing some programs. At the same time the Bappeda is also responsible for monitoring and evaluating programs as well as planning and coordination. However, while there are nutrition staff positioned at all Puskesmas, there is no provincial budget (or district budget in most cases) for data collection and surveys. While the case of NTT is more extreme than in most provinces, it nevertheless reflects the overall lack of coordination between departments, the overlap in responsibilities between sections and departments, and the generally inadequate budget for monitoring, surveilling and evaluating the activities in nutrition at either the provincial or district levels.

C. Structural and related issues that inhibit the fulfillment of these institutional responsibilities

There are a number of problems that prevent government institutions from successfully executing all of their stated nutrition responsibilities. Looking broadly across all possible administrative levels and regions, four types of barriers were most prominently suggested by study respondents: issues in program implementation, human resources, planning and budgeting, and health information systems.

Issues in program implementation

Provincial level

As stipulated by PP No. 25 in 2000, there are 11 roles and responsibilities of the provincial government in the health sector (including nutrition). However, only two of these roles are currently implemented as programs and therefore receive a budget. These budgeted programs are:

1. Epidemiological surveillance (including nutrition surveillance)
2. Provision of essential pharmaceuticals for basic health needs (including those for micronutrient supplementation programs)

The other nine roles and responsibilities are implemented only in the form of standards determination, permission provision, and monitoring (including standardization of nutrient value and guidelines for certification of health and nutrition technology) and receive no budgetary support at the provincial level. As a result, the involvement of the provincial level in nutrition programs is now very limited. Virtually all implementation is left to the districts.

District level

The District Health Office (DHO), through its Nutrition Section, is now the entity most responsible for implementing nutrition programs. Within the district, the Puskesmas is typically seen as the front line institution for implementation. There has recently been a revision of the roles and responsibilities of Puskesmas that reduced the health center mandate from 18 to 6 major programs. One of these six major programs is community nutrition. PP No 25 in 2000 is based on UU No. 22 in 1999.[31] However, the extent to which the Puskesmas can fulfill this new nutrition role is limited by a lack of relevant information, a shortage of staff in most districts and Puskesmas, and limited funds allocation by the district government.

One pressing issue in nutrition program design and implementation is the lack of relevant information, and limited use of the scant existing information when institutions formulate nutrition programs. This problem exists at all levels of government. For example Bappenas formulated the RPJM (Five-year development plan) in nutrition based on the vision and mission of the newly elected president, rather than on the current nutrition situation. Neither the center nor the provinces have high quality nutrition information as neither level receives complete data from districts, sub-districts, and villages. This breakdown in reporting arose after decentralization when the reporting requirements and responsibilities were changed. For example, the ability of the Dinas in East Java to compile data, including data on nutritional status and program performance, is limited since districts no longer send regular reports to the province. The reports received from the districts are restricted to programs funded only through the de-concentration budget or provincial APBD, and the reports are sometimes incomplete and/or late.

[31] Since UU No. 32 in 2004 revised UU No. 22, there will be another revision for PP No. 25. This revision may change the roles and responsibilities of the province (and districts) in the health sector, including nutrition.

As a consequence of this lack of relevant nutrition information, the nutrition section of each PHO prepares program plans which are not firmly based on evidence. In certain provinces the program plan derives from the previous plans with little change and without an explanation of any changes that are made. At the same time, technical policy (still essentially set by the centre) does not adequately reflect existing nutritional needs or take into account the problems at lower administrative levels.

Issues in human resources

At the central level of government, the Directorate of Community Nutrition has adequate numbers of well qualified staff. Ironically, nine additional staff were recruited in 2005, after decentralization, while the provinces and districts suffer from limited human resources. A common problem in the three provinces visited is that the heads of the nutrition sections do not have educational backgrounds in nutrition. Additionally, numerous staff in the province offices have only completed the senior level of high school. However the largest staffing problem is found at the Puskesmas level, the front line of nutrition program implementation.

East Java confronts the most serious human resource situation: only 503 out of 923 Puskesmas have nutrition staff properly trained in nutrition[32]. Among these 503 Puskesmas with properly trained staff, 37 have nutrition staff who are only honorary employees and another 37 only have voluntary staff. These honorary and voluntary members commonly leave the Puskesmas when they receive a permanent job elsewhere. In Surabaya and Lumajang districts, each DHO has only two nutrition staff. Furthermore, some of these staff are expected to leave soon since they will continue study in other areas.

Yogyakarta generally has a better situation in human resources than East Java, except for the district of Gunung Kidul. Nevertheless, only 16 out of 29 Puskesmas have nutrition staff, but two of these Puskesmas with nutrition staff are expected to lose them soon. This problem may grow even worse over time as other PHC nutrition staff will retire in the near future and those staff who continue their education at the university level will most likely not return to Puskesmas after completing their degrees.

The staffing situation in NTT is comparatively better. The Puskesmas in NTT have two nutrition staff on average, although staff training is frequently not adequate for the required tasks. Each DHO in NTT has more than two nutrition staff, except Kota Kupang where the Nutrition section does not have any staff at all.

The rate of skill upgrading has stalled since decentralization. All training programs, which prior to decentralization were run by the center and funded out of the central budget, have now been transferred to the districts as a part of the decentralization process. The training budget is now included in the DAU (dana alokasi umum —general allocation budget), and in the four districts studied, proposed training by the nutrition section was rejected by the planning sub-division at the DHO or rejected in the discussion stage of Satuan Empat (see Box 2). As a result, there has been little nutrition training at the district-level since decentralization, even though the district staff, now fully responsible for program delivery, generally have inadequate skill levels for the tasks they are now expected to carry out.

32 Proper training defined as those with Nutrition Diploma 1 and/or Diploma 3.

Issues in planning and budgeting

Prior to decentralization, sectoral allocations were decided by the central government. Resources were transferred from the central to the regional (provincial and district) governments through multiple earmarked grants. Most health and nutrition funds were channelled through the MOH with smaller amounts through other ministries; other funds were allocated directly to the districts and provinces. After decentralization in 2001, central-regional transfers have continued to be the primary means of transferring resources from the center to the district but they are no longer earmarked for specific activities in any sector. Almost all district funds derive from the Balancing Fund (dana perimbangan). This fund includes a general grant (DAU — dana alokasi umum), shared taxes, natural resource and revenue shares (SDA, sumber daya alam) and a special sector-specific allocation grant (DAK — dana alokasi khusus). The share of DAU and natural resources allocated to the health sector is determined by the district governments themselves. DAK (special allocation grants for health) are distributed by the central government according to specified allocation criteria.

Planning and budgeting processes at each administrative level are explained in more detail in Boxes D1-D3. In regard to central-level allocative planning, the process is clearly defined although there are some weaknesses which can create an imbalance in the de-concentration budget across provinces. Provinces with qualified nutrition staff and strong collaboration with universities (such as all of the provinces in Java and some in Sumatera and Sulawesi) have a big advantage in obtaining resources through the submission of well developed proposals; while more likely to successfully obtain resources, the provinces with these advantages may not have the greatest nutritional needs.

At the provincial level, there are two major issues. First, there is little consultation with outside parties, especially the DHOs, in the planning and budgeting process and therefore the provincial nutrition programs at times work at cross-purposes with district programs. Secondly, typically there is poor coordination across provincial level institutions (the Bappeda, PHO, and other institutions responsible for food and nutrition programs such as the Food Security Board, the Women Empowerment Board, and PKK) and with the DPRD. Developed programs often overlap in area and responsibility. In addition, programs proposed by the APBD can be eliminated by the Bappeda or the DPRD.

At the district-level, the lessons learned from Lumajang and Surabaya should be noted. These two districts have established good coordination between the DHOs (including the nutrition section), other governmental institutions, and NGOs. This coordination has resulted in an increased budget allocation for the nutrition sector in the APBD. This is especially so in Lumajang, where successful collaboration originated from a good relationship between the Director of DHO and the Bupati.[33] In Surabaya, the nutrition section has built a successful collaboration mechanism: NGOs are responsible for conducting nutrition surveys; survey results are disseminated by NGOs to various parties including the mayor, Bappeda, and DPRD; NGOs, BAPPEDA and DPRD then discuss nutrition problems with the nutrition section. As a result, nutrition programs proposed by DHO are easily accepted by the Bappeda and DPRD.

33 Nevertheless, the nutrition section at DHO does not necessarily perform well. This is not only because the section is headed by a midwife with little background in nutrition but also because nutrition is no longer a stand alone division but now a part of maternal and child health/family planning activities.

In summary, there are two sets of issues related to health sector planning and budgeting, both of which are important for nutrition programs. The first issue derives from the change in budget processes that have come with decentralization (Box D1-D3). Whereas the funds for nutrition programs were essentially determined by the centre — largely based on historical grounds — before decentralization, now they are almost entirely determined by the district as part of a general transfer of funds from the centre. Thus, it is the district health office, the Bappeda and the DPRD who now decide how the district funds will be allocated between and within the sectors. The centre and provinces have little influence on the outcome. Largely as a result of the way this process has developed — the inexperience of the district sector officials in the cut and thrust of a competitive budget process and the inability of the newly elected politicians to place sectoral concerns in the broader context of the overall budget or to develop a set of criteria for allocation of public funds — funds for health (including nutrition) are frequently less than had been the case before decentralization. Funds may not be allocated to health and nutrition, and cross-district issues — including training, monitoring and evaluation, and the like — tend to receive much lower priority than activities that will bring a more immediate political impact.

The second, and related, issue pertains to the more technical questions of the most appropriate ways to intervene in nutrition problems once they are on the political agenda. Here, it is not only the need for information that is important but also applying the lessons from elsewhere in Indonesia and other countries, and the availability of technical expertise at the district level. This requires a much more deliberate and medium term (beyond the life of the local parliamentary term) approach, consideration of the role of information, application of lessons learned in other settings, and a focus on results. All of these considerations were not part of the previous approach and are not yet established in the new, decentralized approach. The district by itself may not be the best placed entity to take these issues into account; it may be that some can be more effectively dealt with at the provincial level, in collaboration with the districts.

These institutional issues apply to the health sector generally and to other sectors as well. The recent revisions to the basic laws encompassing decentralization, particularly those related to reconsideration of the respective roles of the province and district, mean that further change is underway. The result may well be that the improved collaboration between districts and with provinces required to deal with many health and nutrition problems is now more possible.

Box D1. Planning and budgeting process at the central level

Bappenas and MOH together propose the nutrition plan and budget, which is approved by parliament.

The nutrition planning and budgeting process will follow these steps in the next years:

1. Priority assessment by Ditzi (Direktorat Gizi Masyarakat — Directorate of Community Nutrition) will refer to the RPJM (Rencana Pembangunan Jangka Menengah — Midterm Development Plan). There is a meeting where all units in Ditzi will discuss planning and budgeting needs related to the role of MOH under de-concentration.
2. At the same time, the PHOs prepare nutrition program proposals for each province under the de-concentration budget released through MOH.
3. A meeting between Ditzi and the PHOs is conducted to discuss proposals submitted from the PHOs and then to determine the nutrition program and de-concentration budget allocation for coming years.
4. The dissemination of results of the meeting between Ditzi and PHO to Dirjen Binkesmas (Director General of Public Health), then to be compiled with programs from others directorates and other units within organization's structure of Dirjen Binkesmas.

5. Compilation by Dirjen Binkesmas is proposed to Sekjen Depkes (Secretary General of MOH) and the Planning Bureau of MOH. Results of compilation and discussion at Sekjen Depkes is established as RKA-KL (Rencana Kerja Anggaran-Kementerian Lembaga — action plan for ministry and board).
6. Sekjen Depkes proposes RKA-KL to Bappenas.
7. Bappenas develops the RKP (Rencana Kerja Pemerintah — government action plan) draft based on proposed RKA-KL from all ministries and boards.
8. Bappenas conducts Musrenbangpus (Musyawarah Perencanaan Pembangunan Pusat — deliberation on central development planning) to improve the RKP. Ministries and boards at the central level participate in this.
9. At the same time, Musrenbangda (Musyawarah Perencanaan Pembangunan Daerah - deliberation on regional development planning) is conducted at the district level to formulate the provincial and central development plans that will be proposed to Bappenas.
10. Bappenas conducts Musrenbangnas (Musyawarah Perencanaan Pembangunan Nasional- deliberation on national development planning) by inviting Governors and central institutions to synchronise central and regional planning.
11. Results of Musrenbangnas are revised by Bappenas for use in the cabinet assembly and will be established as the RKP (Rencana Kerja Pemerintah — government action plan).
12. The RKP is determined through the President's Regulation and disseminated to DPR as the basis for RAPBN development.
13. The Government and DPR review RAPBN corresponding to RKP and determine the APBN, which includes central and regional budget allocation.

Box D2. Planning and budgeting process at the provincial level

There are two channels for planning and budgeting at the provincial level:

Channel One: Planning and budgeting to determine the part of the provincial development plan that will be supported from provincial APBD. There exists only slight variations in the planning and budgeting process at PHO among the three provinces. The differences in process arise after the plan is sent to local governments.

The planning and budgeting occurs as follows:

1. The nutrition section prepares program plans. These program plans are typically not evidence based. In certain provinces, the program plan is based on the previous plan with little change and with no rationales given.
2. The results of this formulation are then delivered to Head of Planning Sub-division at PHO.
3. The planning Sub-division compiles and selects program plans from all units. The sub-division selects the program without any consultation with the original proposers.
4. The compilation and selection results from the sub-division are then delivered to Bappeda to be discussed at the Tim Anggaran Eksekutif (Executive Budget Team)[34] level.
5. Satuan Empat synchronises and coordinates with the proposer institution (for example, PHO) however one of the surveyed provinces directly selects the proposal without consultation with the proposer,

[34] Tim Anggaran Eksekutif is a group consisted of local government institutions: Bappeda, Development Division, Financial Bureau and Regional Monitoring Board

6. Results from Satuan Empat manifest as Provincial Annual Action Plan to be discussed in the DPRD forum. In the observed case of NTT Province, the Financial Bureau revised the report from Satuan Empat by deleting the nutrition program proposal without informing other members of Satuan Empat.
7. The Provincial Annual Action Plan is realized as provincial APBD through the DPRD assembly.

Channel Two: Planning and budgeting to determine the part of the national nutrition program where MOH provides support with the de-concentration budget.

Based on experience from previous years, the PHO collects information on the amount of de-concentration budget allocated for its province. Based on this information, the nutrition section develops a program plan. In almost all provinces, planning is conducted independently by the nutrition section without involving other parties. The planning formulation from nutrition section is then delivered by the Director of PHO to MOH.

Box D3. Planning and budgeting process at the district-level

1. The head of the planning sub-division distributes pre-designed program plan forms to be filled in by each section including the nutrition section. Usually there is no prior discussion of the strategies and priorities of the district.
2. The form is returned back to head of planning sub-division and includes proposed budget allocations.
3. The planning sub-division compiles and selects the proposed programs. At this stage, the head of the planning sub-division does not discuss the proposal again with the proposer sections before selecting the programs. Thus at times programs considered essential to a section are eliminated. In all districts sampled, the programs usually eliminated are training programs and so no training for nutrition staff at the district level has been conducted in the sample districts.
4. The compilation and selection results from the planning sub-division are delivered to head of development division in the Bupati/Major office. At this stage, the proposals are re-evaluated by the head of the development division.
5. Selection results from development division are then discussed by the district level Tim Anggaran Eksekutif. At this stage the DHO, represented by the Head of Administration Division and the head of planning sub-division, has to explain and justify the proposed programs. Common at this stage, all nutrition programs are rejected because members of Satuan Empat do not understand nutrition problems and DHO representatives are not able to present supporting evidence or adequately explain the motivations for proposing these programs. An extreme case is Kupang in 2005. All nutrition programs proposed by the Kupang DHO were rejected
6. The results from Satuan Empat manifest as the Regional Development Plan based on a formal official letter from the Bupati.
7. The Regional Development Plan is discussed at the DPRD with local government. In this forum, the Director of DHO participates as a part of the local government. At this stage there is a possibility of rejection of certain programs or the introduction of entirely new programs. In the case in Kupang, although no nutrition programs were included in the regional development plan, DPRD members agreed to include a nutrition program in the form of the complementary food program (PMT) for poor families. This program became the only nutrition program of the DHO of Kupang in 2005.
8. Result of discussion on Regional Development Plan is realized as APBD (Regional Income and Expenses Budget Allocation) through regional regulation (Perda).
9. Perda APBD becomes the basis for regional development for the coming year.

Issues in health information systems

To assure the proper functioning of the nutrition governance structure, information has to flow smoothly both between the health department and the planning department at every level of government as well as from the district to the province and from the province to the center. This information then has to be analysed and utilized in the planning process and in monitoring and evaluation of programs. These flows of information frequently do not occur. At the same time, districts and provinces need access to the results of national surveys, such as SUSENAS, in planning and evaluating their activities; in general districts have little ready access to these surveys and even if they did they rarely have the skills to analyse and use the information.

Prior to decentralisation, nutrition information was collected and disseminated through the SKPG (Sistem Kewaspadaan Pangan dan Gizi — Food and Nutrition Alertness System). The SKPG survey was conducted annually by related sectors. MOH was responsible for conducting community nutritional status surveys and household nutrition consumption surveys. There was considerable variation between districts and provinces in the quality of the information and in the extent to which it was utilized to set priorities, monitor program implementation and evaluate effectiveness.

Since decentralization, SKPG surveys fall under the authority of each district. The SKPG budget now is included in the DAU (dana alokasi umum — general allocation budget) and most districts do not allocate budget for it. Among the 4 districts studied, Kupang does not allocate any budget for SKPG, and the other 3 districts allocate budget only in a very limited amount. At the provincial level, budget for SKPG is only available for the SKPG development process.

There is no doubt that lack of information hinders not only the planning process but also deprives program design of an evidence base on which to build. But the mere availability of information is not enough to improve the planning and implementation of programs and the effectiveness of interventions. The skills to use the information as well as the incentives to do so are also required. These skills and incentives do not exist at the district level now, nor were they there in the past. The required skills were present in limited supply in some provinces and at the centre but the main programming decisions were, in fact, made in a way that took little account of the differences in nutrition problems between districts, the skills of staff, or the performance of programs in the past.

The continuing development of decentralization provides an opportunity to define and implement a new institutional structure in nutrition, and the health sector generally, which is more capable of using an improved evidence base and taking inter-district differences into account when program planning and implementation decisions are made.

II. OTHER INSTITUTIONS INVOLVED IN NUTRITION DELIVERY

In addition to the planning and health offices of the governments, two other institutions are important for nutrition at the district level - the Dewan Perwakilan Rakyat Daerah (DPRD-Local Parliament) and local NGOs.

A. DPRD (Dewan Perwakilan Rakyat Daerah-Local Parliament)

All the DPRDs at the provincial- and district-level[35] behave in a similar fashion with respect to nutrition. No DPRD has a committee devoted solely for nutritional issues. Nutrition is only a small part of the health sector, and the health sector itself is one of the integrated sectors in the Commission of Social Welfare. At the provincial level, the health sector is located in Commission E while it is in Commission D at district level. Interviews and discussions with DPRD members indicate that they typically have a limited understanding of nutrition. In general, nutrition is considered only a problem for observably underfed children, and all provinces and districts visited have budget allocation for PMT programs although the amount varies[36]. In addition, members of DPRD commonly recognize nutritional problems at a community-level only when marasmus or kwashiorkor, a type of severe clinical malnutrition commonly referred to as *busung lapar*[37], is found.

After decentralization, the DPRDs now have great power in determining the district budgets. In some provinces and districts such as East Java, Surabaya and Lumajang, the DPRD has a stated interest in nutrition because of pressures from local NGOs such as LPKS and continuous advocacy conducted by health offices with support from universities. For example, the head of the Nutrition Section at PHO in East Java and head of the DHO in Surabaya play an important role in building a good relationship with NGOs and Universities, including the Academy of Nutrition. In these districts, budget allocation for nutrition programs is relatively higher than other areas.

B. Local Non Governmental Organizations

Governments at all administrative levels collaborate with the NGOs PKK[38] and Pokja IV[39]. One major program of PKK is growth monitoring through the Posyandu. PKK in selected areas also has specific programs that complement other nutrition programs (Box D4). However, collaboration between a Health Office and domestic NGOs is uncommon, with the exception of Surabaya where DEPKES works closely with KFI (Koalisi Fotifikasi Indonesia-Coalition for Fortification of Indonesia)[40]. DEPKES in Surabaya has collaborated with two other domestic NGOs, LPKS (Surabaya Consumer Protection Agency) and WVI (Indonesian Vision Mode) (Box D5). Among international NGOs, CARE has worked in NTT since 1992 with the initial nutrition and health program intended for earthquake victims. Currently, six nutrition and health programs managed by CARE are implemented in 5 out of the 16 districts in NTT.

[35] The DPRD of Lumajang could not be visited because they were involved in APBD discussions

[36] In Kota Kupang, the PMT program is the only nutrition program in 2005.

[37] *Busung lapar*, which refers to a condition with marasmus and/or kwashiorkor symptoms, is a non medical term, but is widely used among local people as in the recent outbreak in NTT.

[38] PKK is not a typical NGO, but an organization formed and fully supported by government. Members of PKK are wives of civil servants. The head of PKK is the Governor's wife at the province level, and Bupati or Mayor's wife at district level.

[39] Pokja IV includes health and nutrition sectors which are generally headed by the wife of PHO or DHO's director.

[40] KFI is a non-profit and independent foundation, an active advocator and government partner in fortification.

Box D4. Examples of PKK activities in selected areas

PKK of East Java has a malnutrition program with local budget support. In this program, PKK provides additional budget for districts where severe protein-energy malnutrition is prevalent among children. With this additional support, some districts were able to implement PEM control programs.

PKK in Lumajang is the most active PKK team, and received the biggest budget among all the PKK teams in areas studied, across administrative levels. Some of its activities include (1) field testing the local PMT (locally made complementary feeding) in collaboration with DHO, Food Security Board Office, and Brawijaya University and (2) facilitating Posyandu services with increased budget.

Box D5. NGO activities in Surabaya: LPKS and WVI

LPKS is an influential NGO in Surabaya not only in the health and nutrition sector but also in other sectors. All local nutrition surveys have been conducted by LPKS since 2004. LPKS also disseminates results of the nutrition surveys to the government and the public, and advocates for budget increases in nutrition programs. As a result, APBD budget allocation for nutrition programs increased from Rp 1.440.500.500 in 2004 to Rp. 1.736.916.260 in 2005.

The Nutrition Section in Surabaya also collaborates with WVI for PEM control. WVI operates a family development program with nutrition education and also focuses on development and improvement in sanitation and clean water facilities, entrepreneurship, and healthy food preparation training for food vendors. WVI has relatively sufficient budget support from the international NGO World Vision.

III. CURRENT STRENGTHS AND WEAKNESSES OF EACH INSTITUTION THAT MAY AFFECT THE COURSE OF THE REFORM PROCESS

In summary, the issues which impair the ability of the system to deliver improved nutrition of the community are similar to those which affect other parts of the health system. The most significant are:

1. Government structures and processes unsuited to tackling nutrition in a large and diverse country. The most important issues are:
   * Contested authority between the various levels of government in the wake of the initial decentralization and its continuing modification. The result is:
   * The opaque and overlapping responsibilities of those responsible for nutrition at all levels.
   * Overlap between the central, provincial and district descriptions as they seem to be formulated by each level independently of the other levels.
   * Most are not working according to the job descriptions due to financial constraints and lack of skills.
   * Inadequate collaboration within districts and between districts and provinces.
   * Structures and staffing levels which are not clearly related to the nutrition and health problems of the district and province or the responsibilities at each level.

* Very limited flexibility in the ability of districts and provinces to structure their staffing levels and skills mix to meet local needs.
* Leadership is a critical issue at all levels with considerable differences between provinces and across districts

2. Human resources in which there is a mismatch between the required skills and those available, particularly at the district and provincial levels
   * Nutrition has a lower priority than before decentralization as judged by:
     At the district-level: First, a number of districts no longer have a nutrition section (28 out of 38 in Jatim). Second, the person heading the nutrition section often does not have a nutrition background. Finally, the number of staff working in nutrition is small.
     At the Puskesmas level: First, almost half Puskesmas do not have nutrition staff. Second, many of the staff who are now there will leave soon as they are voluntary and are looking for a permanent position. Finally, many nutrition staff are approaching retirement and it is not clear that they will be replaced given the restrictions on recruitment.
   * Generally low skill levels of staff at the district level, especially for program planning and evaluation.
   * An almost complete absence of in-service training for staff at all levels, but particularly at the district and province levels.

3. Inadequate planning and poor implementation of nutrition programs. There is:
   * A limited evidence base, and related staff skills, on which to base program planning and to assess the effectiveness of programs.
   * Considerable overlap between the various departments in their responsibility for nutrition with little coordination vertically, between centre, province and district, or horizontally between departments at any level (e.g. Bappeda, Food Security Office, Depkes, DPRD, Women's Affairs etc) in planning or implementation.
   * However, in those districts in which there was coordination (e.g. Surabaya) nutrition programs seemed to have bigger budgets, and perhaps better implementation, at least as measured by CE.
   * Overall nutrition programs have low coverage.
   * Monitoring and evaluation (M&E) is limited due to both staff shortages and lack of skills:
   * It is now more difficult for the centre and the provinces to do M&E as districts no longer feel an obligation to provide reports. Evidence based policy making is even more difficult in this environment of reduced evidence.
   * Most of that monitoring which is being done is on a project basis, rather than a program basis,
   * but Surabaya seems to be an exception where a limited staff is making a good effort to monitor program implementation

4. Limited financial resources, especially in the worst affected areas:
   * New budget processes have delayed availability of funds, and program implementation at each level of government until well into the financial year.
   * Limited understanding of, and consequent low priority accorded to nutrition and health issues by district governments.
   * A lack of resources, in some districts, to actually implement nutrition programs.

5. Limited collaboration with groups outside government in delivery of nutrition programs
   * Limited involvement of central research institutions in applied research which supports planning and evaluation of nutrition programs.
   * Limited involvement of the private sector in nutrition programs.
   * At the central level there is good cooperation with:
   * national companies e.g. Kimia Pharma, Indo Phama, Gizindo, and
   * national NGOs e.g. Indonesian Coalition for Fortification.
   * At the provincial level there is:
   * limited cooperation between NGOs and provincial health office
   * limited cooperation between provinces and private sector or NGOs— an example of an exception is the collaboration between the Jatim and the iodized salt producers
   * At the district/kota level there is:
   * limited collaboration between NGOs and district/kota — the best example is Surabaya where there is good cooperation with LPKS (who are paid by the province to carry out nutrition surveys) and Wahana Visi Indonesia (who implement some nutrition programs).
   * PKK has good collaboration with health at all levels.

   At the same time, decentralization offers a new opportunity for new institutional links and structures which address nutrition problems in ways that:

   (a) Redefine government structures and processes so that they promote a renewed partnership between all levels of government based on realistic and agreed roles and responsibilities with enough flexibility to take account of local variation in nutrition problems and capacity.

   (b) Strengthen the information base for program planning, implementation and evaluation.

   (c) Improve the capacity of staff at all levels of government and across departments to use information on nutritional status and program effectiveness for planning and implementation.

   (d) Increase collaboration with
      * the district administration and parliament for increased attention to nutrition problems.
      * NGOs and the private sector as partners with government in delivery of nutrition programs.

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