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# Food and Population: Priorities in Decision Making

Report of a Meeting  
of the International  
Conference of Agricultural  
Economists, Nairobi, August 1976.

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# Population and food production in Indonesia

Syarifuddin Baharsjah [1]

## Population growth and food consumption

Presently Indonesia is importing rice to meet its consumption needs, despite its successful efforts to increase domestic production through intensification programmes. Several reasons had been put forward for the delay in achieving self-sufficiency. One is the rapid increase of the population. The annual rate of population growth has been estimated at 2.55 per cent. Although a family planning programme has been implemented in an intensive manner since 1967, its impact will not assume significant proportions until the 1980s. Based on past achievements several projections are made with regard to domestic rice production. When these are compared to consumption projections under different sets of assumptions concerning the effectiveness of the family planning programme, the growth of *per capita* income and consumption habits, it becomes clear that with the same performance in food production as in the past few years self-sufficiency conditions could only be maintained if the family planning programme succeeds in lowering the rate of population growth significantly.

Another factor which contributed to the delay in achieving self-sufficiency was the rise in consumption due to rises in *per capita* income. There is no accurate estimate of the income elasticity of demand for rice in Indonesia. It is believed that for the greater part of the population which is currently enjoying but a low level of income, the income elasticity was underestimated when targets were set and self-sufficiency was predicted in the past. Similar underestimation of the income elasticities in the demands for sugar and cloves were suspected when it was discovered that instead of obtaining surpluses as targetted, the country had to increase the imports of these commodities.

Table 1 shows the above mentioned production and consumption projections. The low estimates shown in this table were obtained by assuming that the family programme could effectively lower the rate of population growth from the current 2.55 to 2.49 per cent, while *per capita* income was assumed to increase steadily at about 4 per cent a year. The high estimates were obtained on the assumption that the family planning programme failed to lower the rate of population growth and that at the same time due to better health conditions the rate of population growth increases, reaching about 3 per cent by the end of the century. The *per capita* income was assumed to increase at an optimistic rate of 4 to 6 per cent per year. On both estimates, the income elasticity in the demand for rice was estimated at 0.4.

Table 1  
Projections of domestic production and consumption of rice,  
Indonesia, 1978–1998

<i>Year</i>	<i>Estimated production* (’000 tons)</i>	<i>Estimated consumption</i>	
		<i>Low estimates (’000 tons)</i>	<i>High estimates (’000 tons)</i>
1978	18.183	18.766	18.766
1983	22.353	22.832	25.611
1988	27.494	27.779	32.686
1993	33.818	33.797	51.390
1998	41.596	41.120	68.771

\* Based on performance in first and second five year plan.

Source: Directorate General of Food Crops, Ministry of Agriculture, 1975.

A closer look at the estimated production will also reveal a high degree of optimism with respect to the performance in increasing rice production. With the current harvested acreage of almost 9 million hectares the projected production figures imply yields of about 3.5 to 4 tons per hectare compared to the current 1 ton per hectare. On the other hand, with present yields they imply an increase of harvested acreage of up to 400 per cent.

Most of the need for rice will arise in Java, where most of the population of Indonesia live. A prominent feature of the demography of Indonesia, beside the size of the population, is that the population is quite unevenly distributed. Java and Madura, in which land area is but 6.95 per cent of the total land area of the country, are inhabited by about 64 per cent of the total population. Consequently, the regions in Java belong to the world’s most densely populated, while those in the outer islands are sparsely populated.

Even if it is assumed that the family planning programme is to be directed only to the densely populated regions in Java and that this programme is successful in lowering the rate of population growth, the population density in Java will still reach over 1,000 persons per square kilometre by the year 2000. If the family planning programme is not as successful, the population density may be as high as 1,300 persons per square kilometre. In the outer islands, even without a successful family planning programme the population densities are considerably lower, namely 115 persons per square kilometre in Sumatra, 117 in Sulawesi and only 23 in Kalimantan by the year 2000.

Transmigration of part of the population from the dense regions to the outer islands had long been regarded as one means of improving the uneven population

distribution. The resettlement programme has been in existence since 1905 when the first organised resettlement project was started at Gedong Tataan Lampung. Since then, the transmigration programme has attempted to move farm families from Java and resettle them in the thinly populated outer islands. The programme was interrupted briefly by the Second World War and was resumed after independence.

The outflow of farmers from Java to the outer islands under the government sponsored transmigration programme does not give the complete picture of the migration which occurs between Java and the outer islands. Each year there is a steady, if not increasing, flow of people who migrate from these thinly populated outer islands to Java. Young men migrate to look for training and employment opportunities which they believe are more plentiful in Java. Once settled their families may follow. Many a disappointed transmigrant may drop out of the programme and return to more familiar situations in Java. On the other hand there are also the spontaneous, non-supported transmigrants who voluntarily left Java for the thinly populated regions. News of prospering transmigration areas may reach home and attract relatives to join. In many cases the spontaneous transmigrants would become the more successful farmers in the new areas. There is no accurate information about the numbers of persons migrating between Java and the outer islands. An estimate placed the net-outflow from Java at 50 persons per year [2].

### **The resettlement programme and future food production**

The main effort to increase food production has been the intensification programme which was directed chiefly to the high potential regions mostly situated in Java and Bali where physical infrastructure, notably irrigation is not a limiting factor. In these areas, packages of new technology consisting of high yielding varieties, fertilisers, pesticides, insecticides and improved cultivation methods are made available to the farmers. The intensification programme has been quite successful. Still, at the end of the first five year development programme, as was stated earlier, some basic problems remain unsolved. Looking into the future, it became also apparent that the intensification programme alone could not solve the food problem. Expansion of cultivated agriculture land in particular for food production becomes crucially important.

In the densely populated regions in Java and Bali, practically all land suitable for agriculture has been utilised, in some places even exceeding the ecologically suitable level. Most of the land resources for the expansion of agriculture are found in the outer islands. In these regions, agriculture, particularly food production, is also conducted by smallholders, however mostly in a much less intensive manner. Land potentials have not been fully utilised, and those which are now under cultivation are not being utilised to the full and in many instances cropping intensities are quite low.

Although inadequate data does not permit precise estimation of the existing unexploited land resources, figures such as 15 to 20 million hectares are mentioned, describing the vastness of these land potentials. It should be noted that a large part of the potential land resource consists of soil types, particularly the Red-yellow Podzolic Soils (Ultisols) and the Organosols (Histosols), categorised as problem soils. These soils are acid and have low fertility. They are considered marginal soils with regard to food production. Careful studies of their properties in order to formulate suitable cultivation practices becomes necessary, since agricultural expansion in the future will have to be directed to regions with these soil types.

A large part of these soils have already become unproductive waste lands. Although no accurate data exist on the size of the waste land, it is agreed that it has reached serious proportions. The shifting cultivation methods, under the population pressure contributed much to the formation of these waste lands. In addition, poor management of forest exploitation also resulted in the increase of these unproductive waste lands. More importantly, however, are measures which could prevent their increase.

A programme to utilise the land resources in the outer islands will necessarily be multi-sectoral. An important part of the overall effort is the transmigration programme.

Transmigration of people from the densely populated core regions to the outer islands is expected to play an important role in the agriculture expansion programme. A resettlement programme was started before World War II. The two main objectives of this pre-independence programme were (1) to lessen population pressure in densely populated Java and at the same time improve population distribution through the country, and (2) to provide plantations situated in the thinly populated outer islands with labour. Resettlement projects have been continued after independence under the national transmigration programme. Meanwhile the objectives of the resettlement programme have changed. Even though demographic considerations remain important, transmigration is now considered as a part of the total effort to develop regions outside the core. Just as the old resettlement programme would supply labour to the plantations, the national transmigration programme would supply the regions with the labour force needed for their development. The difference is of course that regional development is a much more complex undertaking compared to running a plantation. It also has much more far reaching consequences to the national economy, including the aspect of providing enough food in the future for the population.

One of the better known and revealing examples of pre-war resettlement projects is the Pringsewu project, in Lampung, Sumatra. Two conditions prevailing in the years 1927–1931 provided the main reasons for the first large scale resettlement programme. One was the general depression which caused great sufferings to the Sumatran farmer whose agriculture was mostly oriented to the world market. The rice price increases resulting from famines in India and Burma (1927 and 1931) intensified the sufferings. The second reason was the lack of labour to exploit the

huge land resources in Sumatra through the production of world market oriented crops. In Lampung, which was the largest pepper producing area in the archipelago, the scarcity of labour was acutely felt during harvest time. Hired labour, mostly from West Java, created serious social problems. The Dutch government acted to solve this problem through a massive resettlement programme. The basic idea was to resettle several thousand Javanese farmers in Lampung who could also earn additional income as pepper pluckers. The scheme was to serve several purposes: (1) it would lessen population pressure in Java and at the same time improve upon the distribution of the population throughout the country, (2) it would provide labour and (3) it would improve rice self-sufficiently in Sumatra.

One of the basic features of the Pringsewu project is that the resettlement farmers were expected to cultivate their land in the new location according to their Javanese method of cultivation, primarily sawah rice production. Hence, an irrigation network was constructed in Pringsewu prior to the actual resettlement of the farmers. After completion in 1936 about 10,000 Javanese families were settled. The Pringsewu project was quite successful and its design and approach became a standard for future resettlement projects.

The colonisation and transmigration programme in Luwu, South Sulawesi would provide another revealing case. Luwu has long been regarded as a potential area which could grow into a prominent rice bowl. The area is located at the southern arm of Sulawesi, facing the Bay of Bone. It is thinly populated (in some areas as thin as 9 persons per square kilometre) and has vast unexploited land resources. Large tracks of land situated in the plain area are suitable for sawah rice production and the system of large and small rivers would provide good quality irrigation water.

A colonisation programme was initiated in Luwu in 1938 and established the villages of Lamasi, Sidomukti and Katulungan. Between 1938 and 1969 no transmigration projects were undertaken due to the War and the security conditions prevailing in the area following independence. Between 1969 and 1973 a total of about 1,900 families were resettled in the three colonisation villages and in other villages. Following the pattern of Pringsewu in Lampung, irrigation projects were the main components of the resettlement undertakings in Luwu. A total of 2 hectares of potentially irrigable land and upland were allotted to the transmigrant families.

In addition to the government supported colonisation and national transmigrants, local, spontaneous transmigrants are also moving into the region. Most of these migrants come from the neighbouring Tana Toraja area, also in South Sulawesi. The population of North Luwu can therefore be grouped into four categories, namely, the local indigenous people, the local transmigrants, the pre-War colonisation transmigrants and the more recent national transmigrants.

Information on the four groups of the population with regard to their performance in agriculture reflects the performance of the transmigration programme in this area.

A characteristic of the agronomy of the region is the low cropping intensity even



in the colonisation and transmigration areas.

Table 2  
Cropping intensities in three districts in North Luwu, 1975

<i>District</i>	<i>Cropping intensity (%)</i>	
	<i>Sawah</i>	<i>Upland</i>
Bone-Bone, including colonisation transmigration villages	162	202
Lamasi, including colonisation villages	162	259
Kalaena, including transmigration villages	100	190

Source: Micro Economic Study of North Luwu, IPB, 1976.

The above figures indicate that even the colonisation farmers had not been able to fully utilise the land resources allotted to them. These cropping intensities are lower than those in similar areas in other well developed regions. Unlike the current transmigrants, the colonisation transmigrants have had ample time to accumulate capacity to utilise their land.

Another feature is the low agricultural yields obtained in the transmigration areas. Crop failures due to pests and diseases contributed much to the poor performance. The tungro disease of rice is a very serious problem in Luwu. Some areas have not produced a significant crop for several years due to the disease. Rats, unattended roving cattle and wild pigs are also problems.

There is little application of the higher levels of technology that are used in many other areas in Indonesia. Fertiliser utilisation is almost entirely restricted to urea application to rice on a small percentage of the total irrigated sawah.

Although the region is thinly populated the average farm size is not significantly larger than in other parts of the country. Table 3 shows the average farmland utilised per farmer family amongst the different groups of population in transmigration areas in Luwu.

Table 3  
Average farmland utilised by different groups of farmers  
in North Luwu, 1975

<i>Farmer group</i>	<i>Sawah (ha)</i>	<i>Upland (ha)</i>
Local indigeneous farmers	0.47	0.74
Local transmigrants	0.18	0.90
Colonisation transmigrants	0.76	0.22
Current national transmigrants	0.41	0.77

Source: Micro Economic Study of North Luwu, IPB, 1976.

The above figures show that among the government supported transmigrants, both pre-War and current, the actual utilised farm land is smaller than that allotted to them. In the case of the current transmigrants this indicates the inability of the farmers to utilise all the land allotted to them due to limitations on investment capital.

It is interesting to note that among the groups, the colonisation farmers are the ones which increase their land utilisation by all possible methods, implying that they had attempted to enlarge their farm size by opening virgin forests (outside the transmigration project) and through land purchase. Still they end up with an average farm size which is below the size of land previously allotted to them.

The level at which the family labour force in the transmigration areas is being utilised appears to be low, as shown by Table 4.

Table 4  
The average number of days utilised in a year in farm and non-farm activities  
by the family labour force, North Luwu, 1975

<i>Areas</i>	<i>Farm activities</i>	<i>Non-farm activities</i>		<i>Total work days</i>
		<i>Direct income earning</i>	<i>Gotong Royong</i>	
Lamasi	111	20	10	141
Bone-Bone	85	67	15	167
Kalaena	187	12	10	109

Source: Micro Economic Study of North Luwu, IPB, 1976.

It is strikingly evident that job opportunities outside the farm are scarce. The 'Gotong Royong' activities refer to community mutual help, in which neighbours assist in soil preparation, rehabilitation of irrigation ditches, and so on, no wages being earned from these activities.

The low productivity and the small average farm size are reflected by the levels of income received by the farmers in the transmigration areas as shown in Table 5. Comparing farmer groups, the colonisation transmigrants evidently enjoyed the largest farm income. It is to be noted however that even this group's income is below those obtained in other regions with a similar agricultural pattern. Moreover, the low farm income could not be supplemented by income earned from other sources which are also quite low. It is obvious that the transmigration programme which has been implemented in North Luwu for a long time has not been able to help develop the region into a prominent food bowl for the country.

Detailed soil and water surveys revealed that even though the soil fertility is low and the physical characteristics might cause some problems in irrigation and drainage, large pieces of land in the region could become good sawah and upland

Table 5  
The average family farm income by farmers' groups,  
North Luwu, 1975

<i>Farmers'</i> <i>groups</i>	<i>Lamasi</i> <i>(Rp)</i>	<i>Bone-Bone</i> <i>(Rp)</i>	<i>Kalaena</i> <i>(Rp)</i>
Local indigenous farmers	83,339	25,727	33,401
Local transmigrants	—	19,011	51,062
Colonisation transmigrants	96,847	32,751	64,871
Current national transmigrants	—	17,084	29,298

Source: Micro Economic Study of North Luwu, IPB, 1976.

agriculture land. With careful, responsible and improved cultivation methods a high yielding agriculture, mainly of food production, would be possible.

The preceding sections show that while vast unexploited land resources exist in the outer islands, the transmigration programme has not been able to utilise these resources for agricultural development and food production. Several reasons have been identified:

- (1) During the preparation and planning stage the design of a particular project has not been rigorously based on the specific conditions of the location, there is too much reliance on general standards and patterns which may or may not fit these conditions;
- (2) During the implementation stage effective coordination between agencies has yet to be developed with the result that development of the infrastructure such as roads and irrigation and expansion of marketing facilities lags behind;
- (3) During the first years in the new location the transmigrants are under direct guidance and support of the transmigration agency, in many cases the projects are in fact isolated activities which have limited connection with the economy of the region, so that withdrawal of the agency's support caused serious setbacks to the progress of the project.

### **Problems of increasing food production in the crowded regions**

The transmigration programme, which attempts to move farm families from the densely populated regions and resettle them in the outer islands with their vast unexploited land resources, is but a part of the overall population reallocation problem in Indonesia. Its performance in the past has not had any significant effect on the uneven distribution of the population. Indeed, the goals have been wisely shifted from demographic to regional development. However, this also implies that the crowded regions can not realistically expect that the resettlement

programme would ease their population problems in the future. In these regions future increases in the production of food have to be realised under ever increasing population pressures.

One factor which will be seriously affected by the population increase is the average farm size. Practically all food crops are grown on small farms. Table 6 indicates the small average farm size in Java.

Table 6  
Size of farms in Java, 1963

	<i>Size of farm</i>	
	<i>Less than 0.5 Ha</i>	<i>More than 0.5 Ha</i>
Number of farms (millions)	6.1	3.8
Percentage of total number of farms	62.0	38.0
Average farm size in class (hectares)	0.2	1.2
Total class hectarage (million hectares)	1.2	4.5

Source: Sajogyo. ANP Evaluation Study. Lembaga Penelitian Sosiologi Pedesaan. IPB, 1973.

We have shown in the preceding sections that in these regions all increases in food production have to be realised through an intensification programme which involves the use of new high yielding varieties, heavy doses of fertilisers, pesticides and insecticides. The figures in Table 6 show that most of the farmers in Java will be seriously handicapped by their small operations in realising production increases. If we arbitrarily take 0.5 Ha as a dividing line, already 62 per cent of the farmers in Java will have to be categorised as those seriously handicapped in their effort to benefit from the new technology. This means that we cannot expect significant production increases from as much as 6.1 million hectares out of the total 9.9 million hectares under food production in Java.

The rapid population increase aggravates the situation. Recent surveys showed that in many places in Java, notably in Central Java, the class of landless agricultural labourers and those with farms less than 500 square metres have increased in prominence.

Looking at food production as a subsector of agriculture, some plan has to be designed which would regulate the systematic and purposeful reallocation of people hitherto engaged in this subsector among other subsectors in agriculture as well as among other sectors in the economy. The intensification programmes themselves provide possibilities of establishing a rural based agriculture-supporting industry and service sector which can be expected to create employment possibilities and thereby absorb a part of the rural population. The two main intensification

programmes are the BIMAS and the INMAS programmes. The BIMAS programme is a packaged, supervised credit programme where the credit extended consists of high yielding seeds, fertilisers, pesticides and insecticides at subsidized costs. INMAS is likewise an intensification programme, where the modern input factors such as fertilisers and pesticides are provided at subsidised costs, however on a cash payment basis. The intensification programmes are directed by boards set up at the various levels of government. The area under intensification is divided into village units, each covering an area of 600 to 1,000 hectares of rice fields. These village units are urged to equip themselves with the following four supporting institutions: a village unit rural bank, an extension service, a processing plant and a retail shop supplying seeds, fertilisers, pesticides and insecticides. As modernisation of food production proceeds it is expected that the need by each individual farmer for the supporting activities and services will also grow, creating new employment possibilities in the rural industry and services sector.

The ease with which a part of the population find new employment in the rural industry and services sector is affected by the effectiveness of education programmes. During the year 1973 only, a total of 6,000 primary school buildings were built, providing facilities for about 720,000 children. Many of these schools are in Java. In addition to the formal education programme, there is also the adult education and extension programmes. Moreover, since the first five year plan was initiated in 1969, investments by domestic and foreign firms have been encouraged with the result that socio-economic interactions are being established with inroads even to the rural areas. Nevertheless it is felt that the education programmes could be made more effective in facilitating the reallocation of the population between sectors, when more emphasis is placed on vocational training.

Unless the necessary steps are taken to make possible the creation of a vigorously developing farmer class in Java, unencumbered by the Lilliputian farm size, this crowded region cannot be expected to grow enough to feed itself, let alone provide for the other regions of the country.

## Notes

- [1] A revised version of a paper by the same author appearing as Chapter 3 'Indonesia' in D. Ensminger (ed.), *Food Enough or Starvation for Millions*, Tata McGraw-Hill, New Delhi, 1977.
- [2] World Bank, Agricultural Sector Survey, Indonesia, 1974.