COUNTRY INVESTMENT PLAN FOR

FOOD FORTIFICATION

IN INDONESIA

Prepared by

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In Collaboration with

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The Keystone Center, USA

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EXECUTIVE SUMMARY

Country Investment Plan for Food Fortification in Indonesia. 2002. *Bogor Agricultural University, National Fortification Commission, Directorate General of Public Health of MOH, Directorate General of Chemical, Agro and Forestry based Industry of MOIT, Directorate General of Crop Production of MOA, Deputy of Food Safety and Hazardous Substances of NADFC, Indonesia Fortification Coalition, Wheat Flour Producers Association Cooking Oil Industries Association, Food and Beverages Producers Association, Infant Food Producers Association, and Iodized Salt Producers Association.*

Indonesia is a developing country in South-East Asia with 206 million populations and 40 million poor families. Both macro- and micro-nutrient deficiencies, such as Protein Energy Malnutrition (PEM), Iron Deficiency Anemia (IDA), Vitamin A Deficiency (VAD), and Iodine Deficiency Disorders (IDD) are still serious public health problems. The prevalence of PEM was 25.5 % (CBS, 2001). About a half (50.9%) of pregnant women, 39.5 % of women in reproductive age, 45.0 % of school children, 40.5 % of children under-five, and 50 to 85 % infant aged 6 to 11 months suffering from IDA. Sub-clinical VAD problem was 50.2 % among children under-five. Total goiter rate (TGR) prevalence among school children was 9.8 %. Besides, scattered data on other micronutrient problems showed that zinc deficiency among pregnant women was 20 to 65 %; and folic acid deficiency among pregnant women was 10 to 25%. In terms of micronutrient intake, unfortunately, up till now there is no available large scale of individual dietary intake survey. Based on family dietary survey data, about one-third to two-third of the family consumed iron and vitamin A below 50 % of the RDA.

Micronutrient deficiency leads to cause growth failure, impaired immune system, and impaired mental and cognitive development. Some of them are irreversible, and even death at early life. Preventing malnutrition would reduce child mortality by more than 50%, and reduce the burden of diseases in developing countries by about 20%. In the contrary, the benefit of controlling IDD is preventing children from lost of 12 IQ point. The benefits of controlling IDA are increasing adult productivity, improving cognitive of children for better productivity in the future, and preventing maternal death. The benefits of controlling VAD are reducing cost for health care, and preventing child deaths. The benefits of controlling folic acid deficiency are preventing and reducing health care cost for cardiovascular diseases and neural tube defect (NTD).

There are several strategies to eliminate micronutrient deficiency such as nutrition education, dietary diversity, food fortification, food ration, and supplementation. However, the best strategy is the most cost effective strategies, which is a combination of the first three strategies. The last two strategies are required in severe endemic areas of nutrient deficiency or on emergency situation. The nutrition education and the dietary diversity strategies have been implemented since 50 years ago, and need to be strengthened by food fortification strategies. The government of Indonesia has a long standing commitment on food fortification program as shown by the implementation of mandatory iodized salt since 1976, fortified complementary food since 1995, and fortified wheat flour since 2001.

Regarding food fortification, the micronutrient problem control has increasingly gained attention from international conferences, international agencies, and policy makers. These micronutrient problems are still seriously public health problems. More efforts in the near future are required, including improving quality of diet, especially vulnerable groups through food fortification and its supporting programs. Based on the Indonesia data, the benefits of controlling the last three micronutrient deficiencies through is about 2.8% of the GDP, which is equal to annual government expenditure for health sector.

The CIP for Food Fortification in Indonesia was formulated by considering article 27 of Indonesia's Food Legislation 1996, which mandates food fortification program to improve nutritional status of the community; and by considering the nutrition target of the National Food and Nutrition Plan of Action for Healthy Indonesia 2010. The formulation of the CIP is also inspired by the Manila Consensus on Wheat Flour and Cooking Oil Fortification 2001 as a follow up of the Manila Meeting 2000, a regional collaboration network on elimination micronutrient deficiency. Initial activities for gathering ideas for formulating this document were started from two related national scientific meetings, which designed to review current micronutrient problems, knowledge and technology of food fortification.

The CIP is aimed at formulating a national strategy and investment of food fortification, as part of micronutrient deficiency control, human resources and economic development. The objectives of the ten years food fortification programs are to improve 1) micronutrient status (IDD, IDA, and VAD) of population, especially among vulnerable groups, and 2) nutrition related health status of the population. The quantitative objectives of micronutrients deficiency control are to reduce about one-third each of the micronutrient deficiency problems (IDD, IDA, VAD). These objectives are reasonable enough to be achieved by considering the future economic growth (with annual growth 3.5-6.5 %), better political stability, democracy and transparency, as well as better commitment of international agencies and Indonesian government on reducing micronutrient deficiencies.

The main strategies for achieving the above objectives within the ten years of the programs are: 1) involving private sectors since the beginning of planning and program, 2) strengthening public-private partnership, 3) creating conducive business policy and regulations, and 4) increasing consumer awareness. The logical framework of the programs impacts, outcomes and outputs are presented in the following figure.

Impact in 2012	Reduced about one-third of prevalence of micronutrient deficiency (IDA, VAD, IDD) of population, especially vulnerable groups and its related health status
Outcome 2003-2012	1. Good management & implementation of fortification 2. Strong public-private partnership on fortification 3. Updated quality data and information system on fortification 4. Increased intake and coverage of fortified food among vulnerable groups (middle & low income groups)
Output 2003-2012	1. Established food fortification working expert and technical groups (under the NFC) 2. Government, private sectors and international commitment on resource allocation for food fortification, 3. Strong evidence (including efficacy and effectiveness) for food fortification programs 4. Established related regulations 5. Continuing social marketing programs on fortification 6. Increased availability & quality of fortified food for vulnerable groups (middle & low income groups)

Programs 2003-2012	1. Industrial Implementation 2. Regulation, Food Control and Management 3. Nutrition Monitoring 4. Social Marketing 5. Research	**Vehicles:** - Wheat flour - Cooking oil - Complementary foods - Salt

The programs and activities by food vehicles are summarized in the Tables 1. While the activities of the five identified programs and they leading sectors are summarized in table 2.

Table 1. Summary of Programs and Activities by Food Vehicles

Program	Activities**)
1. Wheat flour	QA QC and Monitoring (integrated with other vehicles) Law enforcement Fortificant (pre-mix) subsidy Social marketing for middle & low income groups Efficacy study Evaluation/Biomarker survey Management & operational
2. Cooking oil	Study on cooking oil intake, cooking behavior and vitamin A stability Product development and pilot plan Technology & fortificant subsidy Develop Mandatory regulation Social marketing QA QC and Monitoring (integrated with other vehicles) Law enforcement Efficacy & efficiency study Evaluation/Biomarker survey Management & operational
3. Complementary foods	Develop less expensive complementary foods Develop social marketing and a district sales system via posyandu Monitoring Evaluation/Biomarker survey Management & operational
4. Salt	QA QC and monitoring (integrated with other vehicles) Law enforcement Social marketing for rural and remote areas Evaluation/Biomarker survey Management & operational

Major leading sectors of the food fortification programs are the Related Food Industries (RFI) and Ministry of Industry and Trade (MOIT) for Industrial Implementation; Ministry of Health (MOH) and national Fortification Commission (NFC) for Regulation, Quality Assurance and Management; National Agency for Drug and Food Control (NADFC) for Nutrition Monitoring, Ministry of Health and National Fortification Commission (NFC) for Social Marketing and University and Research Centers (Univ/RC) for Research (Table 2)

Table 2. Summary of Programs and Activities of Food Fortification Programs

Program	Main leading Sectors*)	Activities**)
1. Industrial Implementation	MOIT, RFI	Providing technical assistance, prototyping technology, fortification technology, fortificant start up investment. Provide training and training manual. Developing production and distribution system.
2. Regulation, Food Control and Management	NFC and MOH	Review existing regulations, formulating revised regulation, consultative meeting, advocacy of new regulation, and law enforcement; Developing manual/guidelines on production, QA and information system, Laboratory accreditation, and infrastructure development and training; Set up management office and information system, management and coordination
3. Nutrition Monitoring	NADFC	Conduct monitoring and surveillance of food fortification (dietary and biomarker survey). Training on surveillance, and developing information system. Data analysis and feed back
4. Social Marketing	NFC, MOH	Developing social marketing materials. Printing and broadcasting social marketing materials. Evaluation of the social marketing activities
5. Research	UNIV/RC	Conducting several related studies such as efficacy, efficiency, micronutrient status, dietary intake, pilot plan, and social marketing model

*) depend on topic or activities

Since the main strategy of food fortification program is developing a strong public-private partnership, both public and private sectors have to share the cost of food fortification. Based on several stakeholders meetings managed by NFC, total cost for ten-year program is US$ 153,891,020 ranging from US$ 14,726,630 to US$ 17,418,130 per year (Figure 1). Among the five proposed programs, the cost for industrial implementation (including, fortificant) is the largest one (Figure 2). Since the total annual intake of wheat flour and palm cooking oil is about 4 million tones, the fortificant cost for these two vehicles is also higher (Figure 3). These are reasonable since the fortificant cost is the major component of the food fortification program. This cost also play an important role for strengthening the public-private partnership, and to ensure the sustainability of the food fortification programs. At the beginning the role of the government cost is dominant, then it will be gradually decreased within the ten years program of food fortification; while the private sector cost is dominant at the end of program (Figure 4).

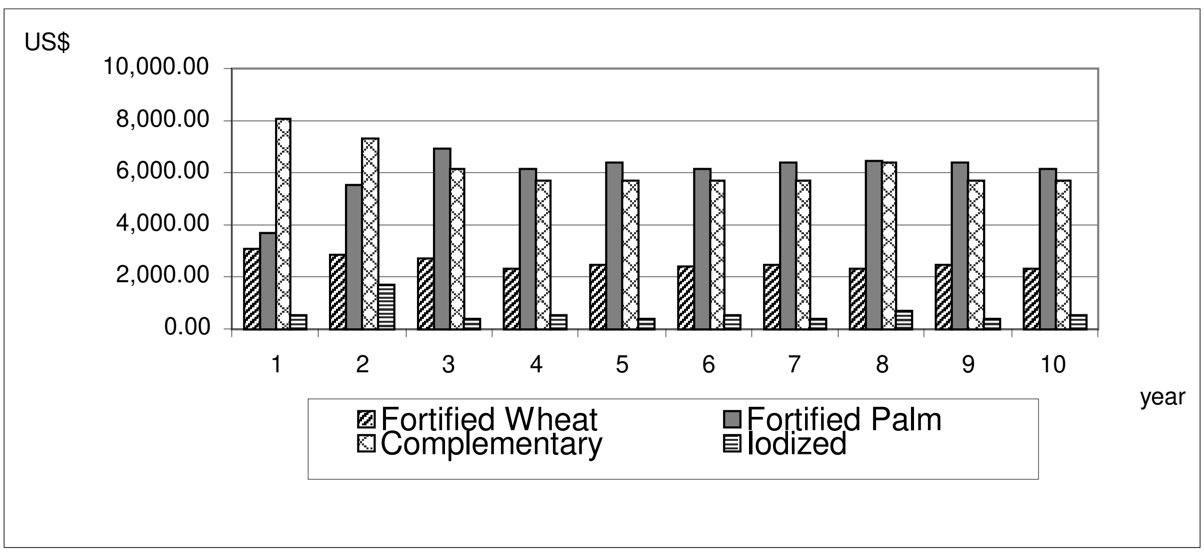

Figure 1. Annual Cost by Food Vehicles

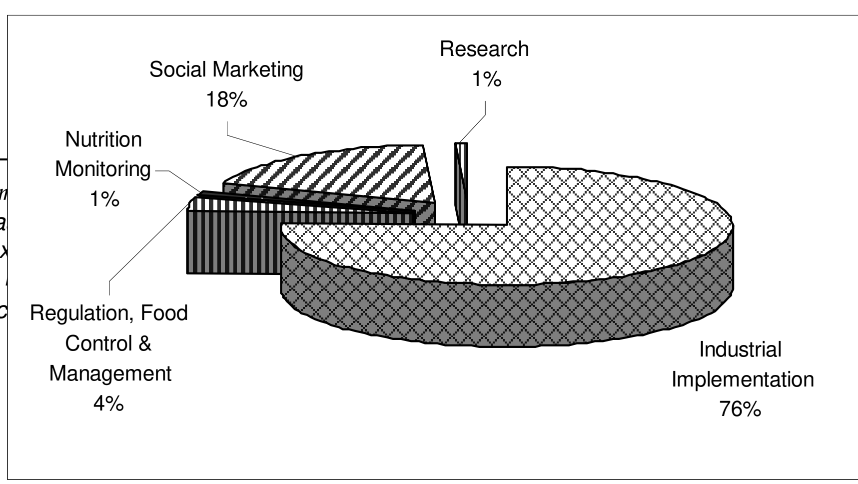

Figure 2. Percentage of Cost by Programs within Ten Years

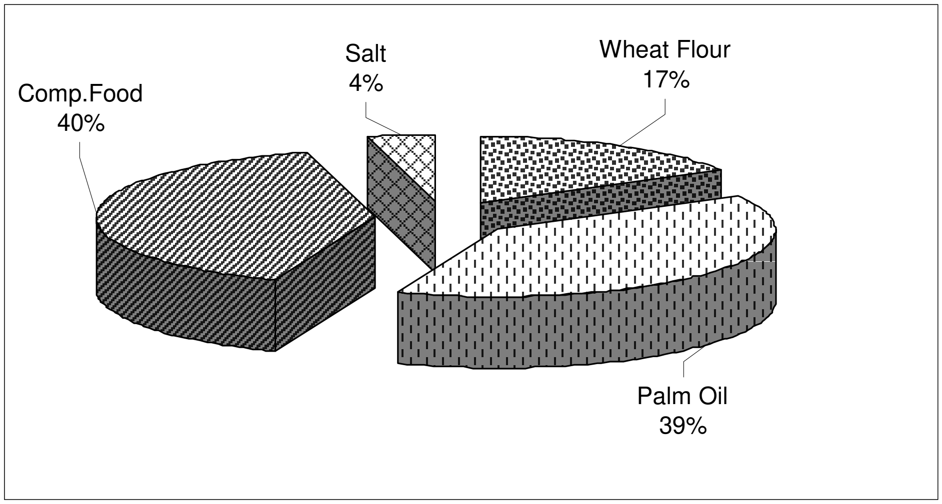

Figure 3. Percentage of Cost by Foods Vehicles within Ten Years

The source of fund for the CIP can be come from government of Indonesia (public sectors), industries (private sectors), national and international lending agencies and donors (grant, technical assistance and soft loans). The estimate cost for food fortification would be borne to government is about 20%, and the rest is expected will be funded from donors and lending agencies (grant and soft loan).

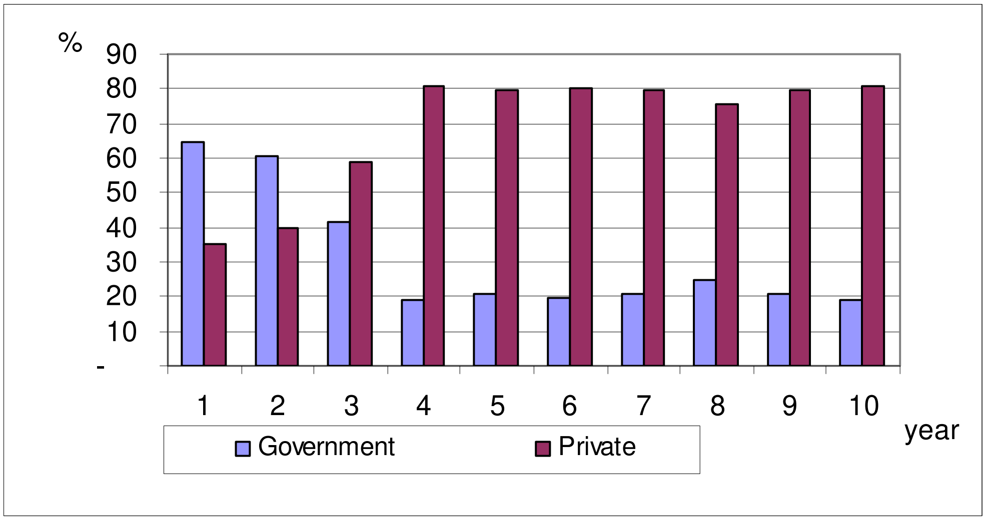

Figure 4. Share of Public and Private Cost within Ten Years Program (%)

The financial analysis shows that the benefit-cost ratio (B/C ratio) of fortification of iron & folic acid (into wheat flour) and vitamin A (into cooking oil) is 10.7 and 7.0 respectively with the Net Present Values range from US$ 135.526, million to US$ 214.529 million. These evidences indicate that each of the above fortification programs is very feasible financially.

In terms of risk analysis, the risk is less likely to occur and influence the future food fortification programs In Indonesia. In the near future the political and economic situation will be more stable since the Indonesian government has just entered the reformation and decentralization era, which indicates better democracy and transparency. Although the crises occurred since July 1997, the economic growth is expected to grow up between 3.5 to 6.5 % during the next ten years. In terms of natural disasters, such as flood, seismic activity and volcanic eruption are very rarely occurred in Indonesia, and they would affect relatively small area.

The implementation of the above mentioned food fortification programs mainly depend upon the commitment and participation of the food industries (private sectors), and public-private partnership. Based on previous experiences on iodized salt, and wheat flour fortification which just started, seems that there is no significant risk in the public-private partnership. Even the National Fortification Commission under the

Coordinating Ministry of Economic Affairs, is exist and actively play an important role in the stakeholders coordination.

FOREWORD

The document of the Country Investment Plan (CIP) for Food Fortification was formulated by considering article 27 of Indonesia's Food Legislation 1996, which mandates food fortification program to improve nutritional status of the community; and the nutrition target of National Food and Nutrition Plan of Action for Healthy Indonesia 2010. This document is also inspired by the Manila Consensus on Wheat Flour and Cooking Oil Fortification 2001 as a follow up of the Manila Meeting 2000, a regional collaboration network on elimination micronutrient deficiency.

Initial activities for gathering ideas for formulating this document were started from two related national scientific meetings, which designed to review current micronutrient problems, knowledge and technology of food fortification, have been done in Jakarta in 2000/2001, The first scientific meeting is the Seminar and Workshop on Fortified Complementary Food Organized by Bogor Agricultural University, National Fortification Commission, Ministry of Health and the Food and Nutrition Society, ILSI-SEA and ASA. The second national scientific meeting is the Seminar and Workshop on Fortified Wheat Flour and Cooking Oil organized by National Fortification Commission, Ministry of Industry and Trade, Ministry of Health, Bogor Agricultural University, ADB and Keystone Center. Several regional meetings had also been done and organized by ADB and Keystone Center in order to facilitate and support this program.

The draft of the document was formulated by the country team leader together with a small team from the National Fortification Commission, and Bogor Agricultural University. Then the drafts were discussed intensively among a larger team consist of steering and organizing teams. Members of the team come from National Fortification Commission and stakeholders of food fortification, including private sectors and academe.

On behalf of the National Fortification Commission, I would like to thank to Dr. Joseph M. Hunt, a senior Health Economist of ADB Manila. I would like also extending my thanks and appreciation to ILSI-SEA, Keystone Center, and UNICEF Indonesia who facilitated and assisted the study team.

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Deputy Coordinating Ministry of Economic Affairs, and

Chairman of the National Fortification Commission

GLOSSARY

ADB	Asian Development Bank
BAU	Bogor Agricultural University, IPB
CBS	Central Bureau of Statistic
CIP	Country Investment Plan
CMOE	Coordinating Ministry of Economy
COIA	Cooking Oil Industries Association, AIMMI
FAFS	Food Agency for Security Agency of MOA
FBAI	Food and Beverage Producers Association, GAPMMI
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorders
IFC	Indonesia Fortification Coalition
IFPA	Infant Food Producers Association, APMB
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOIT	Ministry of Industry and Trade
NADFC	National Agency for Drug and Food Control
NDPA	National Development Planning Agency
NFC	National Fortification Commission
NLA	National Logistic Agency
PEM	Protein Energy Malnutrition
SPAC	Salt Producers Association and Cooperation, APROGAKOP
VAD	Vitamin A Deficiency
WB	World Bank
WFPA	Wheat Flour Producers Association of Indonesia, APTINDO

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*) As issued by Deputy Coordinating Ministry of Economy Number Kep-/KNFN /07/2002.

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COUNTRY INVESTMENT PLAN FOR FOOD FORTIFICATION IN INDONESIA*)

*) As Suggested by ADB and Keystone Center

CHAPTER 1
MICRONUTRIENT PROBLEM ANALYSIS

1.1. Prevalence of Micronutrient Deficiency

Indonesia, a developing country with 206 million population and annual growth 1.6%, categorized as the fourth most populous country in the world after China, India and the United states (CBS, 2001). About 70 % of the people live in rural areas, mostly in Java Island, which is a home of 60 % of the population but represent only 7 percent of the land of the country (CBS, 2000). Since the middle of 1997, Indonesia was suffering from economic and political crises. The poor family increased after two year of crises into 27.4 % (CBS, 2000). Most of the poor families were categorized as chronic poverty (17.9 %), and the rest were categorized as transient poverty. Most of the poor families reside in sub-urban and remote rural areas, and most of them suffering from nutrition deficiency. The number of vulnerable group (children, pregnant and lactating women) is about 30 million people.

1.1.1. Micro-nutritional Status

Both macro- and micro-nutrient deficiencies, such as Protein Energy Malnutrition (PEM), Iron Deficiency Anaemia (IDA), Iodine Deficiency Disorders (IDD), and Vitamin A Deficiency (VAD) are still being serious public health problems. Prevalence of PEM was 25.5 % (CBS, 2001). About a half (50.9%) of pregnant women, 40.5 % of children under-five, 45 % of school children, and 39.5 % of women in reproductive age suffering from IDA (Table 1). A small-scale study showed that 50% to 85% of infant aged 6 to 11 months suffering from IDA (HKI, 1999). Sub-clinical vitamin A deficiency is 50.2 % among children under-five. Total goitre rate (TGR) in school children is 9.8 % (Table 1.1). Scattered data on other micronutrient problems showed that zinc deficiency among pregnant women was 20 to 65 % (Satoto et al, 1999).

Vitamin B6 deficiency among school children about 25 % (Setiawan et al 2001); and folic acid deficiency among pregnant women was 10 to 25 % (Hardinsyah, 2001).

The prevalence of IDA increased during the crises period. Surveillance done by HKI n three ecological zone of central Java showed that the prevalence of IDA among women before the crises (1996) was 20% and increased to 29.5% after one year of the crises (1998). After the crises; IDA among children increased from 39.5 % to 65.0%. A current study (2002) among 2000 new incoming students at Bogor Agricultural University (BAU), who come from all provinces Indonesia, showed that about a half of them suffering from IDA.

Table 1.1. Prevalence of Main Micronutrient Deficiency and Protein Energy Malnutrition

No.	Problem	Group	Prevalence (%)
1.	IDA (MOH, 1995)	Children under-five	40.5
		School children	45.0
		Pregnant & lactating mothers	50.9
		Women at productive age	39.5
2.	Sub-clinical VAD (MOH, 1993)	Children under-five	50.2
3.	TGR (MOH, 1998)	School children	9.8
4.	PEM (CBS & MOH, 2000)	Children under-five	
	a. Underweight		25.0
	b. Severe underweight		7.0

The prevalence of IDD at provincial level, based on palpation assessment among school children, the four most severe endemic provinces are Maluku, East Nusa Tenggara, West Sumatera and South-east Sulawesi. Regarding vitamin A deficiency (Xeropthalmia), the four most severely affected provinces are South-east Sulawesi, Central Kalimantan, Central Java, and West Kalimantan. The four most suffering provinces from iron deficiency anemia (IDA) are South-east Sulawesi, North Sumatera, West Java, and West Sumatera (Table 1.2).

Although the current data on the prevalence of IDA and VAD are not available, the problem of these micro-nutrients are still a public health problem, even bigger after the crisis based on scattered studies done by HKI (1999). It is also indicated by a high prevalence of PEM among children under five. It is most likely that child with PEM is also suffering from micronutrient deficiency (Hunt, J.M., 2002).

Table 1.2. Prevalence of IDA, Xeophthalmia and TGR by Province

No	Province	IDA [3] (%)	Xerophthalmia, X1B [2] (%)	TGR (%)[1]
1.	Aceh	29.7	0.00	5.4
2.	North Sumatera	79.0	0.17	6.7
3.	West Sumatera	66.1	0.00	20.5
4.	Riau	51.2	-	1.1
5.	Jambi	43.8	-	3.7
6.	South Sumatera	68.8	0.14	7.3
7.	Bengkulu	62.9	0.00	8.2
8.	Lampung	58.3	-	11.9
9.	DKI Jakarta	25.0	-	2.0
10.	West Java	69.5	0.11	4.5
11.	Central Java	56.6	0.25	4.4
12.	Jogyakarta	61.5	-	6.1
13.	East Java	49.1	-	16.3
14.	Bali	63.2	0.07	12.0
15.	West Nusa Tenggara	67.6	0.13	19.7
16.	East Nusa Tenggara	63.4	-	38.1
17.	East Timor	40.7	-	-
18.	West Kalimantan	27.0	0.19	2.3
19.	Central Kalimantan	42.9	0.24	8.1
20.	South Kalimantan	42.9	0.00	1.7
21.	East Kalimantan	60.0	-	3.1
22.	North Sulawesi	24.2	-	3.0
23.	Central Sulawesi	45.2	-	16.5
24.	South Sulawesi	35.6	-	10.1
25.	South-east Sulawesi	81.4	2.90	24.9
26.	Maluku	60.0	0.60	33.3
27.	Irian Jaya	68.8	0.80	13.0
	Indonesia	42.0	0.33	9.8

1) Among pregnant women, based on the National Household Health Survey 1995 (Directorate of Community Nutrition, MOH), no current national data available on iron status of the people.

2) Among children under five, based on the National Exophthalmia Survey 1992 (Directorate of Community Nutrition, MOH), which was done only in 15 provinces. No current national data available on vitamin A status of the people.

3) Among school children, based on the National IDD survey 1998 (Directorate of Community Nutrition, MOH), These problems are predominantly caused by poor quality of diet and infectious diseases (Table 1.3). The two factors called as malnutrition-infection complex (Mason, J. et al., 1999). However, among the two factors (intake and infection), the major determinant factor is a lack of micronutrients intake, particularly among the vulnerable groups (pregnant women and children).

Table 1.3. Causal Factors of Micronutrient Deficiency

No.	Micronutrient Problems	Causal Factors
1.	Iron Deficiency Anemia (IDA)	Less iron intake (especially haem iron), inadequate folic acid and vitamin C intake, worming, infectious & malaria, low coverage of iron supplementation, high cost of supplementation, lack of breast feeding & quality CF for infants
2.	Vitamin A Deficiency (VAD)	Less vitamin A intake, inadequate oil consumption, infectious, low coverage of vitamin A supplementation, and high cost of supplementation
3.	Iodine Deficiency Disorders (IDD)	Less iodine intake, poor quality of iodine source of food, intake of goitrogenic foods, high cost of iodine supplementation, low coverage of iodized salt, inadequate low enforcement, inadequate alternative job opportunities for the salt farmer producers

1.1. 2. Micronutrient Intake

In terms of micronutrient intake, unfortunately, up till now there is no available large scale of individual dietary intake assessment except at the family level (MOH and UNICEF, 2002). As shown in Table 1.4, it is about one-third to two-third of the family nutrient intake categorized below 50 % of the RDA (various for type of micronutrients). The iodine, folic acid and zinc intake are not available since the Indonesian Food Composition Table is limited on the micronutrient conversion.

The micronutrient problems have increasingly gained attention from international conferences and international agencies, and policy makers. These micronutrient problems are still being seriously public health problems because of the limited resources available. More efforts in the near future are required, including improving quality of diet, especially vulnerable groups through food fortification and its supporting programs.

Table 1.4. Percentage of Family with Micronutrient Intake under 50% of the RDA in 1999

No	Problem	Region	Mean Intake	% of Family under 50% of RDA
1	Intake of Iron		(mg/cap/d)	
		Urban	8.9	40.1
		Rural	9.1	36.7
		Urban & Rural	9.0	37.9
2	Intake of Vitamin A		(IU/cap/d)	
		Urban	4590	36.7
		Rural	4856	34.4
		Urban & Rural	4757	35.3
3	Intake of Vitamin B1		(mg/cap/d)	
		Urban	0.6	61.9
		Rural	0.6	58.1
		Urban & Rural	0.6	59.5
4	Intake of Vitamin C		(mg/cap/d)	
		Urban	47.6	55.9
		Rural	55.1	52.6
		Urban & Rural	52.3	53.8

Source: (MOH & UNICEF, 2002)
Data on other micronutrient intake are not available

1.2 Cost to Society

Micronutrient deficiency leads to cause growth failure, impaired immune system, mental and cognitive development. Some of the consequences are irreversible, and even death at early life (Table 1.5). According to Pelletier et al (1994) and Murray & Lopez (1997) preventing malnutrition would reduce child mortality by more than 50%, and reduce the burden of diseases in developing countries by about 20%. Inversely, according to Hunt, JM (2002) improving child and maternal nutrition for live learning.

The above micronutrient problems, both biomarkers and nutrient intake (Table 1.1 and 1.4), partly explained why about one-third of the infants death in Indonesia occurred in the first month of life. Infant mortality rate and maternal mortality are still high, namely 46 per 1000 live births and 373 per 100.000 live births respectively, which is higher than the neighbouring countries such as Malaysia, Philippine, Thailand and Singapore. Based on scattered studies about one-third of children suffered from mental retardation (CBS and UNICEF, 2000).

Table 1.5. Possible Negative Consequences of Micronutrients Deficiencies

Physical Negative Consequences	Mental Negative Consequences	Economy Negative Consequences	**Socio-cultural** Negative Consequences
INDIVIDUAL			
1. *Child death* 2. *Maternal death* 3. *Birth defect (NTD)* 4. *CVD death* 5. *Growth retardation* 6. *Fatigue* 7. *Lethargy* 8. *Apathies* 9. *Vision disabilities* 10. *Pale*	1. Brain damage 2. Brain malfunction 3. Low IQ 4. Neurological malfunction 5. Lower school performance 6. Low psycho-motoric capability 7. Absenteeism from school	1. Lower productivity of labour force 2. Working time lost 3. Lower household income 4. Increased child caring cost 5. Absenteeism from work	1. Self esteem lost 2. Isolation 3. Discrimination 4. Increased unskilled labour 5. Increased unemployment 6. Increasing time for childbearing 7. 8. Poor parenting
NATIONAL			
1. *Child mortality rate* 2. *Maternal mortality rate* 3. *Birth defect (NTD) rate* 4. *CVD mortality rate*	1. Less competitive workforce 2. Social unrest due to low cognitive function	1. Higher education expenditure 2. Higher health care cost 3. Depress GNP	1. Discrimination (poor vs rich) 2. Increased unskilled labour rate 3. Increased unemployment rate 4. Disempowerment of women 5. Lower average academic achievement

Source: Lotfi, et al. (1996)

1.2.1 Benefit of Food Fortification Program

The benefits of controlling iron deficiency anemia (IDA) are increasing adult productivity, improving cognitive of children for better productivity in the future, and preventing maternal death. The benefits of controlling vitamin A deficiency (VAD) are reducing cost for health care, and preventing child deaths. The benefits of controlling folic acid is reducing health care cost for cardiovascular disease (CVD), and preventing neural tube defects (NTD). Based on the Indonesia data, the benefit of controlling these micronutrient deficiencies is 127 million USD, as shown in Table 1.6. Comparing with the Indonesian's GDP in 2001 (14,900 million USD), this benefit is about 2.8% of GDP, which is equal to annual government expenditure for health sector.

The results consistent with other studies in developing countries, that there is a significant economic benefit from preventing micronutrient deficiency (Mason, J. et al, 1999); and it should be considered as a long-term investment, like education and health (Hunt, J. M., 2000). Therefore, adequate nutrition should be an integral part of human and economic development.

Table 1.6. Estimated Annual Benefits* of Food Fortification Program to reduce Micronutrient Deficiency in Indonesia (Million USD)

	Aspects	IDA	VAD	IDD	Folic acid deficiency
1.	Productivity gains from improve cognitive of children and work performance of adults	145.2	38.7	n. a	41.6
2.	Reduce health care Cost	n. a	100.7	n. a	75.4
	TOTAL	145.2	139.4	n. a	127.0

*Equal to economic losses of Cognitive and Productivity because of the micronutrient deficiency
n. a = data not available
USD = Rp 8500

1.2.2 Productivity Losses and Cost of Food Fortification

A study from Indonesia (Husaini, Suhardjo, Scrimshaw, 1990) showed that the productivity of tea pickers suffering from IDA 7 kg less than normal non-IDA tea pickers. Iron deficiency anemia (IDA) among adults could reduce 5 to 17 percent of their productivity depend upon severity of the anemia and type of job; and about 10 percent lower for iodine deficiency adults (Table 1.7). In terms of macro-economic, the loss of GDP because of prevalent micronutrient deficiency, such as in South Asia, range between 0.6 to 3.3 percent of GDP (Table 1.8). Considering the serious impacts of the micronutrients deficiency in human quality and economic development, feasible and strategic approaches to address the micronutrients deficiency is urgently required in the near future.

Table 1.7. Estimated Productivity Losses because of Major Micronutrient Deficiency, as percentage to normal*)

	Aspects	IDA	VAD	IDD
1.	Current losses	17 (heavy labour) 5 (blue-collar)	n. a	10
2.	Losses based on childhood	4	n. a	n. a

Source: Horton, S. (1999), based on study in India, Pakistan, Vietnam, and Bangladesh

Table 1.8. Estimated Economic Losses of Cognitive and Productivity because of Major Micronutrient Deficiency, as Percentage of GDP*)

No	Aspects	IDA	VAD	IDD
1.	Cognitive Only	0.8 – 1.1	n. a	n. a
2.	Cognitive and manual work productivity	0.9 - 1.9	n. a	n. a
3.	Productivity only	0.6 – 1.3	n. a	0.3 –3.3

Source: Horton, S. (1999), based on study in India, Pakistan, Vietnam, and Bangladesh
*) Figures represented in the rank (the minimum and the maximum) as percentage of GDP

Since the main cause of the iodine, iron and vitamin A deficiencies is lack of a balance diet, there are three main strategies to overcome these problems, namely improving food consumption, supplementation and food fortification. However, in the case where most people cannot easily and economically access to a balance diet, food fortification should be regarded as a short-cut strategy. The unit cost per target beneficiary per year of food fortification is significantly lower compared to the other alternative intervention. However, it does not mean that the intervention is only rely on the food fortification.

Besides improving food intake through food ration or food supplementation is not efficient (Levin et al., 1991). According to Lotfi *et al* (1996) food fortification strategy is very cost effective by considering services, coverage, *compliance*, maintenance cost, sustainability and external resources.

It is widely believed that the fortification of commonly consumed foods such as salt, sugar, flour, fats and oils, rice, dairy products, condiments and powdered beverages could protect more than 80% of the worlds population from micronutrients deficiencies. The incremental cost of fortification depends on the food vehicle and the added nutrient. However, the range is generally from less that 1% for iron in flour or vitamin A in oils to 2-3% for vitamin A in sugar (USAID and ILSI, 1989; ADB, 2000; Purnama, P., 2001).

In industrial countries, a wide range of fortified foods work to protect populations from micronutrient deficiencies. In the United States, for example, almost one-quarter of dietary iron comes from fortified sources. In most developing countries where micronutrient malnutrition is most prevalent and its impact most devastating, fortified foods are typically available and affordable only among the privileged classes.

Micronutrient deficiency is a “hidden hunger”. With low awareness of the threat there is little consumer demand for the solution. If public goals for the elimination of micronutrient malnutrition could be translated into market realities, foods would be fortified by government fiat. However, particularly in this era of expanding pubic needs and shrinking public budgets, government institutions do not have the resources or technical capacities to sustainable produce or distribute food.

1.3 Government Commitment to Reduce Micronutrient Deficiency

1.3.1. Government Strategy and Targets on Micronutrient Deficiency Control

The well-documented national development policy of the government of Indonesia was started since 1969, when the first stage of the Five Year Development Plan (FYDP) was formulated. In the first FYDP (called REPELITA document) there was no particular chapter on food and nutrition policy. At that time the policy on nutrition is very limited and formulated under health policy chapter (on clinical nutrition policy), and in agriculture policy chapter (on food and community nutrition policy). Meanwhile since the second FYDP (1974) the food and nutrition policy was exclusively formulated into one policy chapter (Hardinsyah and Ariani, M., 2000). The policy stated that the important of nutrition in the human and economic development. Policies and programs for poverty alleviation, and promoting economic growth, agriculture and food, education, health, family planning, and quality of has been formulated and done since the year of independent, but they were intensively done systematically since the first FYDP.

The results were very significant, since the prevalence of the poor in 1970 and 1996 was 60.0 % and 13.5 % respectively. The population growth decreased from about 3.0 % to 1.6 %. Infant mortality rate improved from 145 to 46 per 1000 live births respectively, but it is still higher that in neighbouring countries (Malaysia, Philippine, Thailand and Singapore). The number of children under-five year old is 22 million or about 10 % of the population; and the number of women at reproductive age is 59 million or about 28 % of the population (UNICEF and BPS, 2001).

The policy also places higher prioritise on nutrition and health for specific groups such as pregnant women, lactating mothers, and children form middle and lower income families. The Indonesian government adopted a nation wide policy and programs on nutrition such as: 1) food security, 2) nutrition supplementation, 3) nutrition education, 4) food supplementation, 5) nutrition surveillance, and 6) food fortification.

Policy and programs on controlling micronutrients problems has been done since 1980s. The strategies of controlling micronutrient deficiencies are mainly focus on nutrition supplementation (iron tablet, vitamin A capsule, iodine capsule), nutrition education, and iodized salt. In the nutrition-health related policy also includes immunization, antenatal and pre-natal care, drinking water and sanitation programs. Ninety tablets of iron tablet of 60 mg iron each is given to pregnant women during pregnancy. Iron syrup is also given to infants suffering from PEM. Vitamin A supplementation is given to children twice a year in every February and August. Infants between 6 to 12 months of age are given vitamin A supplementation in the amount of 100.000 IU and children between 1 to 5 years are given 200.000 IU. Vitamin A capsule of 200.000 IU is given also to every woman within the first 30 days after giving birth. Iodine capsule is given to target groups in the endemic goitre areas. Integrated health post (*Posyandu*) cadres, village midwives, or officers of the health service center provide iron tablet, iron syrup, vitamin A capsule, and iodine capsule to the target groups (MOH, 2000; Latief, D., 2000).

Regarding nutrition education, a simple tool of nutrition education for having a balance diet was introduced since early 60s. The tool called a slogan of "Four Healthy, Five Perfect". The four healthy means to be healthy every body should consume carbohydrate source foods, protein sources foods, fruit, and vegetables every day. Then, in 1994 the first Indonesians dietary guidelines, called a guide to have a balance diet, was formulated and published for a detail tool of nutrition education for having a balance diet. All the mentioned above on nutrition program and policies reflect along commitment of the Indonesia government on controlling micronutrient deficiency (Soekirman, 2000).

Since year 1999 (the reformation and decentralization era), the name of FYDP document (REPELITA) was changed into the National Development Program (called PROPENAS), which is also formulated for every five years, but it is simpler and shorter then the REPELITA. The PROPENAS document has no particular chapter on Food and Nutrition. The nutrition policy and programs then was formulated under Agriculture Chapter, and Health Chapter, which are similar to the First FYDP.

In order to integrate the various nutrition programs into a holistic approach, and following an international commitment on country nutrition plan of action, Indonesian Government formulated a document of the National Food and Nutrition Plan of Action (NFNPA). The NFNPA was jointly formulated by related Ministry (Ministry of Agriculture, Ministry of Health, and Ministry of Industry and Trade, Ministry of Home Affairs) in 2000. In the NFNPA, the nutrition and food policy and program was interpreted and formulated in more detail and measurable. NFNPA identify prioritised target groups, indicators of the program and targets to be achieved for the next five years (MOH, 2000). The nutrition targets of the NFNPA are shown in Table 1.9. This also reflects a continuation of government commitment of controlling micronutrient deficiency.

In terms of food fortification policy, the commitment of the government showed by the formulation of article 27 of the Food Act established in 1996 (State Ministry of Food, 1997). The commitment of the government for ensuring food quality and nutrient content of food is stated in the article 28 of the Food Act.

Table 1. 9. Targets to be achieved in Year 2005

No.	Nutrition Problems	Target Groups*	Year 2000 (%)	Year 2005 (%)
1.	IDA	Pregnant & lactating mothers	50.9	40.0
		Children under-five	40.5	30.0
		Women at reproductive age	39.5	30.0
2.	VAD	Pregnant & lactating mothers		
		Children under-five	50.2	30.0
3.	IDD a. Total Goitre Rate	School children	9.8	5.0
	b. Coverage of iodized salt used	Household	65.0	90.0
4.	PEM Underweight Severe malnutrition	Children under-five	25.0 7.0	20.0 5.0

Source: National Food and Nutrition Plan of Action (NFNPA)
*) As a reflection the magnitude of the public health problems

Article 27, FOOD ACT (1996)

1. The Government shall determine and implement nutrition policy for improvement the community nutrition status.

2. To increase the nutrient content of certain processed food, the Government may determine special requirements concerning the food composition.

3. In case of food shortage and or decrease in community nutrition status, the Government may determine the requirements for food fortification of certain food. Any person who is producing food as referred to in point (1) and (2) must follow the nutritional requirements that have been determined.

Article 28, FOOD ACT (1996)

1. Any person who is producing certain processed food that will be sold, he must carry out the food processing procedures that could hamper the process of decreasing or losing the nutrient content in food raw materials

used

2. Certain processed food and the food processing procedures as referred to in paragraph (1) will be further regulated by the Government

1.3.2. Food Fortification Coordination

The issued of food fortification regulation was then followed up with the establishment of coordinating institutions for food fortification, called the National Fortification Commission (NFC) under State Ministry of Food. In 2000, the NFC has been reorganized because the State Ministry of Food that the previous Commission attached was no longer existed. The new home for the NFC was proposed and accepted, namely at the Deputy Coordinating Ministry for Finance and Industry, under Coordinating Ministry of Economic Affairs. The new position of the NFC and its consolidation would have better opportunities to play a better role on coordination of the food fortification programs in Indonesia (Hardinsyah et al, 2000).

1.3.3 Food Fortification Policy and Regulation to Improve Nutrition and Reduce Poverty

Government of Indonesia endorsed the commitment that expressed at the World Food Summit and the World Summit for Children, that several forms of malnutrition including micronutrient deficiency should be eliminated. However, the reality is far from the goal because of lack of government budget, economic crises, and starting in decentralization.

The government realizes that micronutrients supplementation is expensive and should be regarded as a short-term intervention and targeted to high-risk individuals and high prevalent population until more sustainable approach such as food fortification are implemented effectively. Partnership with private sectors and international agencies offers a greater chance to achieve the goal of controlling micronutrient deficiency (Untoro, R. 2002).

Since July 1997, Indonesia was suffering from economic crises. The prevalence of the poor after one year of the crises (in 1998) was 24.2 % (CBS, 1999).

Since the crises, the government introduced a Social Safety Net (SSN) programs particularly for poor (funded from IMF loan, and other sources of loan and grant). The Social Safety Net programs include nutrition and basic health services, food security, social and education subsidies, credit schemes etc. Recovery from the crisis depends on bank and corporate restructuring, achieving fiscal sustainability and maintaining appropriate economic and monetary policies (Bappenas, 1999).

In 1998, a special nutrition program for the poor families was developed under the Social Safety Net program, including food supplementation, which is intended to improve nutritional status of under-nourished young children and pregnant women, particularly among the poor families. Through the social safety net program, every under-nourished young child is given fortified complementary feeding; every under-nourished pregnant woman is given locally available food supplement; and a-twenty kilograms of special market rice (with 50 % price discounted) is given to every poor families. The nutrition surveillance was also strengthened through capacity building and revitalization of *Posyandu.* However, the nutrition surveillance activities are mainly focussed on the surveillance of macronutrient deficiency such as marasmic-kwashiorkor, and underweight (PEM). The only surveillance program for micronutrient deficiency done after the crises is a household survey of iodized salt coverage.

One of the strategies proposed for controlling micronutrient deficiency is multi-nutrients food fortification. In addition to the policy on mandatory iodized salt, which has been done since 1980s, the government also have a policy on mandatory multi-nutrients fortification of complementary foods and wheat flour. All commercial complementary foods for children 4-23 months old in Indonesia have been fortified with micronutrients followed its standard. Besides, in 2001 the government allocated ADB loan for producing 9.375 tonne of fortified complementary foods for children 6-11 months old among 340 districts. The fortified commercial complementary foods are being produced and marketed by food industries (Setiadi, A. 2000).

Based on recommendation from a national food and nutrition workshop attended by the policy makers, experts and related food industry leaders, in the 1998, the Ministry of Health issued (Decree Number 632/1998) the mandatory fortification of wheat flour. The wheat flour produced and distributed in Indonesia must be fortified with iron, zinc, thiamine, riboflavin and folic acid. In addition to government budget, the USAID, CIDA and UNICEF support wheat flour fortification in Indonesia, which is was initiated in 1999. From January 1999 to January 2000, a grant of US $ 850.000 from USAID and CIDA through UNICEF was given to the Indonesian Government to purchase 340 metric tons of iron premix, and has been distributed for wheat flour fortification to Bogasari, Berdikari Sari Utama, Citra, Sri Boga Ratu Raya Flour Mills. In 2001, wheat flour industries received 240 metric tons of premix from CIDA (Purnama, P, 2001).

In addition to the above decree, in May 2001, Ministry of Industry and Trade issued Decree Number 153/2001 on the Mandatory Application of the National Standard of Indonesia (SNI) for Fortified Wheat Flour. Both imported wheat flour or domestically produced wheat flour must follow this SNI. According to the SNI, the wheat flour must be fortified with 50 ppm iron, 30 ppm zinc, 2.5 ppm thiamin, 4 ppm riboflavin, and 2 ppm folic acid (Purnama, P., 2001).

The above policy and regulation show a strong commitment of the government, on controlling micronutrient deficiency, and its provide opportunities for all related institutions such as related sectors of the government, related industries and services, research centres, both local and international NGOs for building a better partnership on food fortification for controlling micronutrient deficiency.

CHAPTER 2
RATIONALE: PROPOSING FOOD VEHICLES

Consumption and Production of Potential Vehicles

According to Lotfi et al. (1996), the rationale reasons to identify potential food vehicle for food fortification programs are: 1) The food vehicles should be consumed by a sizable proportion of the population. 2) The fortified products should be inexpensive, so that it is consumed by the low-income groups, which are more vulnerable to malnutrition. 3) To have a better control management, the food vehicles should be processed centrally in large scale. 4) The products should be distributed through a widespread network so that it reaches all part of the country. 5) There should be no change in taste, appearance, or color on food fortification. 6) There should be minimum loss of the nutrients on further processing/cooking of the foods. 7) The vehicles should be consumed in fairly constant amount so that fortificant dosages can be accurately calculated. There should be a little change of some people consuming large amount of the fortified vehicles as might occur with soft drink or snack foods. These criteria are usually adopted by many countries in implementing mandatory food fortification program.

The Indonesia government also adopted the above criteria when starting the programs of iodized salt and fortified wheat flour. Beside the above mandatory fortification program, some food industries have voluntary fortified some food products such as margarine (with vitamin A, D, E and K), infant formula (with several vitamin and minerals), particular milk (with vitamin, mineral and fatty acids), particular biscuits (with mineral and fatty acids), and particular instant noodle (with iron, vitamin A and vitamin E) for the shake of market positioning, therefore the poor and part of middle income groups can not be covered in their consumer segment.

In order to identify other potential vehicles for mandatory food fortification, some suggested from several meeting to assess the intake of cooking oil, sugar and soy sauce. Rice is a common staple food in Indonesia, but it was produced by many small rice milling, and it was not technically feasible to be fortified, except for the rice ration for the poor, called special market operation rice during the crises.

There are two data set of family food consumption survey available for assessing food intake in Indonesia, namely food consumption data of Susenas from Centrall Bureau of Statistics, and food consumption data from the Ministry of Health. Unfortunately, up till now, there is no data available on the food intake of individual, such as children and women, who are regarded as a vulnerable group.

Table 2.1. Percent of Household Consuming Potential Food Vehicles: Rice, Instant Noodle and Milk in Urban and Rural in Indonesia

No	Province	Rice		Instant Noodle		Milk	
		Urban	Rural	Urban	Rural	Urban	Rural
1.	Aceh	95.0	100.0	41.1	31.8	18.1	7.3
2.	North Sumatra	98.0	99.8	40.0	33.1	24.6	9.4
3.	West Sumatra	97.2	99.8	47.7	37.3	31.9	15.2
4.	Riau	97.9	99.8	43.6	36.8	39.9	19.9
5.	Jambi	99.0	100.0	55.4	38.1	35.0	14.3
6.	South Sumatra	97.6	99.8	72.4	55.9	44.5	16.9
7.	Bengkulu	98.8	99.4	55.9	31.6	28.8	11.2
8.	Lampung	97.9	99.5	51.2	23.5	30.2	11.7
9.	DKI Jakarta	94.5	-	55.9	-	40.0	-
10.	West Java	96.9	99.5	48.7	37.7	27.0	8.8
11.	Central Java	96.8	97.5	46.1	33.7	23.5	10.5
12.	Jogyakarta	80.9	98.6	55.6	44.9	27.6	14.8
13.	East Java	94.3	97.1	41.1	24.0	21.7	6.9
14.	Bali	58.7	76.3	24.5	24.5	9.1	7.1
15.	West Nusa Tenggara	99.1	99.6	48.9	30.1	14.7	5.6
16.	East Nusa Tenggara	98.8	97.6	39.6	21.4	20.5	3.5
17.	West Kalimantan	96.4	99.9	79.2	52.1	47.4	10.6
18.	Central Kalimantan	97.3	99.8	65.5	44.0	39.9	16.1
19.	South Kalimantan	97.3	99.4	51.6	50.8	22.5	10.4
20.	East Kalimantan	96.1	99.0	64.9	66.5	41.0	24.7
21.	North Sulawesi	99.4	99.0	14.7	19.3	28.8	15.7
22.	Central Sulawesi	96.7	98.7	44.9	37.0	38.9	17.4
23.	South Sulawesi	99.0	98.1	55.4	50.5	33.0	22.9
24.	South East Sulawesi	99.0	98.2	73.7	43.9	35.2	11.7
25.	Maluku	98.8	98.5	42.3	24.2	32.1	14.9
26.	Irian Jaya	96.5	86.4	40.6	15.5	40.6	12.1
INDONESIA		95.3	97.6	50.0	36.3	30.6	12.8

Source: SUSENAS 1999 (CBS, 2000)

Tables 2.1 and 2.2 show percentage of families consumed potential food vehicles during the survey (a week recall based on food expenditure) from National Socio-Economic Survey (Susenas). The data revealed that rice is the most common food consumed by both urban and rural people in Indonesia. The average consumption ranged from 2 kg/cap/year (Urban-Jogyakarta), up to 141.1 kg/cap/year (rural-North Sumatra). Overall, the average consumption of instant noodle which is also become popular staple food in last decade was only 3.1 kg/capita in urban areas and 1.5 kg/capita in rural areas. Vegetable oils (mostly palm oil) and white sugar are likely potential to be fortified since the average consumption are relatively high and less varied among urban-rural areas as well among provinces.

Table 2.2. Percent of Household Consuming Potential Food Vehicles: Cooking Oil, and Sugar in Urban and Rural in Indonesia

No	Province	Cooking Oil		Sugar	
		Urban	Rural	Urban	Rural
	Aceh	93.3	97.4	93.7	95.4
	North Sumatra	95.3	96.7	95.7	89.0
	West Sumatra	92.7	98.0	91.1	91.3
	Riau	97.2	99.1	96.5	97.5
	Jambi	98.2	99.5	97.6	98.3
	South Sumatra	97.1	98.8	98.9	99.6
	Bengkulu	95.4	87.8	94.0	93.6
	Lampung	96.5	98.2	98.4	95.7
	DKI Jakarta	93.1	-	95.8	-
	West Java	95.2	98.2	86.3	72.5
	Central Java	95.4	97.8	93.9	88.2
	Jogyakarta	77.5	97.1	90.5	77.3
	East Java	92.8	96.88	92.7	93.6
	Bali	56.5	78.0	53.2	75.1
	West Nusa Tenggara	96.3	95.8	90.0	82.1
	East Nusa Tengga	93.9	71.4	96.3	79.4
	West Kalimantan	96.0	93.9	98.0	96.2
	Central Kalimantan	92.6	98.1	97.9	99.0
	South Kalimantan	96.4	98.8	97.6	97.9
	East Kalimantan	95.7	94.6	97.6	99.2
	North Sulawesi	92.3	98.3	98.3	98.4
	Central Sulawesi	94.8	96.0	97.1	97.8
	South Sulawesi	97.0	95.7	98.0	97.2
	South East Sulawesi	91.7	81.9	96.1	90.9
	Maluku	97.6	98.5	98.8	98.5
	Irian Jaya	91.7	76.7	90.1	78.5
INDONESIA		92.8	93.7	93.6	91.3

Source: SUSENAS 1999 (CBS, 2000)

Rice, cooking oil (palm oil) and sugar are also commonly consumed by people in all provinces, in urban and rural areas. Rice is consumed by more than 95% household in both urban and rural areas, while vegetable oil and sugar are consumed by more than 91% of households in all provinces. Instant noodles are consumed by 50.0% of household in urban area, while in rural area; it is only consumed by 6% of households. It was estimated that the wheat flour products (noodles, biscuits, bread and cakes) is consumed by about 75 % of the population. Milk, however, is the least consumed both in quantity and in term of household coverage. It is consumed by 30.6% urban households and 12.8% of rural household.

Data on the individual dietary intake is not available in Indonesia. However, based on the estimate figure from the Wheat Flour Association, the average consumption of wheat flour (mostly in terms of its derive products) is about 40 grams per capita per day. The consumption of wheat flour among the low-income level is about 10 grams per capita per day.

Although sugar is mostly consumed in Indonesia, however it is more expensive to be fortified compared to palm cooking oil. Therefore, sugar was not recommended to be mandatory fortification in Indonesia. Monosodium glutamate (MSG) previously, was considered also as a vehicle of vitamin A fortification, because of the commonly consumed and limited number of producer of MSG. During the period of 1985-1998, MSG fortifications with vitamin A was pilot-tested by the Ministry of Health and technically assisted by Hellen Keller International. Unfortunately, the project failed to go to large scale because of technical problem. Barriers to the implementation of the MSG fortification in the 1980's included a color change in the product, particle segregation, the price of retinal-palmitate as fortificant, and inconsistent support from the public health professional.

Since the iron deficiency anemia is very prevalent among infant 6-12 months old (about 60 %), and the only main ways to control the problems is through consuming more breastmilk and complementary feeding. Only about 24 % infant before age of 4 months exclusively breastfed, and the average intake of fortified complementary foods only 36 to 40 gram perday among infants 6-12 months from economic strata of A dan B, and only 14 gram from the economic strata of C. UNICEF suggested that these infants required 50 gram fortified complementary foods everyday.

Reasons why the middle and the low income familiy can not afford to buy the fortified complementary feeding because 1) it is expensive, 2) it is not sell at the village lshops, and 3) lack of awareness of the family particularly mother of infants. The

Vitadele and Delvita programs done during the crises were a charity programs for poor infants. Since that is a charity programs, it will not sustain.

Therefore nutrition promotion (via social marketing) and increasing access of the low and middle-income family to fortified complementary feeding is a must in order to control iron deficiency. A cheaper and easier access commercial fortified complementary foods need to be developed in Indonesia.

Regarding the food production, Table 2.3 shows the number of food industries for selected food commodities in Indonesia as well as its actual production. It is shown that wheat flour is ideal to be fortified consider that there are only five flour mills factory in Indonesia, in comparison to rice mills factory, which is estimate around 250 thousands (data not shown) and spread out in the villages all over the country. The number of food industries such as margarine, coconut oil, palm oil, milk, and milk product, and instant noodle ranged from 22 factories (milk) up to coconut oil 114 factories (coconut oil). Margarine factories are concentrated in Java (half are located in Jakarta), while palm oil are mostly located in Sumatra and Java (North Sumatra: 22 factories, Jakarta: 12 factories, and East Java: 9 factories), milk and milk products concentrated in Java, and instant noodle factories are spread out in 12 provinces, although 35 out of 52 factories located in Java.

Table 2.3. Production of Potential Food Vehicles (Mostly by Large and Medium Scale Manufacturing, except for rice and coconut oil)

No	Foods	Number of Factory	Capacity (M.Ton)	Actual Production (M.Ton)
1.	Margarine	31	422 563	328 048
2.	Coconut cooking oil[1]	403	995 522	887.041
3.	Palm cooking oil[1]	57	7.855.372	4.257.754
4.	Milk & dairy product	22	462 469	352 902
5.	Wheat flour	5	7 082 000	4 249 200
6.	Instant noodle	53	976 350	579 642
7.	Rice	84 000	-	33.000 000
8.	White sugar[2]	60	-	1 815 022
9.	Iodized salt	269	1 089 780	770 450
10.	Complementary food	4	36 200	12 000

Source: [1]Directorate General of Plantation (2001)
[2]Ministry of Trade and Industry (1999), CBS (2000) and CFNPS (2001)

The data presented in Table 2.3 also revealed that the utilization rate of industrial capacity ranged from 77.6 % (margarine) up to 101 % (coconut oil). Among the oils group, the highest of actual production is palm oil (2.4 million M Ton) with the utilization rate of production capacity 42%. This means that a double quantity of production of palm oil is possible without any expansion of new factories. The number of 4.2 million M Ton of wheat flour was produced with the utilization rate as low as 60.0 percent.

Public-Private Environment and Assessment

There are three kinds of food that are regulated as mandatory fortification in Indonesia, commercial complementary food and wheat flour. Iodized salt was first introduced to Indonesia in 1930 in selected endemic areas of Java. Considering the problem of IDD, in early 70-s the government recommended a national salt iodization program without monopoly base. This program was started in Madura in 1976 through a project coordinated by Directorate General of Chemical, Agro and Forestry based Industry, MOIT. The fortificant and machinery were provided by UNICEF. The commercial complementary food have been fortified with about 18 vitamins and minerals since late 1980s, and the wheat flour have been fortified with iron, zinc, B1, B2 and folic acid since 2001.

All of the above mandatory fortifications are based on National Standard of Indonesia. Each of the food fortification programs involved public-private partnership, and international donor agencies, such us World Bank, USAID, CIDA and UNICEF. Investment for advocacy, pilot study, and start-up investment partly funded by the government, donor agencies and food industries.

The government had a plan for mandatory fortification of other potential food vehicles (such as cooking oil and sugar), particularly with vitamin A. The National Seminar and Workshop on Fortified Wheat Flour and Cooking Oil, which was attended by most of stakeholders of food fortification, in Jakarta in March 2002, identified and suggested that the palm oil was one of the potential vehicles to be fortified with vitamin A. Sugar was also considered as to be a potential vehicle, particularly for the Eastern Indonesians, who are consumed very limited amount of palm oil. The palm oil fortification with vitamin A can be done in various forms such as bulk palm oil, packed palm oil, and sachet oil.

One of the medium palm oil industries and one of big palm oil industries are currently studying fortification of palm oil with vitamin A. UNICEF Indonesia would like to support research centers for the study on cooking oil intake among children and women; and Roche Indonesia would like to provide fortificants, and technical assistants for fortification studies and pilot plan. This reflects the initial public-private partnership for future cooking oil fortification in Indonesia.

Regarding monitoring, the NADFC already prepared some regulations and guidelines regarding the monitoring and evaluation of food fortification, particularly for iodized salt, fortified complementary food, and fortified wheat flour. A national monitoring system with integrated inter-sector approach should be also further elaborated for a better monitoring system, such as identifying competent authorities and their responsibilities, procedures and low enforcement.

The monitoring of fortified food should be done at 4 levels namely at registration process, at every shipment for imported foods, at food industry, and at marketing or consumers. Many factors should be considered for evaluating the cost of monitoring, such as: frequency of monitoring per year, number of targeted food industries, number of importers, sites of sampling, types and size of packaging, types of lab analyses, number of samples taken, training for lab analyst, cost for lab analysis. However resources available for this are very limited.

The National Agency for Drug and Food Control (NADFC) has 26 agencies for Drug and Food Control at provincial level. Five of them are equipped with AAS for Fe and Zn determination. The NADFC and all its provincial branches are also equipped with HPLC for vitamin A, thiamin and riboflavin determination and Microbiological Laboratory for folic acid determination. Besides, there are also some accredited laboratories belong to universities and research center that could be used to extend the capacity of the monitoring of the food fortification.

The quality assurance is done by the food industries. All of the fortified complementary food Industries, and fortified wheat flour industries have their own laboratory for implementing the quality control of their fortified products. However for the iodized industries, a simple detector is used for the quality assurance of iodine content in fortified salt.

Projected Coverage and Protection

Table 2.4 shows the estimated impact of single nutrient fortification of each food vehicle. The estimated impact (it is refer to the contribution of fortified food to the RDA) is calculated based on the current level of food consumption (in terms of quantity of food consumed and household coverage) and forticant level and its stability. Two estimated impacts are available in this projection. The first ones is calculated based on average consumption of all household (% RDA I), while the second one (% RDA II) is the estimated impact covering limited only to those who are consume the said food commodities.

Iron and folic acid fortification on wheat may contribute up to 25 % of the RDA; and folic acid fortification on wheat may contribute to about two-third of the RDA. Universal salt fortification with iodine at 30 ppm fortificant level can be expected to solve IDD problem since the estimated impact show more than hundred percent of RDA can be achieved with current level of salt intake. A significant contribution of vitamin A also can be expected by fortifying palm oil and sugar. In the long term, fortification of some potential food commodities can be expected to have a significant role on the elimination of micronutrient deficiencies in Indonesia.

To estimate the reduction of micronutrient deficiency during the next five and ten years after food fortification is not easy. It is because some factors can't be measured (intangible), even some factors are out of government control. Therefore, several assumptions are required to have a more rationale estimate. The assumptions are as follows; 1) political stability with economic growth around 3.5 percent per-year, 2) continuing progress of public-private partnership in future food fortification programs, 3) government have adequate resources available from domestic and international assistant, 4) continuing progress of controlling program on infectious diseases, malaria and de-worming, 5) existing programs on nutrition supplementation in the endemic or very poor areas, and 6) previous experience, domestically and internationally.

Table 2.4. Estimated Impact of Food Fortification in terms of Micronutrients Intake by Population

Vehicles and Fortificant	Mean intake	Population Coverage	Fortificant Level	Retention*)	Added Nutrient intake for public	RDA	% Added Nutrient intake for public (% RDA)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Fortified wheat flour	g/cap/d	(%)	ppm	%	mg/d	mg/d	% RDA
- Wheat Flour	30	75					
- Iron			60	100	1.8	10	18.0
- Folic Acid			2.5	70	0.053	0.12	43.8
2. Fortified cooking oil	g/cap/d	(%)	IU/g	%	RE/d	RE/d	% RDA
- Palm Oil	21	80					
- Vitamin A			50	60	189	550	34.4
3. Fortified Comp. Food for the poor (Multi vit & minerals)	g/cap/d	(%)	Ppm	%	mg/d	mg/d	% RDA
- Complementary food	14	30					
- Iron			90	100	1.260	10	12.6
4. Iodized salt	g/cap/d	(%)	ppm	(%)	µg/d	µg/d	% RDA
- Salt	5.2	65					
- Iodine			40	75	156	140	111.4

Note: *) Retention during processing and distribution
(6) = (2) * (4) * (5)
(8) = (6) / (7) * 100

Table 2.5. Estimated Impact of Food Fortification in terms of Micronutrients Intake by Low Income Group

Vehicles and Fortificant	Mean intake	Population Coverage of low income	Fortificant Level	Retention*)	Added Nutrient intake for public	RDA	% Added Nutrient intake (% RDA)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Fortified wheat flour	g/cap/d	(%)	ppm	%	mg/d	mg/d	% RDA
- Wheat Flour	14.5	75					
- Iron			60	100	0.870	10	8.7
- Folic Acid			2.5	70	0.025	0.12	21.1
2. Fortified cooking oil	g/cap/d	(%)	IU/g	%	RE/d	RE/d	% RDA
- Palm Oil	21	80					
- Vitamin A			50	60	189	550	34.4
3. Fortified Comp. Food for the poor (Multi vit & minerals)	g/cap/d	(%)	ppm	%	mg/d	mg/d	% RDA
- Complementary food	10	30					
- Iron			90	100	0.900	10	15
4. Iodized salt	g/cap/d	(%)	ppm	(%)	µg/d	µg/d	% RDA
- Salt	5.2	65					
- Iodine			40	75	156	140	111.4

Note: *) Retention during processing and distribution
(6) = (2) * (4) * (5)
(8) = (6) / (7) * 100

During the last three decades, the IDA prevalence among pregnant women decreased only about one percent per-year. Estimate impact of iron fortification in international studies is to decrease 5 % of IDA's prevalence. Since the IDD problems already reduced from about 30 % (1980) to 9.8 % (1998), and the iodized salt producers are mostly small-scale industries, it is very difficult to decrease the IDD problem less than 3 %. The projected improved micronutrients status after five and ten years of food fortification are presented in the Table 2.5.

Table 2.5. Targets to be Achieved After 10 Year of the Food Fortification

No.	Nutrition Problems	Target groups[1)]	Baseline (%)[2)]	Year 10^{th} (%)
5.	IDA	Pregnant & lactating mothers	50.9	35
		Children under-five	40.5	25
		Women productive age	39.5	25
6.	Sub-clinical Vitamin A deficiency	Children under-five	50.2	30
7.	IDD Total Goiter Rate	School children	9.8	4.0

[1)] As a reflection the magnitude of the public health problems
[2)] Source: National Food and Nutrition Plan of Action (NFNPA)

In summary the existing food fortification program, such as fortified complementary foods, iodised salt and fortified with flour need to strengthen particularly in advocacy, marketing/promotion, monitoring, law enforcement and public-private partnership. While at the same time the food fortification program need to be expanded to vitamin A fortification. Palm oil and sugar are considered to be the two most potential vehicles for vitamin A fortification. The role of the National Fortification Commission and public-private partnership on food fortification is evidence; and will continue to strengthen the existing food fortification program, and expand to other potential vehicles for vitamin A fortification. Considering several assumption on economic and political stability, and continuing progress of the existing related programs, the optimistic estimate reduction of iron deficiency, sub-clinical vitamin A deficiency and iodine deficiency during the next ten year after fortification (2002-2012) is about 15, 15 and 5 % respectively

CHAPTER 3
PROPOSED TEN-YEAR PROGRAMS AND ACTIVITIES

3.1 Ten Year Programs and Activities

The main objectives of the next ten years food fortification programs in Indonesia are to improve 1) micronutrient status (IDA, VAD, IDD) of population, especially among vulnerable groups, and 2) nutrition related health status of the population such as reduction in infant and child morbidity and mortality, reduction in neural tube defects and cardiovascular diseases. In turns, it will contribute partly to improve productivity, economic and welfare of the Indonesians.

The quantitative objective of micronutrient deficiency control is to reduce about one-third each of the micronutrient deficiency problems (IDA, VAD, IDD), as shown at Table 2.8. These objectives are reasonable enough to be achieved by considering the future economic growth (with annual growth3.5-6.5 %), better political stability, democracy and transparency, better attention and commitment of international agencies and Indonesian government on reducing micronutrient deficiencies.

The main strategies for achieving the above objectives within the ten years of the programs are: 1) involving private sectors since the beginning of planning and program, 2) strengthening public-private partnership, 3) creating conducive business policy and regulations, and 4) increasing consumer awareness. The logical framework of the programs impacts, outcomes and outputs are presented in the following figure (Figure 3.1).

Impact in 2012	Improved about one-third of prevalence of micronutrient deficiency (IDD, IDA, VAD) of population, especially vulnerable groups and its related health status
Outcome	5. Good coordination, management & implementation

2003-2012	6. Strong public-private partnership 7. Updated quality data and information system 8. Increased intake and coverage of fortified food among vulnerable groups (middle & low income groups)

Output 2003-2012	7. Established food fortification working expert and technical groups (under the NFC), and the national plan of action of food fortification 8. Government, private sectors and international commitment on resource allocation for food fortification, 9. Strong evidence (including efficacy and effectiveness) for food fortification programs 10. Established related regulations 11. Continuing IEC/social marketing programs 12. Increased availability & quality of fortified food for vulnerable groups (middle & low income groups)

Programs 2003-2012	1. Industrial Implementation 2. Regulation, Fod control & Management 3. Nutrition Monitoring 4. Social Marketing 5. Research	**Vehicles:** 1. Wheat flour 2. Cooking oil 3. Complementary foods 4. Salt

Figure 1. Objectives, Outcomes and Outputs of The Program

Based on the objectives mentioned above, and discussion in Chapter 1 and Chapter 2, there are five areas of programs were identified and shown in Table 3.1 Detail programs, activities and leading sectors of the ten-year food fortification programs are shown in Appendix 2. Major leading sectors of the food fortification programs mainly National Fortification Commission (NFC), Ministry of Industry and Trade (MOIT), Ministry of Health (MOH), National Agency Drug and Food Control (NADFC), Related Food Industries (RFI), and Universities and Research Centers (UNIV/RC).

Major leading sectors of the food fortification programs are the National Fortification Commission (NFC) for management and operational, Ministry of Industry and Trade (MOIT) for regulation, technology, fortificant and training, NADFC for monitoring, Related Food Industries (RFI) for quality assurance, Ministry of Health (MOH) for social marketing and evaluation; and Universities and Research Centers (UNIV/RC) for research (Table 3.1)

Table 3.1. Summary of Programs and Activities of Food Fortification Programs

Program	Main leading Sectors*)	Activities**)
1. Industrial Implementation	Industries	Providing technical assistance, fortification technology, fortificants, pilot plant training, and quality assurance.
2. Regulation,food control and mgt	NFC, MOIT, NADFC and Local govt	Formulating revised regulation, advocacy of new regulation, food control, law enforcement, and establishment secretariat, committee, administration plan, information system and coordination
3. Nutrition Monitoring	MOIT, MOH NADFC	Conduct nutrition monitoring of food fortification (dietary and biomarker survey). Training on surveillance, and developing information system . Data analysis and feed back
4. Social Marketing	MOH, MOIT and Local goverment	Developing social marketing materials. Printing and broadcasting social marketing materials. Evaluation of the social marketing activities
5. Research	UNIV/RC	Conducting several related studies such as efficacy, efficiency of the programs, includes stability of vitamin A

*) depend on topic or activities
**) Further detail see Appendix 2

3.2 Cost of Ten Year Programs and Activities

The summary of the budget plan for each year and program is shown in Table 3.2. These figures are calculated based on the programs and activities plan presented in Appendix 2, which was formulated through a two days workshop of the study team and the stakeholders managed by National Fortification Commission. Total cost for the ten-year programs is USD 153,891,020, ranging from USD 14,726,630 to USD 17,418,130 per year. Detail cost for the ten-year programs and activities of the food fortification programs are formulated in Appendix 3.

Table 3.2. Summary of the Cost of CIP by Year for the Ten Year Programs (in Thousand USD)*

PROGRAM	Year	TOTAL

	1	2	3	4	5	6	7	8	9	10	
Industrial Implementation	9,376.94	11,044.21	12,434.99	11,952.99	11,952.99	11,952.99	11,952.99	11,952.99	11,952.99	11,952.99	116,527.02
Regulation, Food Control & Management	1,007.91	544.91	732.91	477.91	457.91	577.91	457.91	477.91	457.91	477.91	5,671.07
Nutrition Monitoring	13.72	1,065.29	13.72	13.72	13.72	13.72	13.72	665.29	13.72	13.72	1,840.33
Social Marketing	4,416.72	3,938.72	2,960.02	2,282.02	2,512.02	2,282.02	2,512.02	2,730.02	2,512.02	2,282.02	28,427.60
Research	600.00	825.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,425.00
TOTAL	**15,415.28**	**17,418.13**	**16,141.63**	**14,726.63**	**14,936.63**	**14,826.63**	**14,936.63**	**15,826.20**	**14,936.63**	**14,726.63**	**153,891.02**

*See detail in Appendix 3

Among the five proposed programs, the cost for industrial implementation and social marketing are two largest costs. This is reasonable since fortificant cost massive campaign for increasing consumer awareness are included in that cost in order to ensure the sustainability of the food fortification programs. At the beginning the role of the government cost is dominant, then it will be gradually decreased within the ten years program of food fortification. This implies that the role of the private sector cost is dominant at the end of the ten-year program.

Further detail programs for each of the food fortification vehicles, including budget are discussed in Chapter 4 to Chapter 7.

3.3 Cost for Public and Private Sectors

Since the main strategy of food fortification program is a strong public-private partnership, both public and private have to share the cost of food fortification. Based on several stakeholders meetings managed by NFC, total cost for ten-year program is USD 153,891,020. The cost of ten years program for private sectors is USD 105,062,260 (68.27%) and for the public sectors is USD 48,828,760 (31.73%) (Table 3.3). About 3.69 % of the total cost will be allocated to regulation, food control and management; 1.20 % for nutrition monitoring, 0.93 for research, which are government main responsibility (Table 3.4).

Table 3.3. Summary of the Cost CIP by Programs for the Ten Year (in Thousand USD)*

No	PROGRAM	Amount (USD)			Percent		
		Govt	Private	Total	Govt	Private	Total
1	Industrial Implementation	12,914.76	103,612.26	116,527.02	11.08	88.92	100.00
2	Regulation, Food Control & Management	5,621.07	50.00	5,671.07	99.12	0.88	100.00
3	Nutrition Monitoring	1,840.33	0.00	1,840.33	100.00	0.00	100.00
4	Social Marketing	27,027.60	1,400.00	28,427.60	95.08	4.92	100.00
5	Research	1,425.00	0.00	1,425.00	100.00	0.00	100.00

	TOTAL	48,828.76	105,062.26	153,891.02	31.73	68.27	100.00

Table 3.4. Summary of the Cost of CIP by Sectors (Government and Private) for the Ten Year (in Thousand USD)*

No	PROGRAM	Government		Private		Total	
		USD	%	USD	%	USD	% TOT
1	Industrial Implementation	12,914.76	26.45	103,612.26	98.62	116,527.02	75.72
2	Regulation, Food Control & Management	5,621.07	11.51	50.00	0.05	5,671.07	3.69
3	Nutrition Monitoring	1,840.33	3.77	0.00	0.00	1,840.33	1.20
4	Social Marketing	27,027.60	55.35	1,400.00	1.33	28,427.60	18.47
5	Research	1,425.00	2.92	0.00	0.00	1,425.00	0.93
	TOTAL	48,828.76	100.00	105,062.26	100	153,891.02	100

The highest share (percentage) of the private sector is for Industrial implementation, such as training and fortificant technology. The annual cost for public and private sector by program is shown in table 3.5. The two highest costs are for Industrial implementation and social marketing.

Table 3.5 Summary of the Budget Allocation for the Ten Year Programs by Public and Private Sectors (in Thousand USD)*

Year	Industrial Implementation	Regulation, Food Control & Management	Nutrition Monitoring	Social Marketing	Research	TOTAL
1	9,376.94	1,007.91	13.72	4,416.72	600.00	15,415.28
-Government	4,044.77	1,007.91	13.72	4,316.72	600.00	9,983.12
-Private	5,332.16	0.00	0.00	100.00	0.00	5,432.16
2	11,044.21	544.91	1,065.29	3,938.72	825.00	17,418.13
-Government	4,428.56	534.91	1,065.29	3,678.72	825.00	10,532.48
-Private	6,615.64	10.00	0.00	260.00	0.00	6,885.64
3	12,434.99	732.91	13.72	2,960.02	0.00	16,141.63
-Government	3,056.83	732.91	13.72	2,860.02	0.00	6,663.47
-Private	9,378.16	0.00	0.00	100.00	0.00	9,478.16
4	11,952.99	477.91	13.72	2,282.02	0.00	14,726.63
-Government	197.80	467.91	13.72	2,122.02	0.00	2,801.44
-Private	11,755.19	10.00	0.00	160.00	0.00	11,925.19
5	11,952.99	457.91	13.72	2,512.02	0.00	14,936.63

-Government	197.80	457.91	13.72	2,412.02	0.00	3,081.44
-Private	11,755.19	0.00	0.00	100.00	0.00	11,855.19
6	11,952.99	577.91	13.72	2,282.02	0.00	14,826.63
-Government	197.80	567.91	13.72	2,122.02	0.00	2,901.44
-Private	11,755.19	10.00	0.00	160.00	0.00	11,925.19
7	11,952.99	457.91	13.72	2,512.02	0.00	14,936.63
-Government	197.80	457.91	13.72	2,412.02	0.00	3,081.44
-Private	11,755.19	0.00	0.00	100.00	0.00	11,855.19
8	11,952.99	477.91	665.29	2,730.02	0.00	15,826.20
-Government	197.80	467.91	665.29	2,570.02	0.00	3,901.02
-Private	11,755.19	10.00	0.00	160.00	0.00	11,925.19
9	11,952.99	457.91	13.72	2,512.02	0.00	14,936.63
-Government	197.80	457.91	13.72	2,412.02	0.00	3,081.44
-Private	11,755.19	0.00	0.00	100.00	0.00	11,855.19
10	11,952.99	477.91	13.72	2,282.02	0.00	14,726.63
-Government	197.80	467.91	13.72	2,122.02	0.00	2,801.44
-Private	11,755.19	10.00	0.00	160.00	0.00	11,925.19
Total	116,527.02	5,671.07	1,840.33	28,427.60	1,425.00	153,891.02
-Government	12,914.76	5,621.07	1,840.33	27,027.60	1,425.00	48,828.76
-Private	103,612.26	50.00	0.00	1,400.00	0.00	105,062.26

*See detail in Appendix 3

3.4 Source of Fund

The source of fund for the above mentioned cost of food fortification could be come from several sources, such as government of Indonesia (public sectors), Industries (public sectors), national and international lending agencies and donors. The estimate cost that would be burned to government is about 10 %, and the rest should be gained from donors and lending agencies (soft loans). The soft loans will be used also by private sectors.

CHAPTER 4
WHEAT FLOUR FORTIFICATION

4.1 Background

The high prevalence of Indonesian population's anemia strives for government and all of people hand in hand to eliminate such serious problem. The interventions of micronutrient deficiencies in Indonesia are still highly depending on micronutrient supplementation. However, in the area where the primarily health care staff or the village-integrated post (Posyandu) is limited, the distribution of micronutrient supplement to the target population becomes a problem.

In overseas, fortifying common foods with micronutrients has proved one of the most sustainable and cost-effectiveness strategies for delivering key micronutrients to large populations. For eliminating anemia, this experience is being implemented in Indonesia, i.e. by fortification on wheat flour with iron, zinc, vitamin B1 and B2, and folic acid since 2001. The fortificant is supported by CIDA through UNICEF for two years. In Indonesia, wheat flour is considered as an effective food to be fortified for several reasons: 1) the most popular staple food next to rice, about 75% of population consume wheat flour product with the average intake about 40/cap/day, 2) easy to monitor: only 5 flour mills, 3) technically feasible, 4) relatively low cost of fortification, 5) minimal effect on quality. However, the implementation of wheat flour fortification still needs to be strengthened by many supporting aspects to achieve target of vulnerable groups.

Since the policy regulation on mandatory wheat flour fortification is not properly implemented in term of monitoring and law enforcement for imported wheat flour, and the price of imported wheat flour is cheaper than the fortified one, the subsidy for fortificant need to be continued for the next 3 years. At the same time, the industry has to spend much money for the social marketing cost to increase awareness off consumer on the benefit of fortified wheat flour.

To succeed elimination of micronutrient problem, the existed wheat flour fortification implementation needs to be strengthened by several aspects, such as:

management, legislation, research, technology, social marketing, and monitoring-evaluation.

4.2 Objective

The program is aimed at strengthening the existing program of wheat flour fortification to reduce anemia prevalence of children and pregnant women to be 30% of population as stated in Food and Nutrition Action Plan- 2005.

4.3 Program

Programs that considered can be strengthened on wheat flour fortification program are legislation and regulation; research; technology, training and commercialization; quality assurance; social marketing; and monitoring and evaluation.

4.3.1 Industrial Implementation

In 1998, Indonesian government secured a grant of US$ 850,000 from USAID through UNICEF to purchase 340 MT of iron premix. Besides, in August 2001, Indonesia government secured a donation again of 232.44 MT premix from CIDA through UNICEF for all flour mills in Indonesia. The donation could be used only for two years.

To continue in the following years, and to be competitive in the AFTA (Asian Free Trade Area), the fortificants for the flour mills-industries need to be subsidized for about three years by government. Another reason is the law enforcement for bending the imported-non fortified wheat flour is still not adequate, that makes the imported non-fortified wheat flour available and cheaper than domestic one in several areas in Indonesia, and the rest of seven years program, the fortificants must be procured by industries sector themselves. The activities of this program include: fortificant subsidy and fortificant procurement.

The quality assurance (QA) is a must for each industry include mandatory fortification of wheat flour. The QA will protect consumers and producers from unsafe and low quality product; and to ensure that the manufacture follow the technical specification.

4.3.2 Regulation, Food Control and Management

Implementation of wheat flour fortification is regulated by three government regulations, i.e. 632/MENKES/SK/VI/1998 about “Wheat flour fortification”, June 16th, 1998, 153/MPP/Kep/5/2001 jo 323/MPP/Kep/11/2001 about mandatory Flour Standard (SNI) on all wheat flour traded in Indonesia, 03/DIRJEN-IKAH/SK/II/2002 about standard operating procedure of mandatory SNI. The existed regulations are still weak and need to be strengthened to control implementation of wheat flour fortification and avoid violation of non-fortified wheat flour production.

To be well understood and widely adopted, the approved legislation and regulation should be advocated and socialized among relevant institutions, industries sectors, consumer organization, academia and consumer in general.

4.3.3 Nutrition Monitoring

Program monitoring and evaluation should be conducted to verify that fortified wheat flour is manufactured and marketed within the technical specifications, including micronutrient content, packing and labeling at production plants, market places and households.

4.3.4 Social Marketing

Social marketing of wheat flour fortification is needed to obtain the commitment from the national and local policy makers for supporting food fortification program, to obtain the commitment from NGOs for socializing wheat flour fortification program, to bring the participation and commitment from the industrial sectors for food fortification program, and to socialize the community awareness and willingness to consume the fortified wheat flour. This program will also increase awareness of consumer that the imported wheat flour that unfortified is less useful compared to the fortified one.

4.3.5 Research

Since the mandatory fortification for wheat flour is just started, the monitoring system needs to be established based on an action research and monitoring. Besides, the effectiveness and efficacy studies, and the individual dietary intake of wheat flour among the special target group have not been done yet. Considering a large amount of fortificant for wheat flour industries is required for the program, a study on feasibility of fortificant industry in Indonesia is also required.

4.4 Time Table

Detailed of the programs and activities during the next ten years are summarized in the following table.

Table 4.1. Proposed Programs and Activities for Ten Years.

NO	PROGRAMS	1	2	3	4	5	6	7	8	9	10
	Industrial Implementation										
1	Depreciated Cost of Equipment	X	X	X	X	X	X	X	X	X	X
2	Premix Costs	X	X	X	X	X	X	X	X	X	X
3	Premix Duty	X	X	X	X	X	X	X	X	X	X
4	Administration and Overhead	X	X	X	X	X	X	X	X	X	X
5	Storage & Energy	X	X	X	X	X	X	X	X	X	X
6	Quality Assurance: Labor	X	X	X	X	X	X	X	X	X	X
7	Quality Assurance: Reagents and supplies	X	X	X	X	X	X	X	X	X	X
8	Quality Assurance: Outside Contracted Services	X	X	X	X	X	X	X	X	X	X
	Regulation, Food Control & Management										
1	Personnel Cost	X	X	X	X	X	X	X	X	X	X
2	Direct Cost of Inspection Operation	X	X	X	X	X	X	X	X	X	X
3	Analysis	X	X	X	X	X	X	X	X	X	X
4	Enforcement and Legal	X	X	X	X	X	X	X	X	X	X
5	Unforeseen Operational Cost	X	X	X	X	X	X	X	X	X	X
6	Personnel Start-up : Training	X		X			X				
7	Management office, administration, information system	X	X	X	X	X	X	X	X	X	X
8	Planning & coordinating for advocacy and socialization of the plan of action	X	X	X	X	X	X	X	X	X	X
9	Management & coordination meeting	X	X	X	X	X	X	X	X	X	X
10	Supplies, communication & repairing	X	X	X	X	X	X	X	X	X	X
	Nutrition Monitoring										
1	Personnel (salaries and indirect cost)	X	X	X	X	X	X	X	X	X	X
2	Transportation	X	X	X	X	X	X	X	X	X	X
3	Per diems (room and board)	X	X	X	X	X	X	X	X	X	X
4	Administrative	X	X	X	X	X	X	X	X	X	X
5	Shipping	X	X	X	X	X	X	X	X	X	X
6	Hb Field Collection materials (lancet, gloves, etc)	X	X	X	X	X	X	X	X	X	X
7	Zinc Protoporphyrin (.20 cents to addition)	X	X	X	X	X	X	X	X	X	X

NO	PROGRAMS	1	2	3	4	5	6	7	8	9	10
8	Venous Sampling: Serum Collection (for ferritin & transferin)	X	X	X	X	X	X	X	X	X	X
9	Venous Sampling: Cold Chain: Boxes, Dry Ice, etc.	X	X	X	X	X	X	X	X	X	X
10	Field Instrument: Hemocue (Hb)	X	X	X	X	X	X	X	X	X	X
11	Field Instrument: Hematofluorometer (Zinc Protoporphyrin)	X	X	X	X	X	X	X	X	X	X
12	Laboratory Test: Transferin Receptor	X	X	X	X	X	X	X	X	X	X
13	Laboratory Test: Serum Ferritin	X	X	X	X	X	X	X	X	X	X
14	Laboratory Test: Serum Folate	X	X	X	X	X	X	X	X	X	X
15	Study on individual dietary intake of wheat flour and its products (integrated in total dietary survey)		X								
	Social Marketing										
1	Material Costs										
	- District Radio - 2 Spots x 10 week x 350	X	X	X	X	X	X	X	X	X	X
	- Rural Community TV - 1 Station	X	X	X	X	X	X	X	X	X	X
2	District Training for Nutritional Officer										
	- Nutritional Officer Training Meetings (100 per District, 350 district)	X		X		X		X		X	
	- Trainers (Nutritional Officers)	X	X								
	- Provincial Trainings for Nutritional Officers	X	X								
	Research										
1	Efficacy study on wheat flour fortification (anemi, birth weight, child growth, morbidity)	X									
2	Study on developing a higher bioavailability of fortificants		X								
3	Feasibility study on fortificant industries		X								

4.5 Budget

Based on the programs and activities discussed above, the following budget is proposed for wheat flour fortification programs. Total budget for next ten years is US$ 25,447,860, range from US$ 2,309,390 to US$ 3,111,390 per year. The biggest allocation is for Industrial Implementation (fortificant), i.e. US$ 17,086,700 for ten years, which spread for US$ 1,708,670 for each year. While the smallest allocation is for research, i.e. about US$ 425,000, which carried out at the first and the second year.

Table 4.2. Proposed Budget of Wheat Flour Fortification for 10 Years (in thousand US$)

PROGRAM	Year										TOTAL
	1	2	3	4	5	6	7	8	9	10	
Industrial Implementation	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	1,708.67	**17,086.70**
Regulation, Food Control & Management	444.26	144.26	344.26	144.26	144.26	244.26	144.26	144.26	144.26	144.26	**2,042.58**
Nutrition Monitoring	6.46	406.46	6.46	6.46	6.46	6.46	6.46	6.46	6.46	6.46	**464.58**
Social Marketing	652.00	477.00	625.00	450.00	625.00	450.00	625.00	450.00	625.00	450.00	**5,429.00**
Research	300.00	125.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**425.00**
TOTAL	**3,111.39**	**2,861.39**	**2,684.39**	**2,309.39**	**2,484.39**	**2,409.39**	**2,484.39**	**2,309.39**	**2,484.39**	**2,309.39**	**25,447.86**

Most of budget will be allocated for government at he first three years of the payment, and for private sector in the last seven years (Figure 4.1 & 4.2). The budget can be gained from grant and loan of local and international agency/donor.

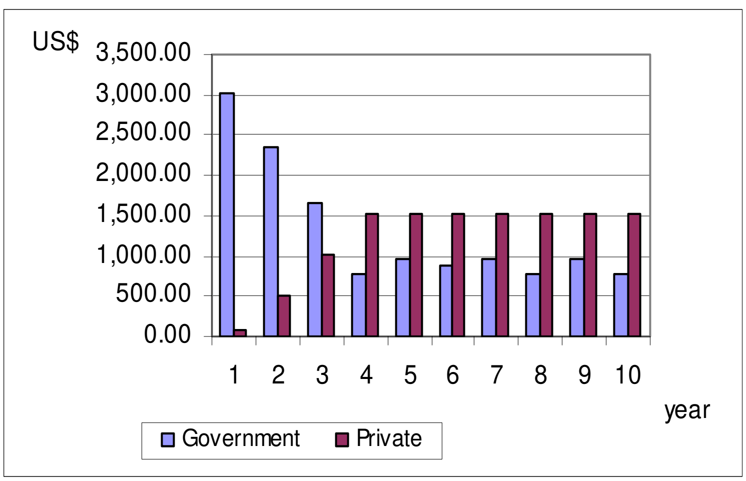

Figure 4.1. Share of Public and Private Cost within Ten Years Programs (US$)

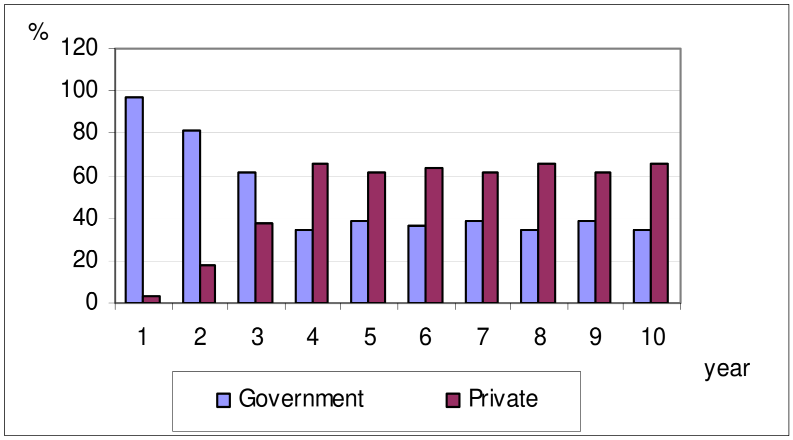

Figure 4.2. Share of Public and Private Cost within Ten Years Program (%)

CHAPTER 5
PALM OIL FORTIFICATION

5.1 Background

Despite of the success story of vitamin A eradication in Indonesia in early 90s, program to control vitamin A deficiency at present is still priority since about 50 % children suffering sub-clinical vitamin A deficiency before the crisis, and even getting worse after the crisis. Currently, the strategy adopted is limited to vitamin A supplementation and nutrition education. It is timely that Indonesia has to initiate assessment of food vehicles most appropriate to meet criteria for mandated vitamin A fortification to complement the existing program.

Cooking oil is one possible vehicle because cooking oil is widely and frequently consumed and centrally produced in Indonesia (there are only 6 big factories of 57 factories) and good solvent of vitamin A. About 90 % of the families consumed cooking oil at least weekly with average intake 21 g/cap/d, the intake is not too different between rural and urban families, and among economic groups. However, uptill now there is no data available on the intake of palm cooking oil among vurnerable gropus such as children and women.

5.2 Objective

The palm oil fortification program is intended to reduce vitamin A deficiency especially among children from 50.2% to 30% as stated in Food and Nutrition Action Plan- 2005.

5.3 Program

Programs that considered can promote palm oil fortification program are industrial implementation including pilot plant, fortificant and quality assurance; regulation, food control and management; nutrition monitoring; social marketing; and research.

5.3.1 Industrial Implementation

Production of fortified cooking palm oil has to be done by private sectors. The researches and pilot studies above have to socialize to industries. For this reason, government sectors have to conduct many trainings and courses on palm cooking oil fortification technology and quality assurance. Besides, private sector will need a technical assistance and transfer of technology on implementing this fortification. To make this fortification adopted by many industries, fortificant subsidy (incentive), seminar/orientation of equipment manufacturers on palm cooking oil fortification technology also needed. It is expected that fortification of palm cooking oil finally can be produced by both large and medium scale industries to make the fortified product consumed by larger population.

The activities of this program include: develop training manual on palm oil fortification technology and quality assurance, training and seminar of equipment manufacturers on palm oil fortification technology, technology assistance to palm oil producers/traders, technology transfer fortified palm oil, prototyping technology for palm oil fortification, fortification technology for mass production, fortificant subsidy, fortificant procurement, provide technical assistance and training for the expansion of palm oil fortification, establishment of medium scale industry

The quality assurance (QA) is a must for each industry include mandatory fortification of palm cooking oil (SNI). The QA will protect consumers and producers from unsafe and low quality product; and to ensure that the manufacture follow the technical specification. The activities of this program include: quality assurance data on fortified palm oil, develop QC guidelines/manual for fortified palm oil, development of manual of procedures for in-plan quality assurance for fortified foods, infrastructure development of laboratories for micronutrient analysis (equipment & human resources), laboratory quality assurance (accreditation) for service laboratories on vitamin A analysis

5.3.2 __Regulation, Food Control and management__

Before implementing palm cooking oil fortification, we need to generate equal perception on its advantage and urgency, and make a consensus on the following actions. The regulation maker (MOH, MOIT, and NADFC) of mandatory fortified palm cooking oil needs to make a mandatory regulation on fortified palm cooking oil (SNI) to avoid violation of non-fortified palm cooking oil production.

The activities of this program include: consultative meetings with the cooking oil stakeholders on fortified palm oil, advocacy activities to produce-mandatory regulation on fortified palm oil, formulate draft of mandatory regulation fortified palm oil (SNI), consultative meeting for preparing the implementation of the regulations, formulate other supporting regulation & legislation for implementing mandatory fortified palm oil, advocacy & socialization of supporting regulation for mandatory fortified palm oil, and law enforcement.

5.3.3 Nutrition Monitoring

To know whether or not the vitamin A fortification program runs properly as expected, it is required monitoring activities of the input, programs and evaluation of outcome. The monitoring will be done at industries by Department of Industry & Trade, at the market by National Agency for Drug and Food Control, and at the target group level by Ministry of Health. The evaluation includes the palm oil intake, vitamin A serum among children and women at productive age. The monitoring and evaluation for all fortification programs will be done integrated.

The program includes testing and revising protocol for monitoring and surveillance system for the fortified palm oil (integrated), conduct monitoring for fortified palm oil (market sampling, testing, plan visits, etc.), dietary and biomarker survey of fortified palm oil, evaluation of progress of fortified palm oil, developing information system of fortified palm oil, and dissemination of results to stakeholders. Indicators for monitoring the programs are shown in Appendix 5

5.3.4. Social Marketing

Since it is a new program, the main activities to succeed the program is regarding advocacy to policy makers and social marketing to increase public awareness. The activities of this program consist of development of IEC materials for print (poster, flyer, sticker) and broadcast (radio and TV), production of collateral materials (advocacy kit), print and broadcasting advertising materials, strengthening activities via symposiums, workshop, etc., conduct advocacy activities for stakeholders through launchings, signings, meetings, summits, etc, and media relation (radio, TV guests, interviews, press conference).

5.3.5 Research

Since palm cooking oil fortification is something new in Indonesia, before implementing this program, the government needs to conduct many researches and pilot studies further for feasibility studies and convincing the cooking oil industries. The studies include product development, technical feasibility, effectiveness and efficacy study, fortified palm oil consumption, monitoring and social marketing.

The activities of this program include: product development on fortified palm oil, technical feasibility study of palm oil fortification with vitamin A (handling, storage, packaging, cooking & stability), pilot plan of palm oil fortification with vitamin A, effectiveness study on the palm oil fortification with vitamin A, efficacy study on the palm oil fortification with vitamin A, developing field test kit for food fortification (vitamin A), individual food consumption & cooking behavior on palm oil (integrated in total dietary survey), pilot study on the development of monitoring on availability and consumption of fortified foods (integrated), and study on social marketing model of palm oil fortification.

5.3 Time Table

Detailed of the palm oil fortification programs and activities during the next ten years are summarized in the following table.

Table 5.1. Proposed Programs and Activities of Palm Oil Fortification for Ten Years.

NO	Program	1	2	3	4	5	6	7	8	9	10
1	Industrial Implementation										
1	Capital Expenses	X	X	X							
2	Maintenance	X	X	X	X	X	X	X	X	X	X
3	Energy cost	X	X	X	X	X	X	X	X	X	X
4	Premix	X	X	X	X	X	X	X	X	X	X
5	Training	X	X	X							
6	Chemicals and Glassware	X	X	X	X	X	X	X	X	X	X
7	Salary and Benefits	X	X	X	X	X	X	X	X	X	X
2	**Regulation, Food Control & Management**										
1	Employee Recurrent Annual Costs	X	X	X	X	X	X	X	X	X	X
2	Subcontracted Lab Test	X	X	X	X	X	X	X	X	X	X
3	Inspector Operations	X	X	X	X	X	X	X	X	X	X
4	Personnel Start-up : Training	X		X							
5	Enforcement Costs	X	X	X	X	X	X	X	X	X	X
6	Unforeseen Operational Cost	X	X	X	X	X	X	X	X	X	X
7	Management office, administration, information system	X	X	X	X	X	X	X	X	X	X
8	Planning & coordinating for advocacy and socialization of the plan of action	X	X	X	X	X	X	X	X	X	X

NO	Program	1	2	3	4	5	6	7	8	9	10
9	Management & coordination meeting	X	X	X	X	X	X	X	X	X	X
10	Supplies, communication & repairing	X	X	X	X	X	X	X	X	X	X
3	**Nutrition Monitoring**										
1	Personnel (salaries and indirect costs)	X	X	X	X	X	X	X	X	X	X
2	Transportation	X	X	X	X	X	X	X	X	X	X
3	Per diems (room and board)	X	X	X	X	X	X	X	X	X	X
4	Administrative	X	X	X	X	X	X	X	X	X	X
5	Shipping	X	X	X	X	X	X	X	X	X	X
6	Venous sampling: serum collection (for retinol)	X	X	X	X	X	X	X	X	X	X
7	Venous sampling: Cold Chain: Boxes, Dry Ice, etc	X	X	X	X	X	X	X	X	X	X
8	Laboratory Test: Serum Retinol	X	X	X	X	X	X	X	X	X	X
9	Children consumption		X						X		
4	**Social Marketing**										
1	Material Costs										
	- District Radio - 2 Spots x 10 week x 350	X	X	X	X	X	X	X	X	X	X
	- Rural Community TV - 1 Station	X	X	X	X	X	X	X	X	X	X
2	District Training for Nutritional Officer										
	- Nutritional Officer Training Meetings (100 per District, 350 district)	X		X		X		X		X	
	- Trainers (Nutritional Officers)	X	X								
	- Provincial Trainings for Nutritional Officers	X	X								
5	**Research**										
1	Integrated research (plant, distribution, family, blood)	X	X								

5.5 Budget

Based on the programs and activities discussed above, the following budget is proposed for palm oil fortification programs (Table 5.2). Total budget for next ten years is US$ 60,271,760 range from US$ 4,599,000 to US$ 5,085,000 per year. The biggest allocation is Industrial implementation, especially for fortificant.

The programs will be expected to begun at year 2006 since the palm cooking oil company request more detail evidence on the individual intake data of cooking oil and its efficacy and effectiveness. If the research shows the vitamin A fortification is not feasible, the program would not be continued.

Most of budget will be allocated for government at the first three years after starting the programs, and then the private will bone most of the cost

(Figure 5.1 & 5.2). The budget can be gained from grant and loan of local and international agency/donor.

Table 5.2. Proposed Budget of Palm Oil Fortification for 10 Years (in thousand US$)

PROGRAM	Year										TOTAL
	1	2	3	4	5	6	7	8	9	10	
Industrial Implementation	2,483.27	4,466.54	6,077.32	5,595.32	5,595.32	5,595.32	5,595.32	5,595.32	5,595.32	5,595.32	**52,194.32**
Regulation, Food Control & Management	388.83	138.83	213.83	138.83	138.83	138.83	138.83	138.83	138.83	138.83	**1,713.25**
Nutrition Monitoring	3.52	253.52	3.52	3.52	3.52	3.52	3.52	253.52	3.52	3.52	**535.18**
Social Marketing	652.00	477.00	625.00	450.00	625.00	450.00	625.00	450.00	625.00	450.00	**5,429.00**
Research	200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**400.00**
TOTAL	**3,727.61**	**5,535.88**	**6,919.66**	**6,187.66**	**6,362.66**	**6,187.66**	**6,362.66**	**6,437.66**	**6,362.66**	**6,187.66**	**60,271.76**

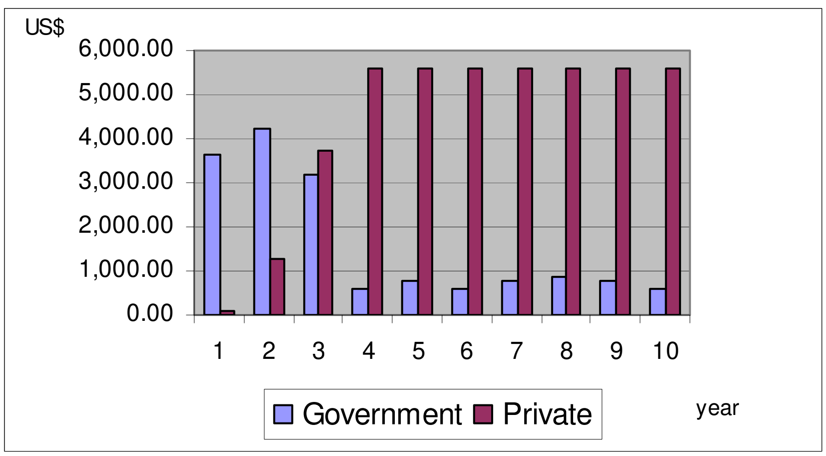

Figure 5.1. Share of Public and Private Cost within Ten Years Programs (US$)

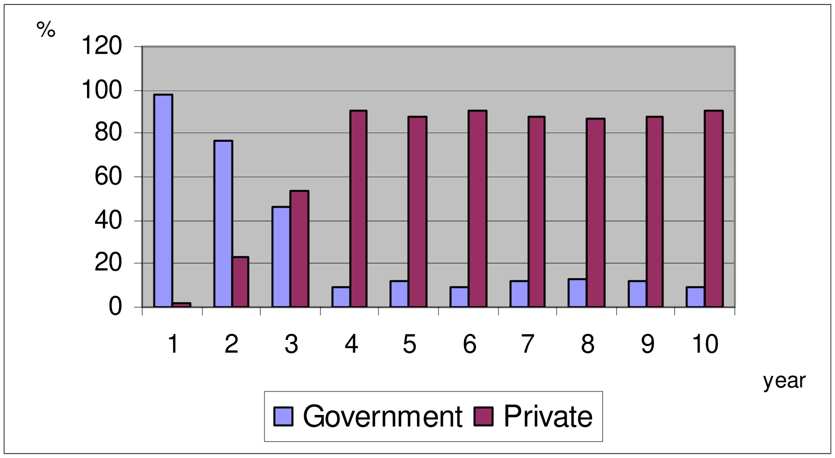

Figure 5.2. Share of Public and Private Cost within Ten Years Programs (%)

CHAPTER 6
COMPLEMENTARY FOOD FORTIFICATION

6.1 Background

Poor food consumption is a common determinant on the under nutrition among children. The problem of complementary feeding in Indonesia is mostly not met the nutritional adequacy for infant and young child. The prevalence of energy-protein deficiency is still high. Moreover, the scatter studies showed that almost 50-65 % of young child (6-12 months) suffering iron deficiency. Most of the complementary food is prepared at home by families using local food, which deficient in iron and several micronutrients. Type of common food eaten for infant and young child is porridge rice mixed with vegetables (spinach, carrot or others) and small amount of protein sources. In addition, the some of families at the level A, B, and C of the economic strata can purchase, even not often, the commercial complementary feeding for their young child.

There are about five companies in Indonesia producing complementary food. The Producers Association mentioned that it seems there is no problem dealing with the production or supply of commercial complementary food. However, the problem is an inadequate intake of complementary food because of the lack of accessibility and awareness. According to the Producer Association, even at the A and B strata, the average consumption of commercial complementary food is only 36 gram per capita per day; and at the C strata is only consume 14 gram per capita per day. This amount is still not adequate compared with the UNICEF recommendation, which is 50 grams per capita per day.

Most of the family at the level D (poor) and E (very poor) do not have an access on the commercial food. Most of them had a problem for providing the adequate food from both home-prepared and commercial complementary food. Infant and young child who suffer from energy-protein and micronutrient deficiencies are usually coming from this level at the community. During the economic crises, those families are getting “special market operation rice”, which price has a 50 % subsidy from the government. So far, there is no program on a cheaper complementary food and its social marketing for middle and lower income strata. THE MODEL

Improving the complementary feeding is one of the programs for eliminating malnutrition among infant and young child. In Indonesia, industry of commercial complementary food must follow a mandatory fortification of micronutrients, included iron, since 1995. This program has become promising since the government committed and stated clearly on the National Food and Nutrition Plan of Action (2000). Strong support on this program is also coming from the private sectors such as Complementary Food Producers and NGO's.

6.2. Objective

The objective of these programs is to reduce about one-third of the iron deficiency (from about 60 % to 40 %) among children age 6-12 months trough providing cheaper complementary food and improving family awareness for better infant feeding, as stated in the National Food and Nutrition Plan of Action (MOH, 2000).

6.3. Programs

The program of improving complementary feeding for infant and young child mainly covered of production (pilot plan and mass production) of cheaper complementary foods, developing an additional distribution system, and social marketing for family awareness.

Distribution system is a component program for selecting an appropriate the distribution line for the cheaper commercial complementary food. Since this food is addressed for the poor and very poor families, the distribution system should be working in an efficient and effective way. There are some alternatives for the distribution system such as private distribution system, and government distribution system (through the National Food Agency distribution system, and Health Office distribution system (Figure 6.1).

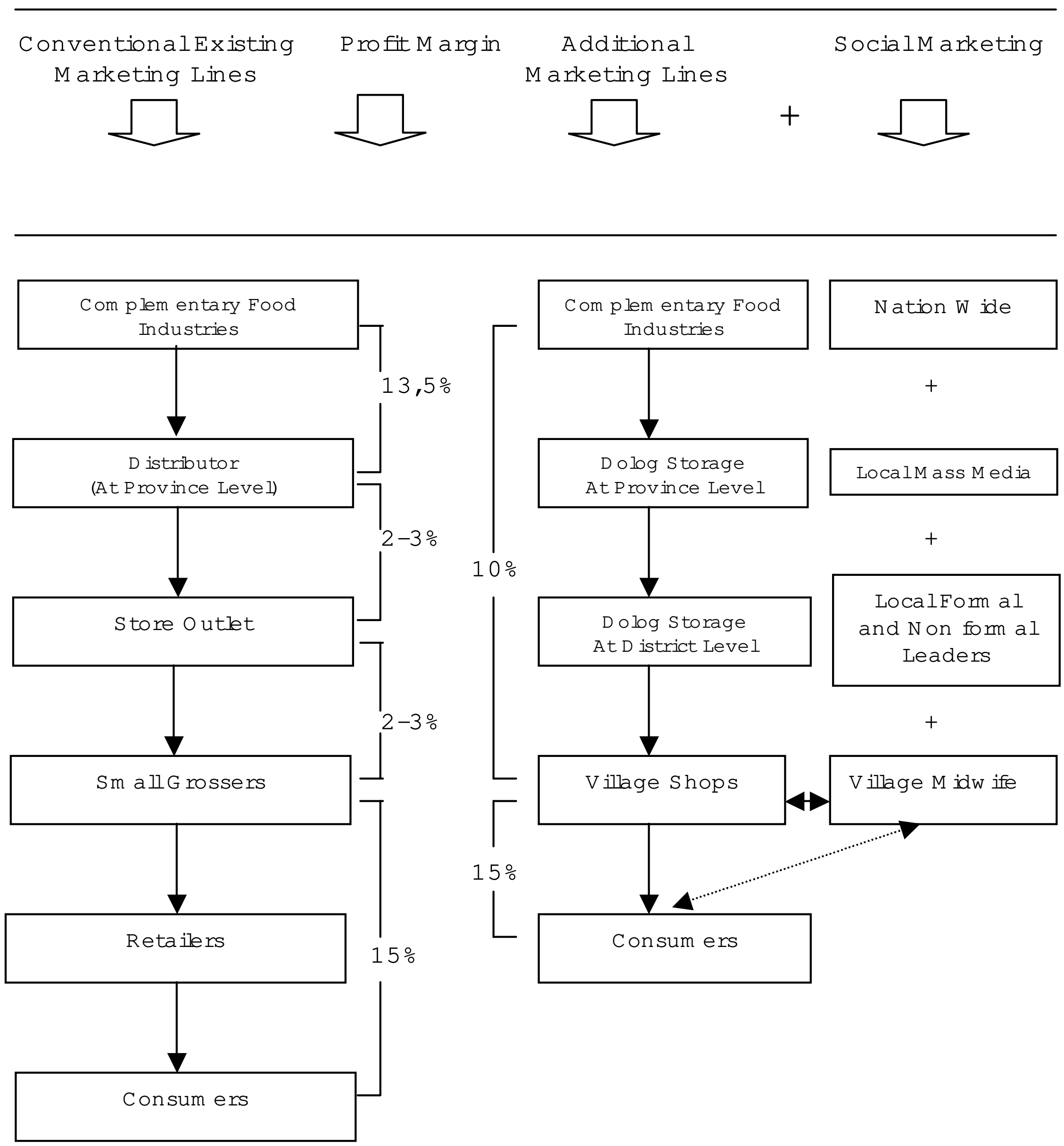

Figure 6.1. Conventional and Additional Marketing Lines of Complementary Foods

Note : Dolog = Logistics Agency at Province Level

6.3.1 Industrial Implementation

Technology and training is an important component for the program. The objective of this activity is establishment of production and distribution system. This activity is started in the year 2005 after finishing the pilot plan on production and distribution system. Most of the budget on this program will be allocated on this activity.

The quality assurance (QA) is an important component for guarantee the quality of complementary food. Since the laboratory equipment is very expensive, the modest internal QA is a one way for the medium scale of this industry. Collaboration with the national private company in the QA activities is an opportunity that should be developed. The external QA is not required the large budget since part of government laboratories have been established.

Besides, an operational research on the product development will be done for producing cheaper complementary food and searching an innovative additional distribution system, which cheaper then commercial system by private sectors. Preliminary study is needed for selecting this system, since there are some advantages and disadvantages for each system. Many factors influenced on the selection of complementary food distribution system depend on the region, existing system and culture. Output of this program is selecting distribution system for delivering the complementary food to the target efficiently. Technical feasibility such as handling, storage, and packaging are also components in this plan. Selecting area of the pilot plan is required the local government commitment to support this program.

6.3.2 Regulation, Food Control, and Management

Regulation for supporting the complementary program is required. Legislation needed is related to the implementing, monitoring, related institution on this program. Advocacy and socialization among the stakeholders are a part of the activities needed for implementing the program complementary food for low-income family.

6.3.3 Nutrition Monitoring

Program of nutrition monitoring should be conducted to verify that fortified complementary food is manufactured and marketed within the technical specifications, includes micronutrient content, packing and labeling at production plants, market places and households. Also to verify weather or not the fortified complementary foods was consumed by the target group, as expected.

6.3.4 Social Marketing

Family awareness is also an important component for success on this program. The IEC/social marketing program is intended to increase the awareness on the important of a quality of complementary food for better infant growth and development. This program also obtains the commitment from the private company for supporting activities. The government will focus on funding the preparation of IEC materials and kits and its broadcast at the early stage of the program, then private sector is expected involved in the producing and broadcasting the messages to ensure the sustainability of the program.

6.4 Time Table

Detailed of the programs and activities for the next ten years planning is summarized on the Table 6.1. Pilot plan is started on the year of 2005, and the product launching will expected on the year 2007.

Table 6.1. Proposed Programs and Activities for Ten Years.

NO	PROGRAMS	1	2	3	4	5	6	7	8	9	10
	Industrial Implementation										
1	Production	X	X	X	X	X	X	X	X	X	X
2	Advocacy	X									
3	Sample Revolving Fund	X									
4	Distribution Network Development	X									
5	Business Plan Development	X									
6	Product development on cheaper complementary food	X									
	Regulation, Food Control & Management										
1	Employee Recurrent Annual Cost	X	X	X	X	X	X	X	X	X	X
2	Subcontracted Lab Test	X	X	X	X	X	X	X	X	X	X
3	Inspector Operations	X	X	X	X	X	X	X	X	X	X
4	Personnel Start-up: Training	X									
5	Enforcement Costs	X	X	X	X	X	X	X	X	X	X
6	Unforeseen operational cost	X	X	X	X	X	X	X	X	X	X
7	Management office, administration, information system	X	X	X	X	X	X	X	X	X	X
8	Planning & coordinating for advocacy and	X	X	X	X	X	X	X	X	X	X

NO	PROGRAMS	1	2	3	4	5	6	7	8	9	10
	socialization of the plan of action										
9	Management & coordination meeting	X	X	X	X	X	X	X	X	X	X
10	Supplies, communication & repairing	X	X	X	X	X	X	X	X	X	X
	Nutrition Monitoring										
1	Personnel (salaries and indirect cost)	X	X	X	X	X	X	X	X	X	X
2	Transportation	X	X	X	X	X	X	X	X	X	X
3	Per diems (room and board)	X	X	X	X	X	X	X	X	X	X
4	Administrative	X	X	X	X	X	X	X	X	X	X
5	Shipping	X	X	X	X	X	X	X	X	X	X
6	Hb Field Collection materials (lancet, gloves, etc)	X	X	X	X	X	X	X	X	X	X
7	Zinc Protoporphyrin (.20 cents to addition)	X	X	X	X	X	X	X	X	X	X
10	Field Instrument: Hemocue (Hb)	X	X	X	X	X	X	X	X	X	X
11	Field Instrument: Hematofluorometer (Zinc Protoporphyrin)	X	X	X	X	X	X	X	X	X	X
12	Dietary intake survey		X						X		
	Social Marketing and Distribution										
1	Material Costs										
	- Store Point of Purchase/Poster	X	X	X	X	X	X	X	X	X	X
	- District Radio - 2 Spots x 10 wk x 256	X	X	X	X	X	X	X	X	X	X
	- Rural Community TV - 1 Station	X	X	X	X	X	X	X	X	X	X
	- Midwife Leave Behind	X	X	X	X	X	X	X	X	X	X
	- Midwife Educational Tool 3 over 10 years	X	X	X	X	X	X	X	X	X	X
2	District Trainings for Dolog/Health/Stores										
	- Midwife Training Meetings (256 district)	X		X					X		
	- Trainers (District Healt Officers-Midwife)	X	X								
	- Provincial Trainings Health and Dolog Officers (Midwife)	X	X								
	- Training District Health Supervisor	X	X								
3	Distribution	X	X	X	X	X	X	X	X	X	X

6.5 Budget

Total budget needed for this program is estimated USD 62,167,200 for ten years. The highest budget is required for the Industrial implementation activities (US$ $46,476,000). Share from the government is higher at the first year of program, meanwhile the private sectors will allocate higher budget since the second year of program. Summary of the budget is presented on Table 6.2.

Table 6.2. Proposed Budget of Complementary Food Fortification for 10 Years (in thousand US$)

PROGRAM	Year										TOTAL
	1	2	3	4	5	6	7	8	9	10	
Industrial Implementation	5,085.00	4,599.00	4,599.00	4,599.00	4,599.00	4,599.00	4,599.00	4,599.00	4,599.00	4,599.00	46,476.00

Regulation, Food Control & Management	72.07	47.07	47.07	47.07	47.07	47.07	47.07	47.07	47.07	47.07	495.74
Nutrition Monitoring	2.59	202.59	2.59	2.59	2.59	2.59	2.59	202.59	2.59	2.59	425.86
Social Marketing and Distribution	2,912.72	2,464.72	1,510.02	1,062.02	1,062.02	1,062.02	1,062.02	1,510.02	1,062.02	1,062.02	14,769.60
TOTAL	**8,072.38**	**7,313.38**	**6,158.68**	**5,710.68**	**5,710.68**	**5,710.68**	**5,710.68**	**6,358.68**	**5,710.68**	**5,710.68**	**62,167.20**

Most of budget for government will be allocated at the first three years of the payment, and for private sector in the whole ten years (Figure 6.2 & 6.3). This is reasonable because the fortification of this vehicle has been done and established by private sectors since several years ago. The budget can be gained from grant and loan of local and international agency/donor.

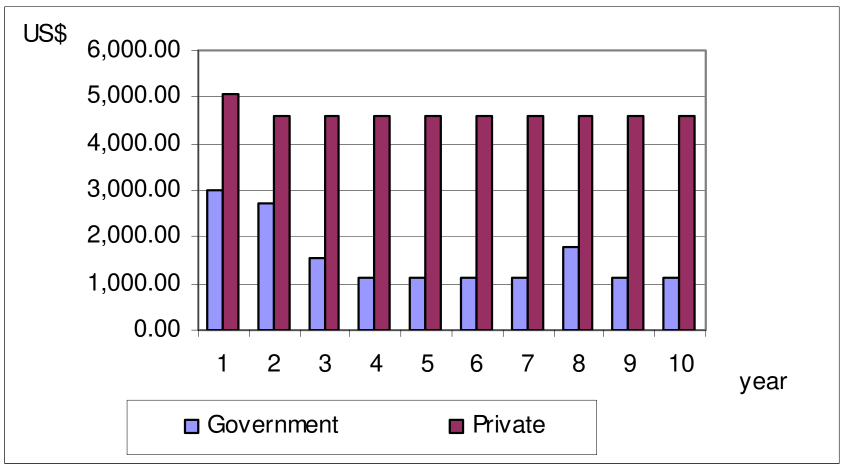

Figure 6.2. Share of Public and Private Cost within Ten Years Programs (US$)

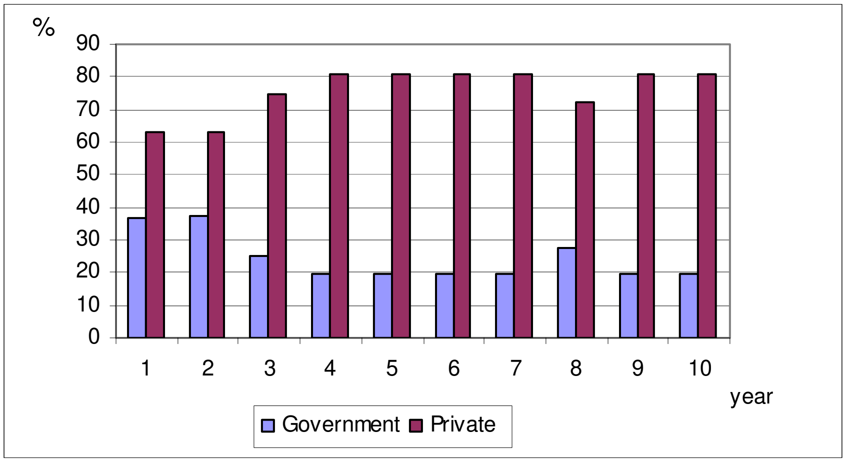

Figure 6.3. Share of Public and Private Cost within Ten Years Program (%)

CHAPTER 8

BENEFIT OF INVESTMENTS AND COMMITMENTS TO GOVERNMENT

8.1. Benefits and Return

Several common measures of the financial analysis, such as Benefits-Cost (B/C) analysis, Net Present Value (NPV), and Internal Rate of Return (IRR), are applied in this study. Applying these measures in the field of food fortification program is not easy since some impacts of food fortification are difficult to measure quantitatively in terms of economic. Therefore, some assumptions are made, as shown in Appendix 1.

The computer program of PROFILES spreadsheet, developed by ADB-Keystone Center Consultants, was used for financial analysis. The analysis was done based on additional cost and the additional benefits for each cost and benefits components. The components of the additional cost and benefits identified are presented in the following table (Table 8.1).

Table 8.1 Components of Cost and Benefits in the Financial Analysis of Food Fortification Programs.

No.	Nutrients to be fortified	Additional cost	Additional benefits
1.	Iron (for wheat flour)	Fortificant Equipment QA/QC Training Monitoring & surveillance	Improving cognitive Increasing productivity
2.	Vitamin A (for palm oil)	Fortificant Equipment QA/QC Training Monitoring & surveillance	Lives saved Health care cost saving
3.	Iodine (for salt)	n.a	n.a
4.	Folic acid (for wheat flour)	Fortificant Equipment QA/QC Training Monitoring &	Lives saved Health care cost saving

		surveillance	

The financial analysis was not applied to iodine fortification because no consensus on the method for calculating the cost and the financial benefit of iodine fortification had been made by the Regional Study Team and Consultant of ADB-Keystone Center. Therefore the computer program of PROFILES for that analysis was not available.

The results of the financial analysis for the iron, vitamin A and folic acid fortification showed that the benefit-cost ratio of the iron – folic acid and vitamin A is 10.7 and 7.0 respectively. While the Net Present Values of each of the fortification programs are US$ 135.526 and 214.529 million respectively with a very high the internal rate of return (Table 8.2). These evidences indicate that each of the fortification programs is very feasible financially.

Table 8.2. Results of the Financial Analysis of Food Fortification in Indonesia

No	Nutrients to be fortified (Vehicles)	B/C Ratio	NPV (10-yr) (USD 1000) r = 5%	IRR (10-yr) (%)
1.	Iron and folic acid (Wheat flour)	10.7	135,526	402
2.	Vitamin A (Palm cooking oil)	7.0	214,529	521
3.	Iron, folic acid & vitamin A (Wheat flour & palm cooking oil)	7.8	350,055	469
4.	Iodine (Salt)	n.a	n.a	n.a

r = discount rate

*) For the detail see appendix 1.

8.2 Risk Analysis

In addition to the financial analysis, a risk analysis (a short of non-financial risk) is also required for the long-term food fortification programs. A risk analysis is intended to identify the most probable threats to the organization (private and public institutions) and analyzing the related vulnerabilities of the organizations and the programs. The factors determine the vulnerabilities of the implementation of future food fortification programs include political and economical stability, public-private partnership, geographic and infrastructure, natural disasters, etc.

In terms of the future political and economic stability, the Indonesian government has just entered the reformation and decentralization era, which indicates better democracy and transparency. However, due to power sharing among many parties, the possibility of forming a dominant and strong government is less likely. Social conflict occurred and affected only in limited area. Although the crises occurred since July 1997, the economic growth is growing up and is now being stable around 3.5% (population growth 1.5%), and it was predicted to be better (3.5 to 6.5 %) during the next 10 years.

The implementation of the above mentioned food fortification programs mainly depend upon the commitment and participation of the food industries (private sectors), and the public-private partnership. Based on previous experiences in iodized salt and wheat flour fortification in Indonesia, seems that there is no significant risk in the public-private partnership. Even the National Fortification Commission under the Coordinating Ministry of Economic Affairs, is exist and actively play an important role in the stakeholders coordination.

In terms of natural disasters, such as flood, seismic activity and volcanic eruption very rarely occurred, they would affect relatively small area.

In summary, the non-financial risk is less likely to occur and influence the future food fortification programs. Even if the food fortification programs succeed, the above risks (except natural one) would decrease.

8.3 Commitments and Roles of Stakeholders

The commitment of the government in food fortification program is proven. The existing legislation on the roles of government in National Food Legislation, and mandatory regulation on iodized salt and fortified wheat flour, which discussed in Chapter 1, are examples of commitments of the government on food fortification programs in Indonesia. Besides, the existing coordination program managed by the National Fortification Commission is also indicating a strong multi-sectors commitment and partnership on food fortification.

The private sectors play an important and ultimate role in food fortification through producing fortified foods. This important role can only be conducted by the guidance and assistance of the responsible government institutions. The private sectors are also responsible for the development of the community where they operated their business including nutritional status of the community. It is because the more develop the community and the better the economic status means the better market for producers.

The food fortification programs formulated in the previous chapter is based on several workshops and meetings of the stakeholders of food fortification, from both private and public sectors, under the coordination of the National Fortification Commission (NFC). This also reflects the commitment, support and partnership since the beginning of the program planning. At this year, the civic sectors established the Indonesian Fortification Coalition (IFC), an NGO to be a partner of the government on food fortification programs.

Based on the stakeholder discussion, the roles of the stakeholders (public and private sectors) for the major programs designed are shown in Table 8.3. Detail leading sectors of each of the activities are presented in detail program of Appendix 2.

As done in previous and current fortification programs, the communication and coordination among the stakeholders is done through coordination meetings and electronic communication, which is managed by National Fortification Commission.

Table 8.3 Institution Roles in Food Fortification Programs

Programs	Leading institution	Institutions involved*)
Management and Operational	National Fortification Commission (NFC)	Ministry of industry and Trade (MOIT) Ministry of Health (MOH) Ministry of Marine and Fisheries (MOMF) Ministry of Agriculture (MOA) State Ministry of Research and Technology (SMORT)

Programs	Leading institution	Institutions involved*)
		State Ministry for Cooperative National Development Planning Agency (NDPA) National Agency for Drug and Food Control (NADFC) National Logistic Agency (NLA) National Standard Agency (NSA) Related Food Industries or private sectors (RFI) Related Food Producers Association (RPA) Universities an Research Center (UNIV/RC) National Fortification Coalition (NFC)
Legislation and Regulation	MOIT, Local Govt	NFC NSA NADFC NDPA NLA MOH MOMF (salt) RFI RPA UNIV/RC NFC
Research and Pilot Plan	UNIV/RC MOIT MOH RFI (depend on research topic)	NFC SMORT NADFC NDPA MOH MOMF (salt) RFI RPA UNIV/RC
Technology, Training & Commercialization	MOIT SMORT MOH Local Govt (depend on topic)	NFC SMORT NDPA NADFC UNIV/RC
Quality Assurance	RFI NADFC	RFI UNIV/RC
IEC/Social Marketing	MOIT MOH RFI Local Govt (depend on topic)	NADFC NDPA UNIV/RC NFC
Monitoring and Evaluation	MOH MOIT NADFC UNIV/RC (depend on topic)	UNIV/RC

*) see glossary

8.4 Measures to Monitor Impact of Food Fortification

Measures to monitor the impact of food fortification include identifying indicators and target groups, formulating manuals, training, implementing, and developing an information system. The monitoring indicators are focused on the impact of iron, folate, vitamin A and iodine fortification at the biomarkers level among vulnerable groups such as children under five, pregnant women, women at childbearing age, and school children (Table 8.4). Detail indicators to be monitor for each of the programs and activities are shown in Appendix 5.

The manual of the impact monitoring and evaluation will be developed by stakeholders under NFC and MOH coordination. While the training for monitoring program will be conducted by MOH in collaboration with responsible government institutions and Universities and research centers.

Table 8.4. Summary of Impact Indicators for Food Fortification Program

Nutrients to be fortified (Vehicles)	Group	Indicator
1. Iron (for wheat flour)	Children<5yr	• Hb • Ferritin • Cognitive score
	Pregnant women Women at Reproductive age	• Hb • Ferritin
2. Vitamin A (for palm oil)	Children <5 yr Women child bearing age	• Vit A serum
3. Iodine (for salt)	School children	• Enlargement of thyroid gland • Iodine urine • School performance
4. Folic acid (for wheat flour)	Pregnant women Women at reproductive age	Folate serum

8.5 Declarations, Statements and other Instruments of Agreement

As discussed in Sectionian government concerns and commits to improve nutrition and health status, including micronutrient status of the poor and vulnerable groups, as part of human resources and economic development strategies.

Following the Food Act (1996), which contains articles on mandatory food fortification and the roles of the government, the Indonesian government also ratified the World Food Summit and International Declaration of Nutrition, which emphasizes the elimination of micronutrient deficiency, especially IDD, IDA and VAD. In addition, in 2001, the government also signed the Manila Declaration on Food Fortification Programs for Eliminating Micronutrient Deficiency.

Besides the Indonesian government also established the Consumer Protection Act (2000), which plays an important role for law enforcement for better nutrition and health status of the people. In 2000, the Indonesian government formulated the National Food and Nutrition Plan of Action (NFNPA), which the food fortification is also one of the major programs in eliminating micronutrient deficiency. In terms of food standard and regulation, the Indonesia standard and regulation of food are mostly follow the standard and regulation of CODEX.

In summary, the government of Indonesia has a long standing commitment on food fortification as shown by the implementation of mandatory iodized salt, fortified complementary food, and fortified wheat flour. Besides, the government established the National Fortification Commission (NFC); and the non-government institution established the Indonesia Fortification Coalition (IFC), an NGO to be a partner of the government on food fortification programs.