



STUDY ON THE FORTIFICATION COSTING OF WHEAT FLOUR (ATTA) AND EDIBLE OIL IN PAKISTAN

USAID/GAIN PAKISTAN REGIONAL FOOD FORTIFICATION
PROJECT

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DOCUMENT INFORMATION

The Global Alliance for Improved Nutrition (GAIN) has prepared this study to determine the impact of fortification on the national total cost as well as retail price of wheat flour and edible oil produced by mills and oil refineries in Pakistan for sale nationally as well as on exports to Afghanistan. All facts, information, estimates and conclusions in this report are based on information provided by stakeholders. Figures used have been shared and discussed with key stakeholders in Pakistan.

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EXECUTIVE SUMMARY

Stunting, wasting and micronutrient malnutrition are endemic in Pakistan¹, caused by dietary deficiencies, poor maternal and child health and nutrition; high morbidity and low micronutrient content in the soil, especially iodine and zinc. Micronutrient deficiencies affect immunity against disease, growth, and mental development. While population iodine status improved in the decade to 2011 due to salt iodization, vitamin A status deteriorated and there was little or no improvement in other areas linked to micronutrient deficiency.

USAID has provided support, through GAIN, to work on food fortification in Pakistan to improve regional linkages and a focus on exports to Afghanistan. Partners in this process include the Pakistan Flour Millers Association (PFMA); the Pakistan Vanaspati Manufacturers Association (PVMA); provincial food authorities; the Ministry of National Health Services, Regulations & Coordination; the National Fortification Alliance (NFA), and the Ministry of Planning, Development and Reforms.

This costing model was developed to calculate the total national cost as well as to estimate the probable increment in the retail price of fortifying wheat flour and edible oil produced by large flour mills and edible oil refineries with essential micronutrients, as well as to determine export price of these products. The model will inform discussion on this issue as well as providing a basis upon which future adjustments to prices can be made. The analysis has determined that the cost of fortifying a 20kg bag of wheat flour (Atta) with Sodium Iron EDTA and Folic Acid (Iron 15 ppm, Folic Acid 1.0 ppm) using 150 gm premix addition rate, is 3.51 rupees (3.3 cents), just over 0.4 % of the current retail price. At this rate the cost of fortifying the whole annual production of wheat flour of large mills in Pakistan (which covers 50% of national demand) is expected to be in the range of 1.826 billion rupees (US\$ 17.391 million), and which is equivalent to 175.50 rupees (\$ 1.67/MT) per metric ton. Fortifying a 20kg bag of flour to the standard required for export to Afghanistan would cost 5 rupees (0.50 cents), or 0.60 % of current retail price. This is equivalent to 250 rupees (\$2.38) per metric ton. The difference in price as compared with the Pakistani fortified flour is because the fortification formula for Afghanistan also includes vitamin B12 and zinc.

The study calculated that the cost of fortifying cooking oil to Pakistan's standard is just 0.33 rupees (0.31 cents) per one-liter pack, or 0.18 % of current retail price. At this rate the cost of fortifying annual production of edible oil of large refineries in Pakistan (that cover 70% of the national demand) is expected to be in the range of 0.620 billion rupees (US\$ 5.905 million), and which is equivalent to 330 rupees (\$3.14) per one thousand liters of oil. To fortify oil to nutrition needs in Afghanistan, the cost would be 0.29 rupees (0.28 cents), or just under 0.16 % of current retail price. This is equivalent to 290 rupees (\$2.76) per one thousand liters of oil.

The study was designed to answer the following three questions:

The **first question** concerned fortification costs to be considered in relation to production, market availability and consumption of fortified wheat flour and edible oils in Pakistani markets, as well as for export to Afghanistan. This analysis shows these costs are minor for the consumer and the nation compared to the potential benefits to the health and well-being of the populations of both countries. Industry needs to be able to transfer the cost into the product price, and government needs to monitor to ensure that fortification is taking place. If retail price is increased to cover nominal fortification costs, effective communications strategies will be needed so consumers accept fortified foods over non-fortified alternatives. It is important to note that the poorest may still be sensitive to even slight changes in price, and that government may need to consider

¹ National Nutrition Survey, Pakistan, 2011

targeted supply side subsidies through stand alone or existing social protection mechanisms, as well as operational research on utilization by the poor. This is especially the case for fortified wheat flour.

On exports, the study identifies the cost implications of differences in fortification standards between Pakistan and Afghanistan, but the cost under both fortification formulations is still low.

The **second question** related to how fortification costs affect market dynamics for wheat flour and edible oils in both countries. Discussions with the private sector flagged cost as a significant impediment to fortification. This study shows that for both Pakistan and Afghanistan, the cost of fortification would have a nominal economic impact on retail price and household food costs. Government gives a rebate on taxes to encourage exports, which can be used as leverage to ensure margins for producers and importers are realistic.

The **third question** related to how differences in country-level wheat flour fortification standards impact fortification costs. With an agreed regional fortification standard for wheat flour and edible oil, fortification costs will become almost the same for wheat flour and edible oil produced in Pakistan and Afghanistan. Accordingly, fortification cost will not have any impact on the regional trade flows.

To support the financial needs of millers and refiners, the study proposes fortification should be a pass-through cost, especially where prices are fixed by provincial governments. It proposes a revolving fund to allow millers and refiners 3 - 6 months' credit to buy premix so fortification costs do not hinder cash flow.

The report points out that fortification of wheat flour is not mandatory in Pakistan. Without mandatory fortification, unfortified brands will always be available in the market unless extensive and prolonged behaviour change communications allow consumers to understand the benefits of fortified flour, or pricing strategies allow a difference between the fortified and unfortified versions. Despite knowing the benefits of fortified foods, consumers may still favour the lower-priced product, so the option of a compulsory program is preferable. For the edible oil/ghee market the situation would be entirely different because mandatory legislation for oil/ghee fortification in Pakistan means that only fortified oil/ghee brands are available.

BACKGROUND

As early as 1965, Pakistan legislated for mandatory fortification of edible oil/ghee with vitamin A. A later amendment made salt iodization mandatory in some provinces. In 2003, a National Plan of Action for the Control of Micronutrient Deficiencies highlighted food fortification as an important strategy. But the 18th Amendment to Pakistan's constitution in 2010 gave provinces more autonomy and led to the abolition of several government ministries, including the Ministry of Health (MoH).

The 2011 National Nutrition Survey revealed that stunting, wasting and the micronutrient malnutrition were endemic in Pakistan. Cross-cutting strategies and a multi-sectoral approach were needed to address the situation. At the request of the federal government, provinces developed nutrition policy guidance notes, and are completing strategies and operational plans. Pakistan joined the global Scaling Up Nutrition (SUN) movement in 2013, uniting the country in a collective effort to improve nutrition.

GAIN began supporting the Pakistan National Wheat Flour Fortification Project in 2005 with the Ministry of Health (MoH), working with the Pakistan Flour Millers Association (PFMA) to support fortification of 1.7 million MT of Atta flour with iron and folic acid to February 2010, introducing fortification to 125 mills and reaching 15 million people. Industry partners purchased fortification equipment, but expected the project to support the provision of vitamin and mineral premix. Movement to address this roadblock was stalled in 2010 with the dissolution of the MoH. Now, provincial governments are seeking to learn from the problems of the past – the lack of legislation for mandatory wheat flour fortification, and the fact that fortification costs cannot be recovered by producers because wheat flour pricing is controlled by the government.

With the increasing attention that large scale food fortification is now receiving from federal and provincial governments and the fact that the cost of fortification has been a major barrier to engaging the private sector, this report attempts to determine the cost of fortification and its implication for policies and programmatic interventions and presents the wheat flour fortification costing model which has been developed in consultation with PFD, PFA and PFMA.

WHEAT AND EDIBLE OIL FORTIFICATION COST IMPACT ANALYSIS

This study analyzes the cost of fortification of wheat flour and edible oil to regional standards (set out below), assesses the impact of this cost on creating sustainable fortification programs for Pakistan and Afghanistan, and provides recommendations on policy and pricing strategies for in-country and cross-border trade.

Calculations deal only with the cost of fortifying wheat flour and edible oil produced by large mills (50% of the national demand) and edible oil refineries (70% of the national demand). It includes a model to determine fortification cost per metric ton as well as for 1, 5, or 20kg bags of wheat flour; and per 1000 liters of oil, as well as for 1, 3, and 5-liter containers of edible oil, which are the standard packaging presentations sold in the market. The model provides an independent framework to determine fortification cost, and was developed following discussions with stakeholders as set out in Annex 1. Annex 2 sets out different fortification scenarios and the structure of the costing model.

FORTIFICATION STANDARDS WHICH WERE CONSIDERED AS PART OF THESE CALCULATIONS FOR COMPARATIVE ANALYSIS

Wheat Flour

- i. As per Pakistan recommended standard – SODIUM IRON EDTA and Folic Acid (Iron 15 ppm, Folic Acid 1.0 ppm) 150 gm premix addition rate
- ii. As per Pakistan recommended standard – SODIUM IRON EDTA and Folic Acid (Iron 20 ppm, Folic Acid 1.0 ppm)– at 200 gm/mt premix addition rate
- iii. As per ANSA Standard – (Iron 15 ppm, Folic Acid 1.0 ppm, B12 – 0.008 ppm & Zinc 50 ppm) at 22.5 gm premix addition rate
- iv. As per Regional Recom. For Low Extraction – (Iron 15 ppm, Zinc 30 ppm, Folic Acid 1 ppm, Vitamin B12 0.008, Vitamin B1 2 ppm, Vitamin B2 3 ppm, Vitamin B3 10 ppm) at 20 gm premix addition rate
- v. As per Regional Recom. For High Extraction – Iron 15 ppm, Zinc 30 ppm, Folic Acid 1 ppm, Vitamin B12 0.008) at 20 gm premix addition rate
- vi. Average of all the above.

Edible Oil

- vii. As per PSQCA standard – Vitamin A – at 33 grams per ton of edible oil/ghee
- viii. As per New PSQCA Recom. – Vitamin A & D - at 33 grams per ton of edible oil/ghee
- ix. As per ANSA Standard – (Vitamin A as 30,000IU and Vitamin – D 3000IU) at 30 grams per ton of edible oil/ghee

WHEAT FLOUR (ATTA)

COSTING

The cost of fortifying wheat flour to the recommended standard for Pakistan is 0.18 rupees (0.17 cents) per kg, 0.41 % of the current retail price of 42.5 rupees (40 cents) per kg. The current retail price of 850 rupees (US\$8.1) per 20 kg bag has been used for this purpose. At this rate the cost of fortifying the entire annual production of wheat flour of large flour mills in Pakistan (50% of national demand) is expected to be in the range of 1.826 billion rupees (US\$ 17.391 million), which is equivalent to 175.50 rupees (\$1.67) per metric ton. Two years ago, the cost to fortify a ton of wheat flour with iron EDTA and folic acid at 150 grams was 0.32 rupees (0.30 cents) per kg, 0.81% of the current retail price. The reduction is mainly due to full tax exemption provided by government in its 2016 Finance Bill. Previously, import and supply of fortification premix was subject to 72% custom tariff and taxes. The study looked at fortifying flour under the new regional recommendations (see Table 1), and estimates that fortification would represent 0.55 % of the retail price. The impact of fortification on monthly family food bills will in the range of an increase of 10.42 rupees (10 cents) for a family of 6 members and 20.84 rupees (20 cents) per month for a family of 12, just 0.040% and 0.079% of family income respectively². To fortify to Afghan national standard the cost is 0.25 rupees (0.24 cents) per kg, 0.60% of the current retail price of 42.5 rupees (40 cents) per kg. This is equivalent to 250 rupees (\$2.38) per metric ton. The difference in price as compared with the Pakistani fortified flour is because the fortification formula for Afghanistan also includes vitamin B12 and zinc.

The cost of fortifying a 20kg bag of wheat flour (Atta) is 3.5 rupees (3.4 cents) at the current wheat flour fortification standard recommended in Pakistan (See Table 1). If wheat flour exported to Afghanistan is fortified as per Afghan National Standard Authority (ANSA), cost of fortification is 5.17 rupees (4.9 cents) per 20kg bag. This cost is equivalent to 258.5 rupees (\$2.46) per metric ton. Accordingly, fortification cost is 0.61% of the current retail price of wheat flour (Atta). The current retail price of 850 rupees (US\$8.1) per 20 kg bag has been used for this purpose.

MARKET

The Ministry of Food Security & Research and the Provincial food departments are responsible for ensuring food security for wheat in Pakistan. A minimum supply of wheat is stocked by the provinces and distributed as per need, providing around 30% to 35% of the total wheat consumed in Pakistan to flour millers under contracts which allow it to be sold only at the price they have determined. Surplus of wheat when available is allocated primarily for exports to other countries, including Afghanistan. Wheat not supplied by provincial food departments is not subject to direct price control. But with fixed-price flour available, competition prevents millers from selling at a significantly higher price. Millers do charge more for specialty varieties of wheat flour. Thus, the overall fortification cost will be less for varieties with higher retail prices.

The profit margin for wheat flour millers remains between 2% to 8% of retail price. An analysis performed by GAIN for Pakistan, Afghanistan and Kazakhstan shows an average profit margin in the range of 5% of retail price. Millers process flour even at very low margins to keep production lines running so they can profit when the price of wheat is low in harvesting season. Profits generated through use of extraction from wheat used for production of other wheat based products such as Maida etc. are not included in the calculation.

² Current per month per capita income is Rs. 13,125 and official minimum wage is Rs. 12,500. Assuming two family members are earning, average family income would Rs. 26,250.

Price is an important constraint to wheat flour fortification in Pakistan. As the millers' profit margin is low, even a small price increase could affect it significantly, which is why the industry is reluctant to accept fortification if they can't transfer the cost into the retail price of the product because of government price controls on subsidized wheat. The government must consider either allowing fortification cost as pass through cost as part of their wheat flour retail price determination, or assume the costs associated with fortification. In addition, the government needs to establish a strong, reliable monitoring and enforcement system, to ensure that millers who don't comply don't benefit unfairly.

Wheat flour production in Pakistan is about 19.46 million tons, out of which around 10.4 million tons is produced by large flour mills³. Retail price of wheat flour produced by large mills between 35 and 45 rupees (33 cents and 43 cents) per kilogram over a 12-month period, depending on supply and demand. At the maximum retail price of 45 rupees (43 cents) per kilogram, the wheat market value is 468.3 billion rupees, or US\$4.45 billion a year. Even at the minimum market retail price of 35 rupees per kg, the market's value is over 364 billion rupees per year, or US\$3.47 billion.

ANALYSIS

Premix accounts for 2.7 rupees (3 cents) of the total fortification cost per 20 kg bag. Premix is not available in country and is imported. Calculations include import cost, local tariffs and taxes, distribution and storage. Cost is sensitive to currency exchange fluctuation. Duties and taxes are zero since the government exempted import of premix from taxes and duties in 2016. Micro feeder related expenses contribute 0.3 rupees (0.28 cents) to the cost of fortifying a per 20 kg bag. They are mainly imported since the quality of locally made micro feeders is not certified. Quality assurance contributes 0.50 rupees (0.48 cents) to the total fortification cost of a 20kg bag and includes laboratory testing of samples (3% of total fortification cost), factory (mill) spot testing on regular basis (4% of total fortification cost), staff salary (6% of total fortification cost) and staff overhead at 20% of the direct staff cost attributable to fortification quality testing at flour mill level (1% of total fortification cost).

Analysis therefore shows that the cost of fortification is nominal in terms of current retail price, fortification costs passed on to consumers, average family income in Pakistan and average profit margins of wheat flour millers. Recent tax exemption legislation has substantially reduced the cost of fortification. The study concludes that the impact of fortification cost on the retail price of wheat flour is insignificant and should not be considered a social and reputational risk for the government. The cost of fortification of wheat flour should not be viewed as an impediment to fortification.

OTHER CONSIDERATIONS

Wheat flour is currently not required to be labeled. Only a few high-end wheat flour brands display the nutritional value of their products, and the author has not seen evidence to show that the product complies with the nutritional claims made on the label.

³ GAIN Pakistan, wheat and flour supply chain study,

EDIBLE OIL

COSTING

The cost of fortifying oil with vitamin A to Pakistan standards is 0.33 rupees (0.33 cents) per liter, or 0.18 % of current retail price. At this rate the cost of fortifying the whole annual production of edible oil of large edible oil refineries in Pakistan is expected to be in the range of 0.620 billion rupees (US\$ 5.905 million), which is equivalent to 330 rupees (\$3.10) per one thousand liters of oil. The cost of fortifying oil with vitamin A and D to Afghan standards is 0.29 rupees (0.28 cents) per liter, or 0.16 % of retail price. This is equivalent to 290 rupees (\$2.80) per one thousand liters of oil. The cost for per liter of oil as per Afghanistan standard is low since the price quoted for premix for vitamin A and D is comparatively lower than the price of premix required for fortification as per Pakistan Standards. Currently, edible oil in Pakistan is required to be fortified with vitamin A, and fortification with vitamin D has been included in the recommended revised standards for edible oil/ghee fortification. Key elements used to calculate fortification cost include premix, equipment, and quality assurance. Details are set out in Annex 2. The impact of oil fortification on monthly family income is about 0.54 rupees (0.52 cents) for a family of 6, 0.002 % of the family income. For a household of 12, the increase in spending would be about 1.08 rupees (1.03 cents) a month, or 0.004 per cent of family income⁴.

MARKET

Retail price of edible oil, which is partially regulated by provincial governments in Pakistan, varies between 130 to 180 rupees (US\$ 1.24 to US\$ 1.71) over a 12-month period. At maximum retail price, the market is worth 338 billion rupees a year, or US\$3.2 billion. At minimum retail price, it is worth 244 billion rupees a year, or US\$2.3 billion. Market size is in the region of 2.7 million tons, out of which 1.9 million tons is produced by oil refineries.

ANALYSIS

Premix contributes 0.30 rupees (0.29 cents) of the total fortification cost per 1-liter pack. It is not available in country and is imported. Calculations include import cost, local tariffs and taxes, distribution and storage. Cost is sensitive to currency exchange fluctuation. Duties and taxes are zero since the government exempted import of premix from all taxes and duties in 2016. Micro feeder related expenses contribute 0.0058 rupees (0.01 cents) to the cost of fortifying a 1-liter pack. They are mainly imported since the quality of locally manufactured micro feeders is not certified. Quality assurance contributes 0.0189 rupees (0.02 cents) to the total fortification cost per 1liter pack and includes regular factory (mill) testing on regular basis, staff salary and overhead.

Analysis shows the cost of fortification is nominal in terms of current retail price, fortification costs passed on to consumers, and average family income. Recent tax exemption legislation has substantially reduced cost. The study concludes that the impact of fortification cost on the retail price of edible oil is insignificant and should not be considered a social and reputational risk for the government. The cost of fortification of wheat flour and edible oil should therefore not be viewed as an impediment to fortification.

OTHER CONSIDERATIONS

There were some private indications that price competition in the edible oil market is so intense that fortification cost has a significant impact on refineries' profit margins. But it is now clear that the overall cost of fortification is so minimal that it is not an impediment to compliance with fortification standards.

⁴Current per month per capita income is Rs. 13,125 and official minimum wage is Rs. 12,500. Assuming two family members are earning, average family income would Rs. 26,250.

CONCLUSIONS

It is clear from this analysis that the cost of fortifying wheat flour and edible oil with the essential micronutrients needed for life, learning and health is minimal. This knowledge, together with other important outcomes of the study, can help move nutrition policy forward in Pakistan, informing decisions in relation to pricing, legislation, and the issue of premix pass-through costs.

While the study makes it clear that the cost of fortification should not be an impediment to progress, there are other factors to consider. Without mandatory fortification of wheat flour, the availability of fortified wheat flour in the market may not have the desired effect. Advocacy would be needed to create strong demand for the product, and financial incentives for producers and consumers – from government or partners - in the nascent stages of a fortification product would also be instrumental in creating demand. Pricing policies both within Pakistan and Afghanistan (where there is no price regulation on fortified products), as well as trade policies between the two countries, need to be considered.

Equipped with the findings of this study, the time has come to advocate with the Government of Afghanistan and its traders and trade organizations to require imports of edible oil from Pakistan and elsewhere to be fortified.

The study also shows that as the cost of fortification is nominal, it might be passed on to the consumer to make the fortification process sustainable, but it requires changes in some national policies associated to price regulation. As stated earlier, financial incentives such as support for making fortification a pass-through cost, may be effective in moving the program forward, especially where prices are fixed by provincial governments. A revolving fund mechanism to allow millers and refiners 3 to 6 months' credit to buy premix so that fortification costs do not hinder their cash flow, would create an enabling environment and prevent the problems that arose during previous national food fortification efforts. However, price control may also be needed to prevent the private sector from increasing retail prices beyond what is needed for fortification.

Beyond that, there are issues related to branding and to quality control and assurance. Currently, while oil and ghee are branded as fortified in Pakistan, compliance and fortifying to appropriate standards are issues that need to be addressed. Investment in the infrastructure needed to support testing of fortified products both in factories and on the shelves, will be a vital component of fortification policy.

RECOMMENDATIONS ON POLICY AND PRICING STRATEGY FOR WHEAT FLOUR AND EDIBLE OIL

This study shows there is a need to identify the issues which food fortification policies must consider. This includes clarifying that cost is not an impediment to progress as it can be passed on to the consumer to make the process sustainable. The private sector should not be allowed to increase retail prices in the name of fortification cost above their actual costs for fortification. Investment in quality assurance processes should be made both in the private and public sector to enhance compliance with wheat flour and edible oil standards, and product nutrition labeling should be clearly defined and designed so that design so that retail level testing can be effectively performed and reported.

TABLE 1: WHEAT FLOUR COMPARATIVE ANALYSIS

		Premix	MicroFeeder	Quality Assurance	Total
Pakistan Recommended Standard - USD	15 ppm	0.0013	0.0001	0.0002	0.0017
	20 ppm	0.0017	0.0001	0.0002	0.0021
Pakistan Recommended Standard - Rupees	15 ppm	0.1351	0.0151	0.0252	0.1754
	20 ppm	0.1802	0.0151	0.0252	0.2205
Pakistan Recommended Standard - % of Retail Price	15 ppm				0.41%
	20 ppm				0.52%
ANSA Standard - USD	20 ppm	0.0021	0.0001	0.0002	0.0025
ANSA Standard - Rupees	20 ppm	0.2183	0.0151	0.0252	0.2586
ANSA Standard - % of Retail Price	20 ppm				0.61%
Regional Recom. Standard - Low Extraction Rate - USD	20 ppm	0.0020	0.0001	0.0002	0.0024
Regional Recom. Standard - Low Extraction Rate - Rupees	20 ppm	0.2131	0.0151	0.0252	0.2534
Regional Recom. Standard - Low Extraction Rate - % of Retail Price	20 ppm				0.60%
Regional Recom. Standard - Low Extraction Rate - USD	20 ppm	0.0018	0.0001	0.0002	0.0022
Regional Recom. Standard - Low Extraction Rate - Rupees	20 ppm	0.1916	0.0151	0.0252	0.2318
Regional Recom. Standard - Low Extraction Rate - % of Retail Price	20 ppm				0.55%
Average Fortification Cost - % of Retail Price	20 ppm				0.54%

TABLE 2: EDIBLE OIL/GHEE COMPARATIVE ANALYSIS

		Premix	MicroFeeder	Quality	Total
Pakistan - PSQCA Standard - USD	33 ppm	0.0029	0.0001	0.0002	0.0031
Pakistan - PSQCA Standard - Rupees	33 ppm	0.3031	0.0058	0.0189	0.3278
Pakistan - PSQCA Standard - % of Retail Price	33 ppm				0.18%
Pakistan - PSQCA Recom. Vitamin A & D - USD	33 ppm	0.0030	0.0001	0.0002	0.0032
Pakistan - PSQCA Recom. Vitamin A & D - Rupees	33 ppm	0.3131	0.0058	0.0189	0.3378
Pakistan PSQCA Recom. Vitamin A & D - % of Retail Price	33 ppm				0.19%
ANSA Standard - USD	30 ppm	0.0026	0.0001	0.0002	0.0028
ANSA Standard - Rupees	30 ppm	0.2682	0.0058	0.0189	0.2929
ANSA Standard - % of Retail Price	30 ppm				0.16%
Average Fortification Cost - % of Retail Price	20 ppm				0.18%

Table 3: Economic impact of fortification to consumers

	Wheat Flour		
	As per Pakistan Recom. Standards	As per ANSA Standards	% to Average Monthly Family Income
	Rupees		
Household of 6	10.42	15.36	0.040%
Household of 8	13.89	20.48	0.053%
Household of 10	17.37	25.60	0.066%
Household of 12	20.84	30.72	0.079%
	Edible Oil		
	As per PSQCA Standards	As per ANSA Standards	% to Average Monthly Family Income
	Rupees		
Household of 6	0.54	0.48	0.002%
Household of 8	0.72	0.65	0.003%
Household of 10	0.90	0.81	0.003%
Household of 12	1.08	0.97	0.004%

ANNEX 1: CONSULTATIONS

Documents Used

Afghanistan Wheat Flour Fortification Standard issued by ANSA
Afghanistan Oil and Ghee Fortification Standard issued by ANSA
Pakistan Wheat Flour Fortification Standard Recommended by National Fortification Alliance
Edible Oil Standard issued by Pakistan Standards & Quality Control Authority (PSQCA)
Central Asian Regional Harmonization Wheat Flour Fortification Standard
Current premix per kg import rates as provided by GAIN Premix Fund as of November 2016
Legislation and Policy Analysis of Central Asian Countries and Pakistan related to wheat flour fortification 2015
Finance Bill - Government of Pakistan 2016

Persons Consulted

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Mr. Khawaja Masoud, National Fortification Alliance, Pakistan
Mr. Munir Hussain, Secretary, Pakistan Flour Mills Association – PFMA
Mr. Asim Raza Ahmed, Member Executive Committee, PFMA
Mr. Waseem Irshad Butt, Genera Pharmaceuticals, Pakistan
Acting Secretary, Food Department, Government of Punjab
Dr. Sakhawat Ali, Director General, PCSIR, Lahore
Dr. Shahzad Afzal Deputy DG of Pakistan Standard Quality Control Authority (PSQCA)
Mr. Naeem Butt, Chairman Pakistan Flour Mills Association
Mr. Ishtiaq of Shama Ghee Mill, KPK
Dr Haroon of KPK Health Department
Dr Ali Ahmed KPK Health Department
Muhammad Anwar Khan, Chairman of KPK Food Authority
Mr. Tariq Sarwar of Pakistan Flour Mills Association
Mr. Abdul Rehman of Arsalan Flour Mills, Baluchistan
Mr. Munir Ahmed of Bilal Flour Mills, Baluchistan
Syed Bahauddin Darwaish of Abad Flour Mills, Baluchistan
Mr. Abdul Wahid of Ikram Flour Mill
Mr. M. Sharif of Ghaznawi Flour Mills
Dr. Masood Qadir Noshervani - Director General, Department of Health, Government of Baluchistan
Dr. Ali Nasir Bugti - Nutrition Cell, Department of Health, Government of Baluchistan
Mr. Abdur Rauf – Managing Director, Farooq Oil Mills
Mr. Mehrab Khan – Additional Secretary Food – Government of Baluchistan
Mr. Sharif Agha - Chairman PFMA Baluchistan
Mr. Quentin Johnson, International Food Consultant
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ANNEX 2: COSTING MODEL STRUCTURE

COSTING STRUCTURE

The wheat flour fortification costing model is clustered in following four sections:

- i. **Assumptions:** Based on inputs provided by related experts, current economic conditions or historic related industry trends.
- ii. **Production:** Annual production of wheat flour and edible oil by flour millers and edible oil refineries has been calculated using expected annual consumption determined by multiplying per capita consumption provided by the Planning Commission of Pakistan with the population size of the target market.
- iii. **Cost Calculations:** Cost for each primary and secondary cost element is calculated for 1kg, 10kg and 20kg bags of wheat flour and 1, 3 and 5 liter containers of edible oil.
- iv. **Analysis:** Includes overall fortification cost, its impact on overall wheat flour and edible oil price and monthly financial budget of an average household.

The wheat flour fortification costing model is mainly clustered in the following four sections:

Premix costs	Micro feeder costs	Quality Assurance costs
Premix Import Price	Depreciation	Cost of Laboratory Tests
Local Import Tariff	Import	Cost of Spot Tests
Premix Transportation	Transportation	Cost of Quality Assurance Staff
Distribution Margin	Installation and maintenance	Overhead

ANNEX 3: COSTING MODEL ASSUMPTIONS

PREMIX

TABLE 4: WHEAT FLOUR PREMIX COSTS

Per capita consumption of wheat flour is 8.23 kg per month⁵, about 274 grams per day. In this scenario, WHO recommends fortification levels of 20 ppm of iron and 1.3 ppm of folic acid. WFP Pakistan has been using 23 ppm of iron for vulnerable communities. Therefore, fortification with 15 ppm⁶ of iron and 1ppm of folic acid is required.

	Quantity	Currency	Wheat Flour				
			as per Pakistan Recom. Standard		as per ANSA Standard	as per Regional Guidelines	
			15 ppm	20 ppm		Low EXT	High EXT
Premix Assumptions							
Premix Rate - Landed - Islamabad	Per KG	USD	6.00	6.00	6.50	7.19	6.41
Shipment Cost - Sea	Per KG	USD	0.50	0.50	0.50	0.50	0.50
Shipment Cost - Air	Per KG	USD	5.00	5.00	5.00	5.00	5.00
Overall landed cost of premix - Sea	Per KG	USD	6.50	6.50	7.00	7.69	6.91
Quantity of Premix Required per Ton of Edible Oil	Grams		150	200	225	200	200
Local Import Customs Applicable Tariff	%		0%	0%	0%	0%	0%
Local Distributor Margin (including local port clearance)	%		20%	20%	20%	20%	20%
Annual Quantity Required for the Program	KGs		1,560,780	2,081,040	97,500	2,081,040	2,081,040
Six month inventory to be maintained	KGs		780,390	1,040,520	48,750	1,040,520	1,040,520
Storage and Distribution Cost	% of Landed Cost	USD	10%	10%	10%	10%	10%

Premix rate used is as quoted by GAIN Premix Facility based on real-time market prices provided by audited suppliers .

TABLE 5: EDIBLE OIL PREMIX COSTS

In Pakistan, all branded edible oil products are licensed and label products as complying with standards set by PSQCA. The premix requirement per ton of edible oil is 33 grams per ton.

	Quantity	Currency	Edible Oil		
			as per PSQCA Standard	as per New Recom of PSQCA Vitamin A & D	as per ANSA Standard
Premix Assumptions					
Premix Rate - Landed - Islamabad	Per KG	USD	60.00	62.00	53.00
Shipment Cost - Sea	Per KG	USD	0.85	0.85	0.85
Shipment Cost - Air	Per KG	USD	6.50	6.50	6.50
Overall landed cost of premix - Sea	Per KG	USD	60.85	62.85	53.85
Quantity of Premix Required per Ton of Edible Oil	Grams		33	33	33
Local Import Customs Applicable Tariff	%		0%	0%	0%
Local Distributor Margin (including local port clearance)	%		25%	25%	25%
Annual Quantity Required for the Program	KGs		62,000	62,000	2,846
Six month inventory to be maintained	KGs		31,000	31,000	1,423
Storage and Distribution Cost	% of Landed Cost	USD	15%	15%	15%

⁵ Planning Commission of Pakistan

⁶ Recommendations of the Regional Expert Group (REG) under Kazakhstan Academy of Nutrition (KAN) and the WHO guidelines. This has been agreed by the Technical Committee of Pakistan Standards & Quality Control Authority (PSQCA).

MICRO FEEDERS

TABLE 6: WHEAT FLOUR MICRO FEEDER COSTS

To fortify Atta, millers will need to install micro feeders and the study has calculated costs related to their procurement, installation and maintenance. Feeders are not necessary for edible oil, but the study includes costs related to equipment to ensure accurate and hygienic fortification.

	Quantity	Currency	Wheat Flour				
			Pakistan Recom. Standard	Pakistan Recom. Standard	ANSA Standard	Regional Guidelines	
Assumptions							
Cost of Micro Feeder - Landed - Lahore Pakistan	No.	USD	6,500	6,500	6,500	6,500	6,500
Transportation Costs	% Landed Cost		5.0%	5.0%	5.0%	5.0%	5.0%
Local Import Customs Applicable Tariff and others	% Landed Cost		15%	15%	15%	15%	15%
Installation Costs	No.	USD	500	500	500	500	500
Annual Maintenance Costs	No.	USD	250	250	250	250	250
Depreciation Period	Years		7	7	7	7	7
Average Annual Production could handle	Tons		10,000	10,000	10,000	10,000	10,000

WHEAT FLOUR (ATTA)

TABLE 7: EDIBLE OIL MICRO FEEDER COSTS

	PSQCA Standard	New Recom of PSQCA Vitamin A & D	ANSA Standard
Assumptions			
Cost of Micro Feeder - Landed - Lahore Pakistan	3,000	3,000	3,000
Transportation Costs	10.0%	10.0%	10.0%
Local Import Customs Applicable Tariff and others	15%	15%	15%
Installation Costs	500	500	500
Annual Maintenance Costs	500	500	500
Depreciation Period	7	7	7
Average Annual Production could handle	45,000	45,000	45,000

QUALITY ASSURANCE

Quality assurance is critical to ensure compliance with standards. Fortification of Atta and edible oil will require specific quality assurance testing at mill level. Costs related to laboratory tests, quality assurance staff and overhead (proportionate) have been included in this cost element. In due course, GAIN will aim to support the government to undertake appropriate, more cost-effective regulatory monitoring which relies less on sampling and testing and more on process auditing.

TABLE 8: WHEAT FLOUR QUALITY ASSURANCE COSTS

	QTY	Currency	Wheat Flour				
			as per Pakistan Recom. Standard	as per Pakistan Recom. Standard	as per ANSA Standard	as per Regional Guidelines	
			15 ppm	20 ppm		Low EXT	High EXT
External Laboratory Testing - Cost	Per Test	USD	40	40	40	40	40
Number of External Laboratory Tests to be Conducted	No.		12	12	12	12	12
Spot Testing Costs	Per Test	USD	5	5	5	5	5
Number of Spot Tests to be Conducted	No.		144	144	144	144	144
Dedicated Quality Assurance Staff	Annual Cost per Staff	USD	10,000	10,000	10,000	10,000	10,000
% of Quality Assurance Staff for fortification	% of total time		10%	10%	10%	10%	10%
Staff Overhead rate	% of Annual cost of staff		20%	20%	20%	20%	20%

TABLE 9: EDIBLE OIL QUALITY ASSURANCE COSTS

	QTY	Currency	Edible Oil		
			as per PSQCA Standard	as per New Recom of PSQCA Vitamin A & D	as per ANSA Standard
External Laboratory Testing - Cost	Per Test	USD	60	60	60
Number of External Laboratory Tests to be Conducted	No.		12	12	12
Spot Testing Costs	Per Test	USD	5	5	5
Number of Spot Tests to be Conducted	No.		48	48	48
Dedicated Quality Assurance Staff	Annual Cost per Staff	USD	22,000	22,000	22,000
% of Quality Assurance Staff for fortification	% of total time		10%	10%	10%
Staff Overhead rate	% of Annual cost of staff		20%	20%	20%

PRICING

The assumptions used for production and pricing are as follows:

TABLE 10: WHEAT FLOUR AND EDIBLE OIL PRODUCTION AND PRICING

		Currency	Wheat Flour	Edible Oil
			As per Pakistan Standard	
Wheat Flour / Edible Oil Pricing	Per KG / L	USD	0.40	1.71
Wheat Flour / Edible Oil Pricing	Per KG / L	PKR	42.50	180.00
Wheat Flour / Edible Oil Pricing	Per 20 KG Bag / 5l	USD	8.10	8.57
Wheat Flour / Edible Oil Pricing	Per 20 KG Bag / 5l	PKR	850.00	900.00

EXCHANGE RATE (PKR TO USD)

An exchange rate of PKR to USD of 105 has been used for this study.

ANNEX 4: COST TO CONSUMERS

WHEAT FLOUR

Using the assumptions mentioned above following cost elements are calculated clustered by 1kg, 10kg and 20kg bags of Wheat Flour (Atta):

TABLE 11: COST OF WHEAT FLOUR FORTIFICATION TO PAKISTAN RECC. STANDARD OF 15 PPM

	USD			PKR		
	1kg	5kg	20kg	1kg	5kg	20kg
Premix						
Premix Import Price	0.0010	0.0049	0.0195	0.1024	0.5119	2.0475
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0001	0.0005	0.0020	0.0102	0.0512	0.2048
Distributor Margin	0.0002	0.0011	0.0043	0.0225	0.1126	0.4505
Total Premix Cost	0.0013	0.0064	0.0257	0.1351	0.6757	2.7027
MicroFeeder						
Microfeeder Depreciation Cost	0.0001	0.0005	0.0019	0.0098	0.0488	0.1950
Import Cost	0.0000	0.0001	0.0003	0.0015	0.0073	0.0293
Transportation Costs	0.0000	0.0000	0.0001	0.0005	0.0024	0.0098
Installation Costs	0.0000	0.0000	0.0001	0.0008	0.0038	0.0150
Annual Maintenance Costs	0.0000	0.0001	0.0005	0.0026	0.0131	0.0525
Total	0.0001	0.0007	0.0029	0.0151	0.0754	0.3015
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0002	0.0010	0.0050	0.0252	0.1008
Cost of Spot Tests	0.0001	0.0004	0.0014	0.0076	0.0378	0.1512
Cost of Assurance Staff	0.0001	0.0005	0.0020	0.0105	0.0525	0.2100
Overheads of Assurance Staff	0.0000	0.0001	0.0004	0.0021	0.0105	0.0420
Total Quality Assurance Cost	0.0002	0.0012	0.0048	0.0252	0.1260	0.5040
Total Cost Per Unit	0.0017	0.0084	0.0334	0.1754	0.8771	3.5082
% of retail price of Wheat Flour / Edible Oil	0.41%	0.41%	0.41%	0.41%	0.41%	0.41%

Impact of fortification cost on household Cashflow Per Month

	USD		PKR
Household of 6	6	0.10	10.4211
Household of 8	8	0.13	13.8948
Household of 10	10	0.17	17.3685
Household of 12	12	0.20	20.8422

TABLE 12: COST OF WHEAT FLOUR FORTIFICATION TO PAKISTAN REC. STANDARD OF 20 PPM

	USD			PKR		
	1kg	5kg	20kg	1kg	5kg	20kg
Premix						
Premix Import Price	0.0013	0.0065	0.0260	0.1365	0.6825	2.7300
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0001	0.0007	0.0026	0.0137	0.0683	0.2730
Distributor Margin	0.0003	0.0014	0.0057	0.0300	0.1502	0.6006
Total Premix Cost	0.0017	0.0086	0.0343	0.1802	0.9009	3.6036
MicroFeeder						
Microfeeder Depreciation Cost	0.0001	0.0005	0.0019	0.0098	0.0488	0.1950
Import Cost	0.0000	0.0001	0.0003	0.0015	0.0073	0.0293
Transportation Costs	0.0000	0.0000	0.0001	0.0005	0.0024	0.0098
Installation Costs	0.0000	0.0000	0.0001	0.0008	0.0038	0.0150
Annual Maintenance Costs	0.0000	0.0001	0.0005	0.0026	0.0131	0.0525
Total	0.0001	0.0007	0.0029	0.0151	0.0754	0.3015
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0002	0.0010	0.0050	0.0252	0.1008
Cost of Spot Tests	0.0001	0.0004	0.0014	0.0076	0.0378	0.1512
Cost of Assurance Staff	0.0001	0.0005	0.0020	0.0105	0.0525	0.2100
Overheads of Assurance Staff	0.0000	0.0001	0.0004	0.0021	0.0105	0.0420
Total Quality Assurance Cost	0.0002	0.0012	0.0048	0.0252	0.1260	0.5040
Total Cost Per Unit	0.0021	0.0105	0.0420	0.2205	1.1023	4.4091
% of retail price of Wheat Flour / Edible Oil	0.52%	0.52%	0.52%	0.52%	0.52%	0.52%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.12	13.0972
Household of 8	0.17	17.4630
Household of 10	0.21	21.8287
Household of 12	0.25	26.1945

TABLE 13: COST OF WHEAT FLOUR FORTIFICATION TO ANSA STANDARD

	USD			PKR		
	1kg	5kg	20kg	1kg	5kg	20kg
Premix						
Premix Import Price	0.0016	0.0079	0.0315	0.1654	0.8269	3.3075
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0002	0.0008	0.0032	0.0165	0.0827	0.3308
Distributor Margin	0.0003	0.0017	0.0069	0.0364	0.1819	0.7277
Total Premix Cost	0.0021	0.0104	0.0416	0.2183	1.0915	4.3659
MicroFeeder						
Microfeeder Depreciation Cost	0.0001	0.0005	0.0019	0.0098	0.0488	0.1950
Import Cost	0.0000	0.0001	0.0003	0.0015	0.0073	0.0293
Transportation Costs	0.0000	0.0000	0.0001	0.0005	0.0024	0.0098
Installation Costs	0.0000	0.0000	0.0001	0.0008	0.0038	0.0150
Annual Maintenance Costs	0.0000	0.0001	0.0005	0.0026	0.0131	0.0525
Total	0.0001	0.0007	0.0029	0.0151	0.0754	0.3015
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0002	0.0010	0.0050	0.0252	0.1008
Cost of Spot Tests	0.0001	0.0004	0.0014	0.0076	0.0378	0.1512
Cost of Assurance Staff	0.0001	0.0005	0.0020	0.0105	0.0525	0.2100
Overheads of Assurance Staff	0.0000	0.0001	0.0004	0.0021	0.0105	0.0420
Total Quality Assurance Cost	0.0002	0.0012	0.0048	0.0252	0.1260	0.5040
Total Cost Per Unit	0.0025	0.0123	0.0493	0.2586	1.2929	5.1714
% of retail price of Wheat Flour / Edible Oil	0.61%	0.61%	0.61%	0.61%	0.61%	0.61%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.15	15.3616
Household of 8	0.20	20.4822
Household of 10	0.24	25.6027
Household of 12	0.29	30.7233

TABLE 14: COST OF WHEAT FLOUR FORTIFICATION TO REG. RECC. STANDARDS LOW EXTRACTION

	USD			PKR		
	1kg	5kg	20kg	1kg	5kg	20kg
Premix						
Premix Import Price	0.0015	0.0077	0.0307	0.1614	0.8072	3.2286
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0002	0.0008	0.0031	0.0161	0.0807	0.3229
Distributor Margin	0.0003	0.0017	0.0068	0.0355	0.1776	0.7103
Total Premix Cost	0.0020	0.0101	0.0406	0.2131	1.0655	4.2618
MicroFeeder						
Microfeeder Depreciation Cost	0.0001	0.0005	0.0019	0.0098	0.0488	0.1950
Import Cost	0.0000	0.0001	0.0003	0.0015	0.0073	0.0293
Transportation Costs	0.0000	0.0000	0.0001	0.0005	0.0024	0.0098
Installation Costs	0.0000	0.0000	0.0001	0.0008	0.0038	0.0150
Annual Maintenance Costs	0.0000	0.0001	0.0005	0.0026	0.0131	0.0525
Total	0.0001	0.0007	0.0029	0.0151	0.0754	0.3015
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0002	0.0010	0.0050	0.0252	0.1008
Cost of Spot Tests	0.0001	0.0004	0.0014	0.0076	0.0378	0.1512
Cost of Assurance Staff	0.0001	0.0005	0.0020	0.0105	0.0525	0.2100
Overheads of Assurance Staff	0.0000	0.0001	0.0004	0.0021	0.0105	0.0420
Total Quality Assurance Cost	0.0002	0.0012	0.0048	0.0252	0.1260	0.5040
Total Cost Per Unit	0.0024	0.0121	0.0483	0.2534	1.2668	5.0673
% of retail price of Wheat Flour / Edible Oil	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.14	15.0524
Household of 8	0.19	20.0699
Household of 10	0.24	25.0874
Household of 12	0.29	30.1049

TABLE 15: COST OF WHEAT FLOUR FORTIFICATION TO REG. RECC. STANDARDS HIGH EXTRACTION

	USD			PKR		
	1kg	5kg	20kg	1kg	5kg	20kg
Premix						
Premix Import Price	0.0014	0.0069	0.0276	0.1451	0.7256	2.9023
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0001	0.0007	0.0028	0.0145	0.0726	0.2902
Distributor Margin	0.0003	0.0015	0.0061	0.0319	0.1596	0.6385
Total Premix Cost	0.0018	0.0091	0.0365	0.1916	0.9578	3.8310
MicroFeeder						
Microfeeder Depreciation Cost	0.0001	0.0005	0.0019	0.0098	0.0488	0.1950
Import Cost	0.0000	0.0001	0.0003	0.0015	0.0073	0.0293
Transportation Costs	0.0000	0.0000	0.0001	0.0005	0.0024	0.0098
Installation Costs	0.0000	0.0000	0.0001	0.0008	0.0038	0.0150
Annual Maintenance Costs	0.0000	0.0001	0.0005	0.0026	0.0131	0.0525
Total	0.0001	0.0007	0.0029	0.0151	0.0754	0.3015
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0002	0.0010	0.0050	0.0252	0.1008
Cost of Spot Tests	0.0001	0.0004	0.0014	0.0076	0.0378	0.1512
Cost of Assurance Staff	0.0001	0.0005	0.0020	0.0105	0.0525	0.2100
Overheads of Assurance Staff	0.0000	0.0001	0.0004	0.0021	0.0105	0.0420
Total Quality Assurance Cost	0.0002	0.0012	0.0048	0.0252	0.1260	0.5040
Total Cost Per Unit	0.0022	0.0110	0.0442	0.2318	1.1591	4.6365
% of retail price of Wheat Flour / Edible Oil	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.13	13.7728
Household of 8	0.17	18.3638
Household of 10	0.22	22.9547
Household of 12	0.26	27.5457

EDIBLE OIL

Using the assumptions mentioned above following cost elements are calculated clustered by 1 liter, 3 liter and 5 liter containers of edible oil.

TABLE 16: COST OF FORTIFYING EDIBLE OIL TO PSQCA STANDARD FOR VITAMIN A

	USD			PKR		
	1L	3L	5L	1L	3L	5L
Premix						
Premix Import Price	0.0020	0.0060	0.0100	0.2108	0.6325	1.0542
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0003	0.0009	0.0015	0.0316	0.0949	0.1581
Distributor Margin	0.0006	0.0017	0.0029	0.0606	0.1819	0.3031
Total Premix Cost	0.0029	0.0087	0.0144	0.3031	0.9093	1.5155
MicroFeeder						
Microfeeder Depreciation Cost	0.0000	0.0001	0.0001	0.0023	0.0068	0.0113
Import Cost	0.0000	0.0000	0.0000	0.0003	0.0010	0.0017
Transportation Costs	0.0000	0.0000	0.0000	0.0002	0.0007	0.0011
Installation Costs	0.0000	0.0000	0.0000	0.0004	0.0011	0.0019
Annual Maintenance Costs	0.0000	0.0001	0.0001	0.0026	0.0079	0.0131
Total	0.0001	0.0002	0.0003	0.0058	0.0174	0.0291
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0001	0.0002	0.0038	0.0113	0.0189
Cost of Spot Tests	0.0000	0.0000	0.0001	0.0013	0.0038	0.0063
Cost of Assurance Staff	0.0001	0.0003	0.0006	0.0116	0.0347	0.0578
Overheads of Assurance Staff	0.0000	0.0001	0.0001	0.0023	0.0069	0.0116
Total Quality Assurance Cost	0.0002	0.0005	0.0009	0.0189	0.0567	0.0945
Total Cost Per Unit	0.0031	0.0094	0.0156	0.3278	0.9834	1.6390
% of retail price of Wheat Flour / Edible Oil	0.18%	0.18%	0.18%	0.18%	0.18%	0.18%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.0052	0.5418
Household of 8	0.0069	0.7224
Household of 10	0.0086	0.9030
Household of 12	0.0103	1.0836

TABLE 17: COST OF FORTIFYING EDIBLE OIL TO PSQCA RECC. STANDARD VITAMINS A AND D

	USD			PKR		
	1L	3L	5L	1L	3L	5L
Premix						
Premix Import Price	0.0021	0.0062	0.0104	0.2178	0.6533	1.0889
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0003	0.0009	0.0016	0.0327	0.0980	0.1633
Distributor Margin	0.0006	0.0018	0.0030	0.0626	0.1878	0.3131
Total Premix Cost	0.0030	0.0089	0.0149	0.3131	0.9392	1.5653
MicroFeeder						
Microfeeder Depreciation Cost	0.0000	0.0001	0.0001	0.0023	0.0068	0.0113
Import Cost	0.0000	0.0000	0.0000	0.0003	0.0010	0.0017
Transportation Costs	0.0000	0.0000	0.0000	0.0002	0.0007	0.0011
Installation Costs	0.0000	0.0000	0.0000	0.0004	0.0011	0.0019
Annual Maintenance Costs	0.0000	0.0001	0.0001	0.0026	0.0079	0.0131
Total	0.0001	0.0002	0.0003	0.0058	0.0174	0.0291
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0001	0.0002	0.0038	0.0113	0.0189
Cost of Spot Tests	0.0000	0.0000	0.0001	0.0013	0.0038	0.0063
Cost of Assurance Staff	0.0001	0.0003	0.0006	0.0116	0.0347	0.0578
Overheads of Assurance Staff	0.0000	0.0001	0.0001	0.0023	0.0069	0.0116
Total Quality Assurance Cost	0.0002	0.0005	0.0009	0.0189	0.0567	0.0945
Total Cost Per Unit	0.0032	0.0097	0.0161	0.3378	1.0133	1.6888
% of retail price of Wheat Flour / Edible Oil	0.19%	0.19%	0.19%	0.19%	0.19%	0.19%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.0053	0.5582
Household of 8	0.0071	0.7443
Household of 10	0.0089	0.9304
Household of 12	0.0106	1.1165

TABLE 18: COST OF FORTIFYING EDIBLE OIL TO ANSA STANDARD

	USD			PKR		
	1L	3L	5L	1L	3L	5L
Premix						
Premix Import Price	0.0018	0.0053	0.0089	0.1866	0.5598	0.9330
Local Import Tariff	-	-	-	-	-	-
Premix Storage and Transportation Costs	0.0003	0.0008	0.0013	0.0280	0.0840	0.1399
Distributor Margin	0.0005	0.0015	0.0026	0.0536	0.1609	0.2682
Total Premix Cost	0.0026	0.0077	0.0128	0.2682	0.8047	1.3411
MicroFeeder						
Microfeeder Depreciation Cost	0.0000	0.0001	0.0001	0.0023	0.0068	0.0113
Import Cost	0.0000	0.0000	0.0000	0.0003	0.0010	0.0017
Transportation Costs	0.0000	0.0000	0.0000	0.0002	0.0007	0.0011
Installation Costs	0.0000	0.0000	0.0000	0.0004	0.0011	0.0019
Annual Maintenance Costs	0.0000	0.0001	0.0001	0.0026	0.0079	0.0131
Total	0.0001	0.0002	0.0003	0.0058	0.0174	0.0291
Quality Assurance						
Cost of Laboratory Tests	0.0000	0.0001	0.0002	0.0038	0.0113	0.0189
Cost of Spot Tests	0.0000	0.0000	0.0001	0.0013	0.0038	0.0063
Cost of Assurance Staff	0.0001	0.0003	0.0006	0.0116	0.0347	0.0578
Overheads of Assurance Staff	0.0000	0.0001	0.0001	0.0023	0.0069	0.0116
Total Quality Assurance Cost	0.0002	0.0005	0.0009	0.0189	0.0567	0.0945
Total Cost Per Unit	0.0028	0.0084	0.0139	0.2929	0.8788	1.4647
% of retail price of Wheat Flour / Edible Oil	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%

Impact of fortification cost on household Cashflow Per Month

	USD	PKR
Household of 6	0.0046	0.4842
Household of 8	0.0061	0.6455
Household of 10	0.0077	0.8069
Household of 12	0.0092	0.9683

ANNEX 5: HOUSEHOLD COST

TABLE 19: FINANCIAL EFFECT OF WHEAT FLOUR FORTIFICATION ON HOUSEHOLDS

	Wheat Flour		
	As per Pakistan Recom. Standards	As per ANSA Standards	% to Average Monthly Family Income
	Rupees		
Household of 6	10.42	15.36	0.040%
Household of 8	13.89	20.48	0.053%
Household of 10	17.37	25.60	0.066%
Household of 12	20.84	30.72	0.079%

	Edible Oil		
	As per PSQCA Standards	As per ANSA Standards	% to Average Monthly Family Income
	Rupees		
Household of 6	0.54	0.48	0.002%
Household of 8	0.72	0.65	0.003%
Household of 10	0.90	0.81	0.003%
Household of 12	1.08	0.97	0.004%

ANNEX 6: IMPACT ON FLOUR MILLS

TABLE 20: CASH FLOW IMPACT ON FLOUR MILLS AND OIL REFINERIES

Wheat Flour			
Average Annual Production pe Mill (Tons)	Premix Required Per Year	Cashflow Required to Finance Premix for Six Months	
Rupees			
2,500	375	168,919	
5,000	750	337,838	
7,500	1,125	506,756	
10,000	1,500	675,675	
12,500	1,875	844,594	

Edible Oil			
Average Annual Production per Refinery (Tons)	Premix Required Per Year	Cashflow Required to Finance Premix for Six Months	
Rupees			
2,500	83	378,863	
5,000	165	757,725	
7,500	248	1,136,588	
10,000	330	1,515,450	
12,500	413	1,894,313	