

Benefit Incidence Analysis: Update Appendix based in Rolling District study Phase -2

December 2019

Introduction

The purpose of the Benefit Incidence Analysis (BIA) is to assess the extent to which the Food Fortification Programme's target groups benefit from the programme, through looking at coverage – both projected and (as time goes on) actual. Target groups are defined as the poorest socio-economic groups (lowest two wealth quintiles) as well as the demographic groups of children under 5, girls aged 10-14 years and women of reproductive age (WRA).

A prospective BIA was finalised in September 2018 which was a forward-looking projection based on consumption patterns identified in the Fortification Assessment Coverage Toolkit (FACT) survey and Round 1 of the Rolling District Study (RDS-I). This analysis projected the distribution of benefits, if existing consumption patterns were maintained. A BIA to assess distribution of benefits based on actual consumption of fortified product will take place in the final year of the programme.

This document serves as a brief interim BIA update based on the findings of Round 2 of the Rolling District Study (RDS-II) and also incorporating preliminary findings from the Loose Oil study. RDS-II probed some specific areas which were not covered in the first BIA, including intra-familial distribution of benefits based on relative consumption by individual family members, and the significance of purchased wheat-based foods. RDS-II also provided an opportunity to verify the extent to which adequately fortified products were reaching households, allowing us to start looking at actual beneficiaries from consuming *fortified* products (rather than just projected beneficiaries from consuming *fortifiable* products). The Loose Oil study looked at the size and distribution of the informal oil/ghee market which operates outside of the formal regulated system and is therefore not covered by FFP.

RDS Round 2

RDS-II was conducted from May to April 2019 and covers a follow-up in four early districts (Lahore, Rawalpindi, Hafizabad and Gujranwala) and a baseline in four "mid districts" namely Karachi, Peshawar, Rahim Yar Khan and Narowal. The respondent base for RDS-2 survey comprised of 6,607 respondents. The target respondents included Households (4,152), Retail Users (1,221) and Retail Suppliers (1,234).

Loose Oil Study

This study collected primary data from both the formal and informal sectors from the representative supplier markets, sales forces of different brands, as well as the oil and ghee processing industry around the country. The study also reviewed secondary data on consumption, production, import and regulations of loose edible oil and ghee in Pakistan from different national and international sources.

The market for data collection was segmented into 6 regions including South Punjab, North & Central Punjab, KPK, Karachi, Interior Sindh and Balochistan. Data was collected for 5 quality tiers of edible oil including; premium brands, popular/regional brands, partially refined and packed brands (all regarded as formal sector) and unrefined but packed brands and loose oil (regarded as informal sector).

Coverage of Fortifiable Wheat Flour

The current scope of FFP covers fortification of flour from the commercial roller mill sector, and not from the largely informal chakki mill sector. Whether consumers are currently buying this type of commercial roller mill flour (*fortifiable flour*) determines whether they will potentially benefit from FFP and is therefore a variable of interest.

The RDS-II found that 36.6% of household respondents use packaged, branded wheat flour—either commercially branded (14.7%) or branded as “Chakki” flour (24.3%). The category of “Chakki” branded flour is somewhat ambiguous: it is reportedly mostly produced by the organised, roller mill sector which is therefore **fortifiable** and covered by the current FFP scope. Some, however, is produced by larger chakkis who market their flour commercially; this would be in theory fortifiable though not covered in FFP’s current scope.¹ There has been significant growth in this category and further probing of the provenance of commercially branded chakki flour will be done in the third round (RDS-III) so we can more accurately describe the breakdown between what is essentially roller mill flour cleverly marketed as “chakki” flour, or larger chakki-produced flour which is marketed and distributed through commercial channels.

59.8% of respondents reported using non-commercial, unbranded chakki flour, i.e. **not fortifiable** – either getting their own wheat grain ground from the local chakki (37.9%) or buying it from the chakki directly (21.9%). In terms of geography, the more urbanized districts of Karachi, Lahore and Rawalpindi are split nearly evenly between commercial and chakki wheat flour. An outlier is Peshawar, with nearly 86.1% of respondents using commercial wheat flour.

RDS-II showed a slightly greater association between use of fortifiable flour and belonging to a higher income quintile. A larger proportion of the population, however, was found to be using fortifiable flour compared to the first round. For example, 30% of the lowest income quintile consumes potentially fortifiable wheat flour (12.4% + 17.9%), which is higher than the 25% estimated from Round 1. For the highest income group, this rises to 48.5%.

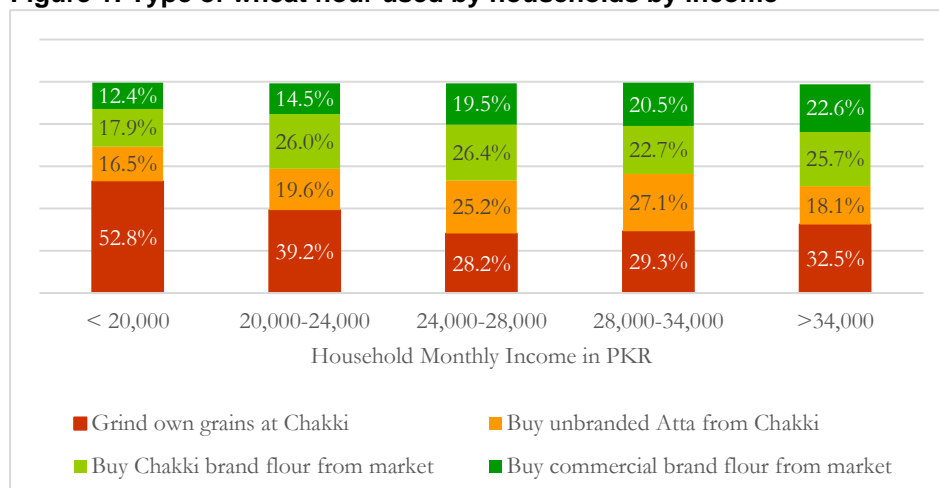
This change likely results from the fact that the original Round 1 districts reflected FFP programme roll-out and heavily over-represented the biggest wheat producing areas in Punjab. Results are also different from the earlier FACT study which found a slightly lower market shares for non-chakki fortifiable flour across the three provinces included in the household module (19% Punjab, 33% Sindh, 17% Balochistan). The overall difference is likely explained by the omission of KP province in the FACT study, for which a No Objection certificate was not granted. Peshawar was an outlier in RDS-II having the biggest market share for commercial branded flour, and its inclusion in RDS-II therefore explains the difference.

These areas have higher rates of own-consumption and other informal and small-scale supply channels, bypassing larger, commercial and fortifiable channels. As a consequence, RDS-I would have likely underestimated actual coverage of the roller mill/large scale chakki market. As the districts were broadened in RDS-II to include less heavily wheat producing areas, this effect would have reduced.

Figure 1 below shows types of flour consumption by income group, with the green categories being fortifiable and the orange/red not fortifiable. Consumption of a fortifiable flour vehicle does clearly rise moderately with income.

¹ Under FFP’s operations research component, a feasibility study is underway on fortification at larger chakkis. It is therefore possible that a future programme could cover large scale chakkis.

Figure 1: Type of wheat flour used by households by income



Two conclusions can be reached from current consumption patterns of fortifiable wheat flour:

The exploration of the feasibility of fortification of bulk-produced flour at chakki mills is highly appropriate to complement the current FFP scope and potentially allow full population coverage which will be important for reaching the lowest income quintile;

Despite the positive relationship with income, the extent of micronutrient deficiency in Pakistan and the fact that deficiencies occur across all income groups (though are highest among the poor), means that a population level intervention such as fortification is still much needed and appropriate. According to NNS 2018, the prevalence of iron deficiency is 28.6% for children under 5, and 18.2% for WRA.

Coverage of Fortified Wheat Flour

Projections of which groups are likely to benefit from fortification remain completely theoretical unless and until the “fortifiable” products become “fortified” products. The RDS-II study tested a total of 3,342 wheat flour samples for fortification status.

It was found that labels on about a third of wheat flour packages (33.5%) provided for inspection had some mention of the product being fortified, either in writing or logo. It is interesting that 49.3% respondents thought their last purchased wheat flour was fortified, while 42.1% could not tell.

Disappointingly, however, only 2 out of 3,342 wheat flour samples (virtually 0%) tested across eight districts were validated as adequately fortified, with 45 yielding ambiguous results. This was a decline from the first Round when 13% of wheat flour samples were adequately fortified. The fieldwork for RDS-II was conducted during a particularly contentious time when many millers temporarily ceased fortifying due to unhappiness with attempts to enforce mandatory fortification.

Indeed, the most pervasive challenge in implementing FFP is the proportion of total wheat flour production that millers are willing to fortify. Whereas the programme initially assumed this would be 95%, actual percentages fortified have generally hovered around 12-20%. Millers give various reasons citing lack of demand and concern that some consumers would be put off. In the most recent month, according to the programme FORTIS database, the percentage of flour being adequately fortified by the 669 enrolled wheat flour mills, is 15% (as of November

2019). FORTIS triangulates production data with premix usage data and is therefore the most accurate measure of fortification market share.

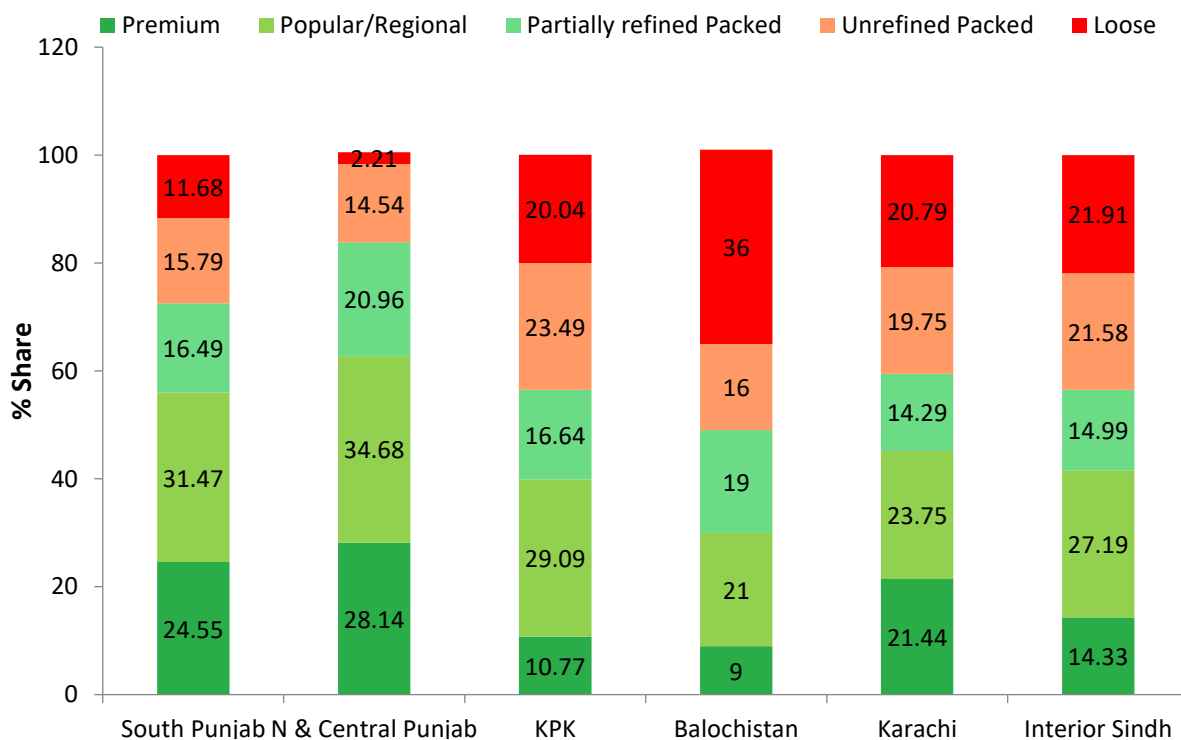
By far the most crucial priority for FFP is to increase this percentage for the realisation of the projected impacts. As we hope that the next round of RDS will record an improvement in detection of fortified samples at household level, it will be important to track coverage of fortified product by income group to detect if there is any pattern.

Coverage of Fortifiable Oil/Ghee

For oil/ghee there is a higher population coverage of fortifiable oil/ghee and better rates of adequate fortification. There is, however, a very significant informal sector which caters to the poorest and which varies by province. This informal sector by-passes government regulation and is therefore **not fortifiable**; consumers of these products will not benefit from FFP unless they switch to a formal sector product.

FFP commissioned the Loose Oil study to investigate the informal sector as there was a general lack of information about it. This study found that, overall, the total share of the informal sector market of edible oil/ ghee is 28.2%, including 16.2% from low quality unrefined but packed brands, and 12% from the loose oil market. Sindh and Balochistan dominate the informal sector market; 52% of oil/ghee consumed in Balochistan is from the informal sector, followed by 43.5% in interior Sindh. In Karachi city the figure is 40.5%. See Figure 2.

Figure 2. Market share (%) of different tiers of edible oil sector in different regions of Pakistan



In north and central Punjab, the informal sector poses less of a problem, as a result both of stricter government regulation as well as higher income levels. Punjab province has implemented a ban of loose oil (although not comprehensively, particularly in south), and has closed 15 facilities due to non-compliance with the loose oil ban. Punjab Food Authority (PFA) has collected samples of all tiers of edible oil and ghee, and analysed these for qualitative and safety parameters, including vitamin A levels. According to the results, 63 brands were

deemed low quality with unsafe parameters and were pulled back from the market, with warnings issued as a first step, followed by a ban for continued non-compliance.

The dynamics of the oil market combine to encourage an informal sector in which oil is sold to low-income consumers with no refining or value added. Pakistan is highly dependent upon imports of bulk oil mainly coming from Malaysia. In addition to large-scale processors, some smaller traders are also involved in the direct import of bulk edible oil, who team up to afford the cash flow requirements. The fact that traders are allowed to import bulk edible oil, without having the means to process it at a processing plant, means that they are willing to sell their commodities at very low prices, as they are not adding any value. Some traders are even selling at prices similar to import prices, and making their margins purely from differences in credit terms between 45 days import credit and 30 days selling credit. The presence of low quality/informal sector edible oil then has a knock-on effect on the formal sector, forcing it to produce cheap quality brands alongside their premium and popular segment to match the prices and compete. The market failures thus combine to fuel the supply of cheap and low-quality edible oil and ghee.

It is clear from the Loose Oil study that it is the poorest consumers who buy this unregulated cheap oil/ghee and that this phenomenon will prevent the poorest groups, especially in Balochistan and Sindh, from benefitting to the fullest extent from FFP. The recommendations in the Loose Oil study on how FFP can mitigate this and support the Government in clamping down on the informal sector are timely. Further discussion and strategizing are needed on how to take these forward.

[Information from RDS-II](#)

The RDS sample is skewed to north and central Punjab, with 5 of the 8 districts (Lahore, Rawalpindi, Hafizabad, Gujranwala and Narowal) falling in this region. This is a consequence of the district selection following the roll-out sequence of FFP.

According to RDS-II, all (100%) respondents use cooking oil and/or ghee to prepare food. The lowest three income quintiles indicated mostly using ghee, with the other three higher quintiles reporting using mostly cooking oil. A trend can be observed across all five quintiles with ghee usage steadily declining as income increases and vice versa for cooking oil. Unlike wheat flour, ghee/oil products purchased were generally branded. Sufi and Dalda overall appear to be the two most favoured brands, more popular in urban households than rural, and remaining predominant across all five income quintiles. A total of about 111 different brands of ghee were identified to be in stock in the retail outlets visited across the eight districts.

Table 1: Most Popular Brands of Ghee/Cooking Oil – by Income Quintile

| Less than 20,000* | 20,000 – 24,000* | 24,000 – 28,000* | 28,000 – 34,000* | More than 34,000* |
|-------------------|------------------|------------------|------------------|-------------------|
| Kiran | Sufi | Sufi | Sufi | Dalda |
| Sufi | Dalda | Dalda | Dalda | Sufi |
| Shahbaz | Kiran | Shaan | Shaan | Meezan |
| Dalda | Shahbaz | Sawera | Meezan | Shama |
| Shama | Shaan | Meezan | Habib | Shaan |

* Household monthly income in Pak Rupees

Oil/ghee was available in loose form at **10%** of retailers stocking any ghee/cooking oil at the time of the survey. More than a third of households in Karachi indicated using unbranded, unpackaged ghee/cooking oil which corresponds with the results from the Loose Oil study.

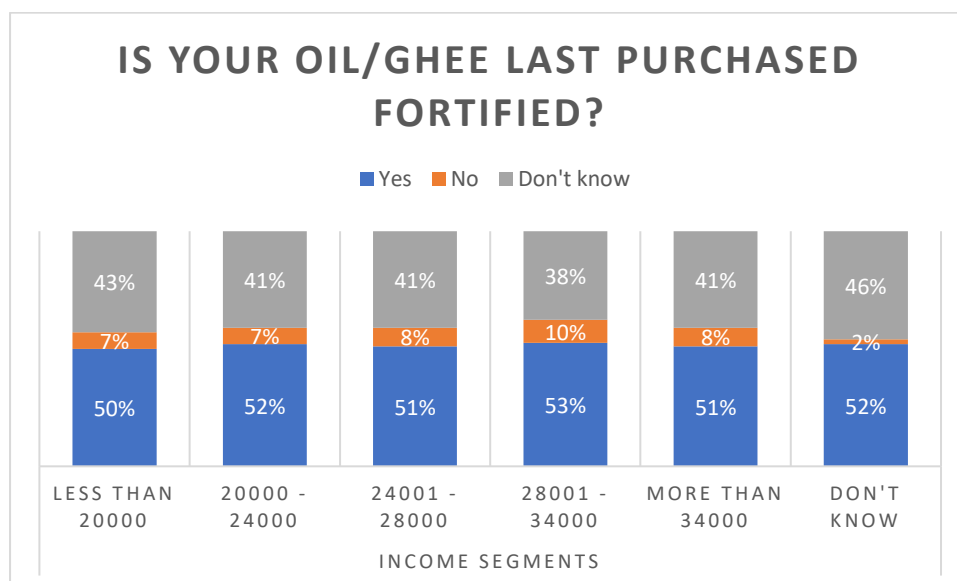
Kiran and Shahbaz brands were popular brands in the lower income quintiles only, and appear to be extremely popular local brands in Narowal and Rahim Yar Khan, respectively, which may have skewed the results for the lowest income quintile. It is noteworthy that Sufi and Dalda retain their usage and popularity across districts and income segments despite being amongst the more expensive ghee/cooking oil brands. While this may appear as an anomaly as pricing plays a critical role in the purchase decision for lower income households, a host of other marketing factors may also be at play.

In conclusion, therefore, given that the overall market share for the formal oil sector is 71.8%, benefits of oil/ghee fortification are projected to extend across a greater segment of the population, with significant exceptions particularly in Sindh and Balochistan. The strong actions of the Punjab government demonstrate that regulation is possible and has had a direct impact on the likely number of beneficiaries of the programme in Punjab.

Coverage of Fortified Oil/Ghee

In the RDS-II study, asked whether they thought their last-purchased oil/ghee was fortified, there was very little variation by income groups (see Figure 2). Just over half of all groups thought their oil/ghee was fortified; the next largest segment (41% - 47%) did not know, and a minority thought it was not fortified. In fact, 91.1% of the 201 samples tested were fortified, and 82.1% were found to be adequately fortified with Vitamin A.

Figure 3: Perception of whether last purchased oil/ghee was fortified



A total of 201 samples were collected for testing at a laboratory for vitamin A content. According to the lab reports, 82.1% of the samples tested were found to be adequately fortified. In the baseline four districts, a decline in the ratio of ghee/cooking oil samples being fortified was observed, from 100% in Round-1 to 91.1% in Round-2.

From the FFP FORTIS database, we know that oil mills enrolled in FFP are currently fortifying 96% of their oil production of which 95.5% is confirmed as adequately fortified in lab tests.

Willingness to Purchase Fortified Products

Importantly, a majority of consumers appeared to demonstrate a low level of price sensitivity. 85.2% of consumers reported that they would buy fortified wheat flour if the price differential was PKR 0.5 per kg higher than the unfortified alternative (equating to PKR 10 for a 20 kg bag) and 78.5% of households would purchase if the cost was higher by PKR 1 per kg. For

oil/ghee, 84% of households reported that they were willing to buy fortified oil/ghee even if it was PKR 1 per kg (or litre) more expensive than an unfortified alternative. Given the study over-sampled from lower income groups, this finding suggests that willingness to pay enough to absorb the incremental cost increase of fortification might not be a barrier. We do, however, have to interpret these data with caution and understand that stated preferences are rarely reliable, given what we know about price sensitivity of consumers especially the poorest. Further data based on actual consumer choices when fortified alternatives are more readily available will be more telling. The ideal scenario, however, continues to be mandatory fortification with no differential pricing, so this choice does not need to be made.

Across all 8 districts, the responses indicate a generally positive attitude towards food fortification across all income segments: 75% of households find the idea of food fortification plausible, and 81.3% think that food fortification has major health benefits. However, only 57.5% of the households indicated that fortified foods were easily available, 76% expected the taste of fortified foods to be different and 71.7% thought the appearance could be different. These are significant findings and the taste misconception may need to be addressed, for example through the national level television campaign. Nearly 80% of all respondents stated that they would switch to fortified foods if available in the market alongside their unfortified alternatives, with 61.6% indicating a strong preference.

Consumption of Ready-Made Foods

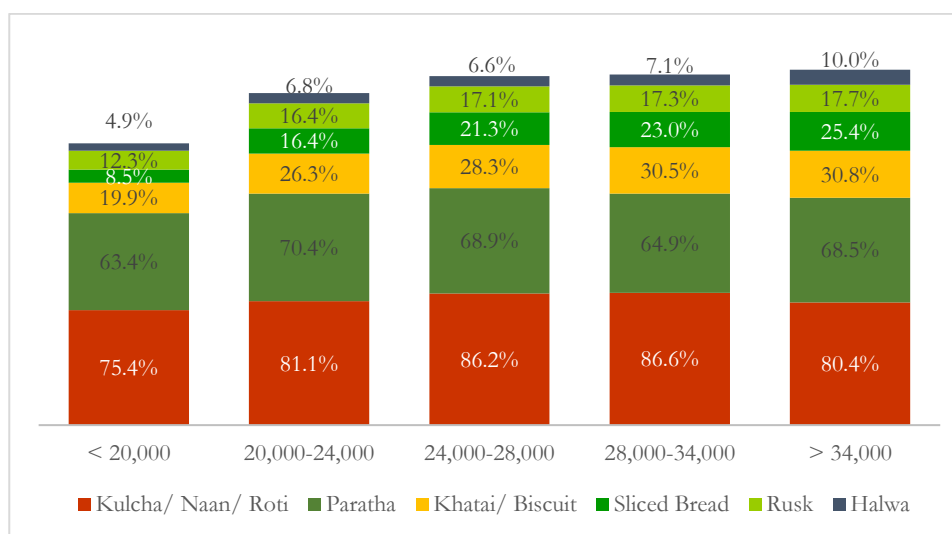
As the flour purchased by households does not account for all wheat-based foods that are consumed, questions were added in RDS-II about consumption of ready-made foods purchased outside the home. Households were asked whether six common wheat-based foods² were consumed and if they were sourced from home or market. They were then asked the frequency and portion sizes.

A new category of Retail Users was also added; a total of 1,221 Retail Users were surveyed from the eight districts. Of these 652 were naan shops, 69 branded bakeries, 344 roadside restaurants and 156 non-branded bakeries. About 87.6% of these Retail Users reported buying packaged wheat flour – considered fortifiable. Thus, the purchase of ready-made food outside the home has very good potential to be fortified.

RDS-II established that kulcha/nan/roti, paratha and halwa are most often always made at home, while **khatai/biscuit**, **sliced bread** and **rusk** are generally always sourced from the market. These three categories would therefore mostly be made with commercial branded (and thus fortifiable) flour. The consumption patterns of these foods was fairly even across the top four income quintiles, but the lowest income group was less likely to consume these three foods (Figure 4).

² GAIN advised on six most commonly eaten wheat-based foods based on unpublished data collected through FACT study

Figure 4: (Selected) food items consumed by households in the past 24 Hours by income



So while overall there are additional fortification benefits potentially conferred when this ready-made category of foods is included, the benefits are not quite proportionately distributed by income group, although differences are not large.

In looking at the extent of overlap between the groups consuming ready-made food purchased from the market, and those purchasing fortifiable flour, the overlap is only partial, meaning that some households who are buying non-fortifiable flour are deriving some additional benefit through the ready-made food they purchase. See Table 2.

Table 2: Additional households potentially benefitting from purchasing ready-made foods

| | Overall percentage of sample who consumed in last 24 hours | OF WHICH | |
|------------------|--|--|---|
| | | Additional consumed otherwise use flour) | Overlap consumed product but already use fortifiable flour) |
| Khatai / biscuit | 22.6% | 13.1% | 9.5% |
| Sliced bread | 13.7% | 7.3% | 6.4% |
| Rusk | 13.8% | 8.5% | 5.3% |

Although the largely market-sourced foods were consumed by a minority (13.7% – 22.6%) the survey only asked about consumption in the last 24 hours, as longer food recall periods become very much more difficult to administer. This is likely therefore an underestimate of households who might consume these items regularly (though not daily).

As Table 2 shows, over half the households consuming the ready-made foods were those who use non-fortifiable flour – so this finding increases coverage to a further potential 13% of households who would be getting some additional benefit from ready-made foods made with fortifiable flour.

Although we did ask about portion sizes, we would need to do further analysis to convert these into grams consumed in order to accurately compute the additional quantity of wheat flour consumed through ready-made food. This could be worth doing in the final BIA, if we know

fortified flour is actually available and being used, in order to assess distributions of benefits in more detail.

Intra-family distribution

The first BIA concluded that while we can reasonably assume that all household members eat together from the same pot, we did not know much about quantities consumed by individual household members. The FACT study estimated the quantities of fortifiable product consumed by women of reproductive age (WRA) and children under 5, however these were pro-rata estimates based on age and gender related energy needs; consumption below the household unit was not actually measured and there was no estimate for adolescent girls.

To verify, therefore, that target groups were consuming “their fair share” and were likely to benefit proportionately from FFP, we added a module into RDS-II that asked about intra-household food consumption of six wheat-based foods.

Differences in the consumption pattern among household members were observed. Around 80% of households reported that the respondent herself had eaten kulcha/naan/roti in the last 24 hours, but only 60.5% reported this for the child under 5. On the other hand, adolescent girls were reported to have had paratha the most times (59.5%), compared to 48.1% of men, with children under 5 having had it the least times (40%). Some foods were given more to young children than to other family members including khatai/biscuit (consumed by a child in 46.5% of households, rusk (15.4%) and sliced bread (12.8%), the highest among all family members analyzed for these foods. (Table 2).

Table 3: Incidence of consumption of selected food items by household members in last 24 hours

| | REPOUDENT (WRA) | | | ADOLESCENT GIRL | | | CHILD UNDER 5 | | | MALE ADULT | | |
|-------------------------|-----------------|-------------|-------------|-----------------|-------------|-------------|---------------|-------------|-------------|--------------|-------------|-------------|
| | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural |
| <i>Kulcha/Naan/Roti</i> | 80.3% | 80.0% | 80.8% | 74.7% | 73.4% | 76.2% | 60.5% | 59.6% | 61.7% | 81.3% | 81.5% | 81.0% |
| Sliced Bread | 9.4% | 13.1% | 4.1% | 10.1% | 14.0% | 5.0% | 12.8% | 16.4% | 7.9% | 5.4% | 7.1% | 3.1% |
| <i>Khatai/Biscuit</i> | 12.4% | 14.8% | 8.8% | 20.0% | 27.2% | 10.8% | 46.5% | 51.5% | 39.9% | 5.2% | 5.9% | 4.1% |
| Rusk | 8.6% | 10.1% | 6.5% | 7.5% | 8.5% | 6.3% | 15.4% | 16.4% | 14.2% | 4.5% | 5.2% | 3.4% |
| <i>Halwa</i> | 5.5% | 6.7% | 3.7% | 4.1% | 6.3% | 1.3% | 3.8% | 4.8% | 2.3% | 3.6% | 4.8% | 2.1% |
| <i>Paratha</i> | 54.9% | 58.0% | 50.5% | 59.5% | 62.6% | 55.5% | 40.0% | 41.8% | 37.6% | 48.1% | 50.8% | 44.3% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

A comparison of average consumption, combining **frequency** and **quantity**, of the wheat flour-based products by household members is provided in Table 4, keeping the adult male as the control variable. On average, consumption by target groups of most of the wheat-based staples, as a percentage of consumption by adult men, is higher than expected (based on the calorie requirement ratio). The exception is consumption of kulcha, naan and roti which is lower than expected for adolescent girls (10-14) and children U5 compared to consumption by men. For example, based on calorie requirements alone, one might expect an adolescent

girl (10-15) to consume 74% of what an adult male consumed. However, these groups are consuming substantially more of the other categories and so the overall intake of the wheat flour food vehicle looks to be more than proportional.

Table 4: Relative consumption of household members relative to energy ratio

| | <i>Calories per day</i> | <i>Energy ratio</i> | <i>Kulcha/Naan/Roti</i> | <i>Sliced Bread</i> | <i>Khatai/Biscuit</i> | <i>Rusk</i> | <i>Halwa</i> | <i>Paratha</i> |
|-------------------|-------------------------|---------------------|-------------------------|---------------------|-----------------------|-------------|--------------|----------------|
| Respondent WRA | 1840 | 78% | 82% | 170% | 219% | 175% | 121% | 93% |
| Girls (10-14) | 1600 | 74% | 61% | 167% | 362% | 168% | 89% | 87% |
| Child Under 5 | 1275 | 49% | 22% | 132% | 781% | 221% | 60% | 33% |
| Adult Male | 2600 | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

These results show that the contribution of the ready-to-eat wheat-based products is more significant for children under 5 than for other age groups, and so the fact these products are very likely to be made with fortifiable wheat flour is welcome. However, it is of concern for the future disease burden from non-communicable diseases that very young children are eating khatai/biscuits at a frequency approaching that of kulcha/nan/roti (46.5% versus 60.5%). Likewise, the fact that almost 60% of adolescent girls consumed paratha in the last 24 hours is of concern for rapidly rising levels of overweight and obesity, which are especially affecting women in Pakistan.

The result that target groups are consuming a proportional share within the family is not especially surprising given that wheat is a staple and not a “precious” food more likely to be served disproportionately to higher ranking family members (men, elders) such as meat, dairy etc. Indeed, this is a prime benefit of fortification that the nutrients are added to inexpensive staple foods that nearly everyone consumes.

Projected Beneficiaries and Micronutrient Deficiency Cases Averted

We have modelled likely beneficiaries of FFP **broken down by income quintile**. The model has been built using:

- i) Total projected users of fortified product by end of project (as per logframe targets)
- ii) best estimates of the income distribution of formal sector, fortifiable flour/oil use;
- iii) revised estimates of specific micronutrient deficiency prevalence rates for specific target groups, using data from NNS 2018;
- iv) estimates of the income skew of micronutrient deficiencies;
- v) evidence of effectiveness of fortification in averting cases of deficiency taken from the global evidence base (see original BIA analysis).

The model is explained in greater detail in annex 1, and a breakdown of results is provided there.

Wheat Flour Benefits

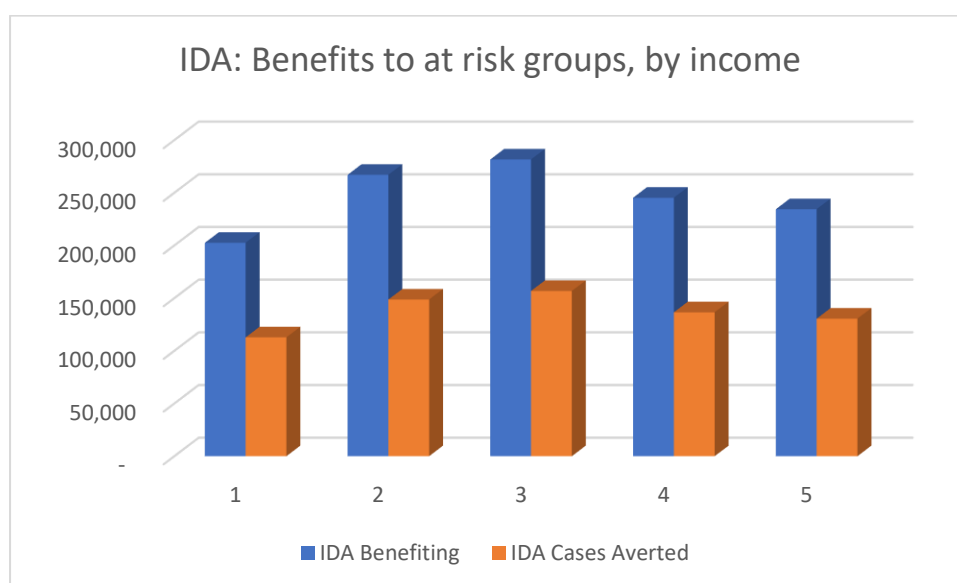
The summary results show that an estimated **6,037,964** at risk population (WRA, adolescent girls and children under 5) will have consumed fortified flour by 2021, including **1,238,638** who suffer from iron deficiency anaemia. Fortification can be expected to avert **690,174** cases of

IDA by 2021 (see Table 5). The distribution of benefits by income group is fairly proportional by income group (Figure 5).

Table 5: Summary of Key Risk Group Benefits – Wheat Flour Fortification

| Income group | 1 (poorest) | 2 | 3 | 4 | 5 (richest) | |
|--|-------------|-----------|-----------|-----------|-------------|----------------|
| At Risk Groups Consuming/Benefiting | 878,724 | 1,174,532 | 1,331,136 | 1,252,834 | 1,400,738 | 6,037,964 |
| IDA Benefiting | 192,373 | 255,214 | 278,374 | 251,770 | 260,906 | 1,238,638 |
| Possible IDA Deficiency Cases Averted | 106,498 | 141,390 | 154,808 | 140,587 | 146,891 | 690,174 |

Figure 5: Benefits of addressing IDA Deficiency



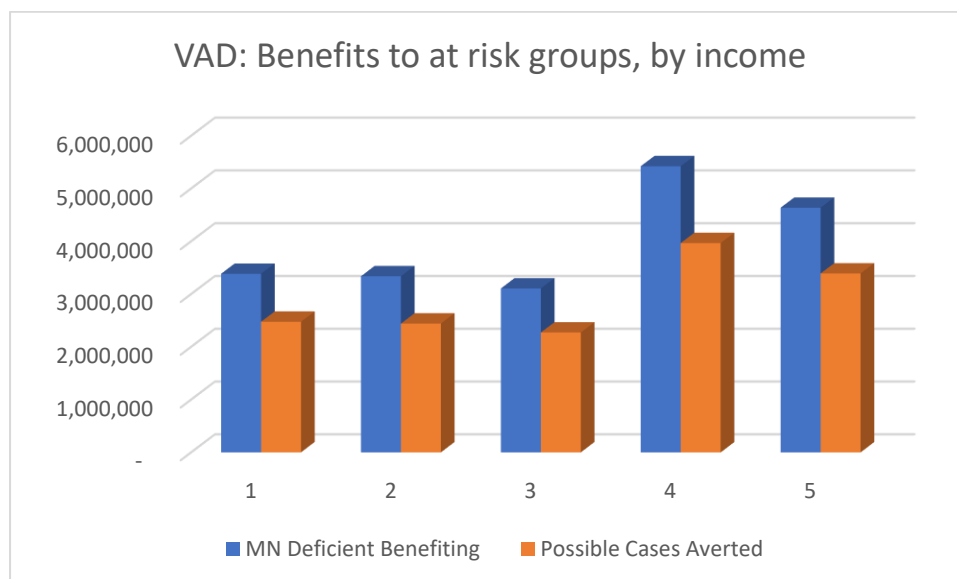
Oil Benefits

The summary results show that an estimated **57,094,311** at risk population (WRA, adolescent girls and children under 5) will have consumed fortified oil/ghee by 2021, including **19,883,963** who suffer from VAD. Oil fortification can be expected to avert **14,542,502** cases of VAD by 2021 (see Table 6). The distribution of benefits by income group is somewhat skewed to higher income groups given the informal oil sector is assumed to serve the poorest three quintiles only (see Figure 6). However, there are higher absolute numbers of beneficiaries even in the poorer quintiles.

Table 6: Summary of Key Risk Group Benefits – Oil Fortification

| Income group | 1 (poorest) | 2 | 3 | 4 | 5 (richest) | Total |
|--|------------------|------------------|------------------|------------------|------------------|-------------------|
| At Risk Groups Consuming/Benefiting | 8,428,965 | 8,428,965 | 8,428,965 | 15,903,708 | 15,903,708 | 57,094,311 |
| Vitamin A Deficient Benefiting | 3,383,667 | 3,337,315 | 3,105,557 | 5,422,263 | 4,635,160 | 19,883,963 |
| Possible Cases Vit A deficiency averted | 2,474,707 | 2,440,807 | 2,271,307 | 3,965,672 | 3,390,010 | 14,542,502 |

Figure 6: Benefits of addressing VAD



Conclusion

The absolute number of beneficiaries remains large with over 14 million people projected to consume fortified flour and over 133 million people projected to consume fortified oil/ghee by the end of the project. The extent of micronutrient deficiency in Pakistan and the fact that deficiencies occur across all income groups (though are highest among the poor), means that a population level intervention such as fortification is still much needed and appropriate. According to NNS 2018, the prevalence of iron deficiency is 28.6% for children under 5, and 18.2% for WRA. Given that fortification is a preventive measure, it benefits anyone whose diet is not already comfortably meeting minimum daily micronutrient needs.

Given that the overall market share for the formal oil sector is 71.8%, the benefits of oil/ghee fortification are projected to extend across a greater segment of the population, with significant exceptions particularly in Sindh and Balochistan. The strong actions of the Punjab government demonstrate that regulation is possible and will have a direct impact on the likely number of beneficiaries from the poorest groups.

It is reassuring that target groups are consuming a proportional share of fortified foods within the family, though this is not especially surprising given that wheat is a staple and not a “precious” food such as meat or dairy more likely to be served disproportionately to higher ranking family members (men, elders). Indeed, a prime benefit of fortification that the nutrients are added to inexpensive staple foods that nearly everyone consumes.

The exploration of the feasibility of fortification of bulk-produced flour at chakki mills is highly appropriate to complement the current FFP scope and potentially allow full population coverage which will be important for reaching the lowest income quintile.

The greatest threats to realisation of potential benefits of FFP come from two sources:

- For wheat flour, the lower than expected percentage of total output that is being fortified. This needs to be increased significantly for fortified product to reach the majority of households who consume commercial sector flour.
- For oil/ghee, regulation of the informal sector especially in Sindh and Balochistan is needed and greater behaviour change to encourage consumers to switch to safer brands.

Annex 1

Key Risk Group Benefits Model

The model is constructed using our best data or assumptions on:

- i) total projected users of fortified product by end of project (as per logframe targets)
- ii) best estimates of the income distribution of formal sector, fortifiable flour/oil use;
- iii) revised estimates of specific micronutrient deficiency prevalence rates for target groups, using data from NNS 2018
- iv) estimates of the income skew of micronutrient deficiencies;
- v) evidence of effectiveness of fortification in averting cases of deficiency taken from the global evidence base (see original BIA analysis).

i) **Total projected users** are calculated for the logframe EOP targets, based on data from expected total production of fortified food (in metric tons) divided by per capita consumption, which is 84 kg in the case of flour and 20.45 Kg in the case of oil.

The FFP logframe has recently updated outcome targets related to the number of people consuming fortified products, given the lower than anticipated percentage of wheat flour production that millers are willing to fortify. The current logframe targets for outcome indicators 1 and 2 by end of project (EOP) are:

| | |
|--|----------------------|
| Number of people (% of population) consuming fortified wheat flour | 14,127,196 (6.8%) |
| Number of people (% of population) consuming fortified oil/ghee | 133,235,411 (64.14%) |

ii) **Estimates of the income distribution of the formal sector, fortifiable flour/oil use:** For wheat flour, we use the distribution of fortifiable wheat flour from the RDS II results (see Figure 1 main document). For oil/ghee, we do not have data on the income distribution of the informal sector but know that it accounts for 28.2% of the population. We know that there is a strong relationship with geography, with Sindh, Balochistan and southern Punjab accounting for most of the informal sector, and that there is also an assumed relationship with poverty. For the purpose of this model, we have therefore assumed that all consumption of informal sector oil falls equally between the bottom three income quintiles. As better data becomes available from RDS-III, using data on actual consumption of fortified vs unfortified oil, we will refine this assumption.

iii) **Revised estimates of micronutrient deficiency** – we have taken rates from the National Nutrition Survey (NNS 18) for three groups - WRA, adolescent girls and children under 5 – for iron deficiency anaemia (IDA) and vitamin A deficiency (VAD). According to NNS 2018, the prevalence of IDA is 28.6% for children under 5, and 18.2% for WRA. NNS data released so far reports only anaemia for adolescent girls (57.1%) and not IDA. We have estimated IDA for this group using the average ratio between anaemia and IDA for WRA and children under 5, which gives an estimated IDA rate of 25.9% for adolescent girls.

Vitamin A Deficiency (VAD) is 51.5% for children under 5 and 27.4% for WRA according to NNS18. VAD prevalence for adolescent girls is not reported by NNS18 and so we have used an average of the WRA and under 5 rates to give 39.5%.

iv) **estimates of the income skew of micronutrient deficiencies:** Rates of micronutrient deficiency are not spread uniformly across income groups and affect the poorest the worst. Data from NNS 2018 is not disaggregated by income group, but we do have stunting figures from NNS 2011 by income group. We therefore used these relative ratios to create deficiency rates specific for each income group, with the following results:

| | 1 (poorest) | 2 | 3 | 4 | 5 (richest) |
|--|----------------|-------|-------|-------|----------------|
| Relative ratio (from previous dataset on stunting) | 112% | 110% | 102% | 95% | 81% |
| IDA children (average 28.6%) | 31.9% | 31.5% | 29.3% | 27.1% | 23.2% |
| IDA WRA (average 18.2%) | 20.3% | 20.0% | 18.6% | 17.3% | 14.7% |
| IDA adolescent girls (average 25.9%) | 28.9% | 28.5% | 26.5% | 24.6% | 21.0% |
| VAD children (average %) | 57.5% | 56.7% | 52.8% | 48.8% | 41.7% |
| VAD WRA (average %) | 30.6% | 30.2% | 28.1% | 26.0% | 22.2% |
| VAD adolescent girls (average %) | 44.1% | 43.5% | 40.5% | 37.4% | 32.0% |

v) **evidence of effectiveness of fortification in averting cases of deficiency** – these were taken from the global evidence base which was presented in the original BIA analysis.

Wheat Flour Beneficiaries

| | 1 (poorest) | 2 | 3 | 4 | 5 (richest) | Total |
|---|----------------|------------|------------|------------|-------------|-------------------|
| Consuming/Benefiting Population | 2,055,975 | 2,748,086 | 3,114,497 | 2,931,291 | 3,277,347 | 14,127,196 |
| Children 0-5 Consuming/Benefiting @12.66% | 260,286 | 347,908 | 394,295 | 371,101 | 414,912 | 1,788,503 |
| Iron Deficient Children Benefiting | 83,093 | 109,543 | 115,527 | 100,617 | 96,166 | 504,946 |
| Potential IDA Cases Averted @ 55% Effective | 45,701 | 60,249 | 63,540 | 55,340 | 52,891 | 277,720 |
| Adult Women 15-49y Consuming/Benefiting @ 25.08% | 515,639 | 689,220 | 781,116 | 735,168 | 821,959 | 3,543,101 |
| Iron Deficient Women Benefiting | 104,751.90 | 138,096.90 | 145,641.08 | 126,844.56 | 121,232.60 | 636,567 |
| Potential IDA Cases Averted at 50% | 52,376 | 69,048 | 72,821 | 63,422 | 60,616 | 318,284 |
| Adolescent Girls Benefiting @ 5% | 102,798.76 | 137,404.28 | 155,724.86 | 146,564.57 | 163,867.33 | 706,360 |
| Anaemic Girls Benefiting @ 25.9% | 29,719 | 39,179 | 41,319 | 35,987 | 34,395 | 180,599 |
| Potential Anaemia Cases Averted at 49.5% | 14,710.86 | 19,393.67 | 20,453.14 | 17,813.44 | 17,025.33 | 89,396 |
| Summary Key Risk Group Benefits | | | | | | |
| At Risk Groups Consuming/Benefiting | 878,724 | 1,174,532 | 1,331,136 | 1,252,834 | 1,400,738 | 6,037,964 |
| Micronutrient Deficient Benefiting | 202,555 | 267,034 | 281,622 | 245,275 | 234,424 | 1,230,910 |
| Possible IDA Deficiency Cases Averted | 112,788 | 148,691 | 156,814 | 136,575 | 130,533 | 685,400 |

Oil Beneficiaries

| | 1 (poorest) | 2 | 3 | 4 | 5 (richest) | Total |
|--|--------------|------------|------------|------------|-------------|--------------------|
| Population Consuming Fortified Oil | 19,669,852 | 19,669,852 | 19,669,852 | 37,112,928 | 37,112,928 | 133,235,411 |
| Assumed VAD Prevalence Children - 51.5% | 57.5% | 56.7% | 52.8% | 48.8% | 41.7% | 51.5% |
| Assumed VAD Prevalence Women - 27.4% | 30.6% | 30.2% | 28.1% | 26.0% | 22.2% | 27.4% |
| Assumed VAD Prevalence Adolescent Girls - 39.5% | 44.1% | 43.5% | 40.5% | 37.4% | 32.0% | 39.5% |
| Children 0-5 Consuming F Oil/per quintile @12.66% | 2,490,203 | 2,490,203 | 2,490,203 | 4,698,497 | 4,698,497 | 16,867,603 |
| Children 0-5 w/ VAD Consuming @ 51.5% | 1,431,486 | 1,411,877 | 1,313,830 | 2,293,930 | 1,960,940 | 8,686,816 |
| Cases VAD Averted @ 67% | 959,096 | 945,957 | 880,266 | 1,536,933 | 1,313,830 | 5,636,082 |
| Women 15-49y Consuming Benefiting | 4,932,817 | 4,932,817 | 4,932,817 | 9,307,202 | 9,307,202 | 33,412,854 |
| Women w/VAD consuming @ 27.4% | 1,508,658 | 1,487,991 | 1,384,658 | 2,417,595 | 2,066,654 | 8,865,557 |
| Cases Averted @ 79% | 1,191,839.47 | 1,175,513 | 1,093,880 | 1,909,900 | 1,632,657 | 7,003,790 |
| Adolescent Girls Consuming/Benefiting | 1,005,945.00 | 1,005,945 | 1,005,945 | 1,898,009 | 1,898,009 | 6,813,854 |
| Adolescent Girls with VAD @ 39.5% (Av Child&WRA) | 443,523 | 437,448 | 407,069 | 710,738 | 607,566 | 2,606,344 |
| Cases Averted @ 73% (Av Effectiveness) | 323,772 | 319,337 | 297,161 | 518,839 | 443,523 | 1,902,631 |
| Summary Key Risk Group Benefits | | | | | | |
| At Risk Groups Consuming/Benefiting | 8,428,965 | 8,428,965 | 8,428,965 | 15,903,708 | 15,903,708 | 57,094,311 |
| MN Deficient Benefiting | 3,383,667 | 3,337,315 | 3,105,557 | 5,422,263 | 4,635,160 | 19,883,963 |
| Possible Cases Averted | 2,474,707 | 2,440,807 | 2,271,307 | 3,965,672 | 3,390,010 | 14,542,502 |