

# Cost-effectiveness of shifting from short-term methods to Long Acting Reversible Contraceptives in Punjab

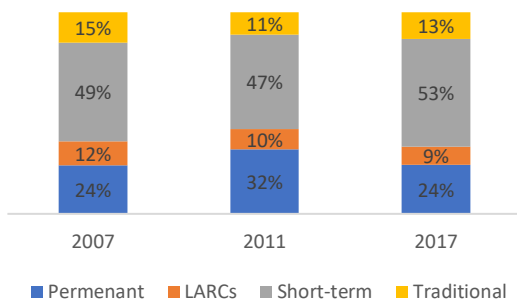
## Health and Economic Impact Analysis

### FAMILY PLANNING AND USE OF LONG ACTING REVERSIBLE CONTRACEPTIVES IN PUNJAB

Punjab province has not witnessed any substantial change in modern method contraceptive use over the last decade. The modern method contraceptive prevalence rate (mCPR) increased only by 2.9%<sup>1</sup> points between 2003 (27%) to 2017 (29.9%). However, during the same period some of the other reproductive health indicators have improved substantially. For example, delivery by a skilled birth attendant increased from 32% to 76% and antenatal care improved from 44% to 87%<sup>2</sup> between 2003 and 2017.

The contraceptive method mix has remained largely the same over the last decade. Female sterilization and condom use remained the two most preferred methods in Punjab. The use of Long Acting Reversible Contraceptives (LARCs) has remained low.

Figure 1: Punjab method mix - trend



Source: calculated by author using data from Multiple Indicator Cluster Survey (MICS), 2007, 2011 and 2017, Government of Punjab

Method mix is dominated by the use of short and permanent methods. Share of LARCs has reduced over time from 12% to 9%. Fig 1, above suggests that LARCs are grossly underutilised and have lost their share overtime. Limited choice of LARC is also due to insufficient provider training on

counselling, unpredictable and fragmented availability of long acting reversible methods.

Research provides strong scientific evidence that LARCs benefit a wider population of potential users than previously thought. According to a research<sup>3</sup> women who tried LARC despite their general preference for oral contraceptives or injections, found LARC highly satisfying. Moreover, the study showed that the decision to try a LARC prevented unintended pregnancy far better than using a short-acting method. One year after initiation, women randomised to long-acting reversible contraception had high continuation rates and consequently experienced superior protection from unintended pregnancies compared with women using short-acting reversible contraception<sup>4</sup>.

Punjab has a high unmet need for family planning of 17.8%<sup>5</sup>, LARCs can be an effective method that can be promoted to fill this gap. Nepal started working on promoting the use of LARCs in 2016 through piloting different approaches and found LARCs to be highly cost-effective with a return of 6 Nepali Rupees on each Nepali Rupee invested<sup>6</sup>. In Sri Lanka, 33% of the modern method users are of LARCs<sup>7</sup>. Globally LARCs are estimated to be used by 19% of the modern method users<sup>8</sup>.

### ABOUT THIS PAPER

This paper tries to estimate, through modelling of different scenarios, the impact (health and financial) of shifting from short-term methods to LARCs in Punjab.

This analysis has been conducted under the Health Financing pathway of change to achieve the Milestone - Costing analysis of FP/SRH services and/or commodities for WISH Pakistan.

The results of this study will be shared with the Government of Punjab (GoPb) to guide and advocate for promoting the

<sup>1</sup> Calculated based on data from Multiple Indicator Cluster Survey, 2003, 2007, 2011 and 2017.

<sup>2</sup> Multiple Indicator Cluster Survey, 2003 and 2017.

<sup>3</sup> David Hubacher, Hannah Spector, Charles Monteith, Pai-Lien Chen, Catherine Hart. Long-acting reversible contraceptive acceptability and unintended pregnancy among women presenting for short-acting methods: a randomized patient preference trial. American Journal of Obstetrics and Gynecology

<sup>4</sup> David Hubacher, Hannah Spector, Charles Monteith, Pai-Lien Chen, Catherine Hart. Long-acting reversible contraceptive acceptability and unintended pregnancy among

women presenting for short-acting methods: a randomized patient preference trial. American Journal of Obstetrics and Gynecology.

<sup>5</sup> MICS, 2017, GoPb.

<sup>6</sup> Afeef Mahmood. Mobilising Visiting Providers to expand access to LARC in Ramechhap district, Nepal – a costing analysis, 2016. DFID and USAID.

<sup>7</sup> Calculated by author based on data from data booklet on contraceptive use by method, 2019, United Nations.

<sup>8</sup> Calculated by author based on data from data booklet on contraceptive use by method, 2019, United Nations.

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appropriate method mix in future policies and programmes leading to increasing CPR in the province.

### PROPOSED SCENARIOS

To estimate the impact of shifting from short term methods to LARCs we developed two scenarios namely '*business-as-usual scenario*' SCENARIO 1 and '*shifting from short-term methods to LARC scenario*' SCENARIO 2. Table below explains the key assumptions used to construct these scenarios.

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Table 1: Key assumptions used for construction of scenarios

Details	Business-as-Usual scenario	Shifting from short-term methods to LARCs
<b>Baseline method mix data</b>	Refer to figure 1, year 2017-18 from MICS, 2017.	
<b>Contraceptive Prevalence Rate</b>	Increases by 0.7% per annum – based on historical trend of increase	
<b>Additional users</b>	No additional users	No additional users – only existing short-term method users will switch to LARC
<b>Method mix</b>	No change in method mix	Share of short-term methods decreases from 53.1% to 47.4% and of LARCs increases from 9.3% to 15%
<b>Costs and benefits</b>	Only additional/incremental costs and benefits are considered	
<b>Baseline year</b>	2020	
<b>Projection years</b>	2021 to 2025	
<b>Discounting for time value of money</b>	Not factored in the analysis	
<b>Impacts</b>	Impacts of commodity use are considered only for the additional commodities and no historical service use has been factored in. e.g. An IUCD user who got insertion in 2020 will continue to provide benefits in 2021 and onwards. As these are not additional, therefore these were not considered.	
<b>Exchange rate</b>	Was kept constant for future years. 1 US \$ was valued at 165 PKR.	

Figure below presents the change in method mix as programmed to develop the shifting methods scenario.

### METHODOLOGY

To assess the health and economic impacts of shifting existing users of short-term methods to LARCs we used two tools to model our scenarios as detailed in table 1. Tools used were Lives Saved Tool (LiST)<sup>9</sup> version 5.761 and Impact 2 (version 5, March 2019)<sup>10</sup>.

LiST was setup by entering a range of data for Punjab, which included but was not limited to (i) demography, (ii) cause of death information for neonates, children under five, mothers, stillbirths, (iii) coverage levels for a variety of key health interventions that affect child and maternal mortality including CPR and method mix, (iv) health status indicators<sup>11</sup>.

LiST analysis was run for both scenarios separately, programming changes in each scenario as detailed in table 1. The only change between the two scenarios was shifting of method mix in the scenario 2. Following key results were obtained from LiST under each scenario.

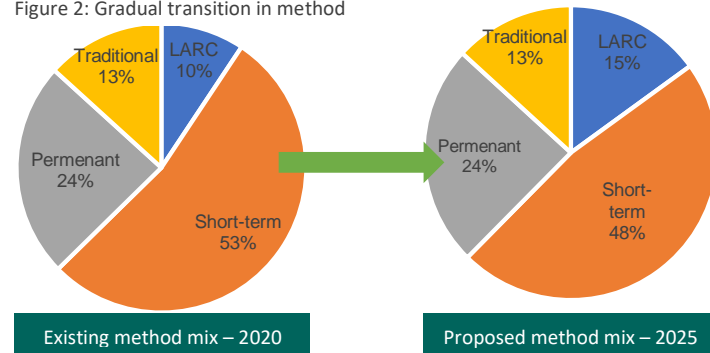
- Estimated additional commodities by method that will be required.
- Estimated number of female populations for projection years based on increased CPR (0.7% per annum) and existing population growth rate.
- Estimated number of Women of Reproductive Age (WRA) for projection years.
- Estimated Total Fertility Rate (TFR) for projection years.

Two models (one for each scenario) were setup for Impact 2 using the data obtained from LiST (above) and other data points were updated with Punjab specific data from Pakistan Demographic Health Survey (PDHS) 2017-18 and MICS 2017-18. Following results were generated using Impact 2.

- Number of unintended pregnancies, live births and abortions averted
- Number of deaths (maternal and child) averted
- Number of Disability Adjusted Life Years (DALYs) averted
- Number of Couple Years of Protection (CYPs) generated

Following costs were considered in calculating the financial impact of both the scenarios.

Figure 2: Gradual transition in method



Source: calculated by author using data from MICS 2017, GoPb.

Source: Author assumptions based on baseline data from MICS 2017, GoPb

<sup>9</sup> The Lives Saved Tool is a mathematical modelling tool which allows users to estimate the impact of coverage change on mortality in low- and middle-income countries. LiST calculates changes in cause-specific mortality based on intervention coverage change, intervention effectiveness for that cause, and the percentage of cause-specific mortality sensitive to that intervention.

<sup>10</sup> Impact 2 is a reproductive health model designed to run off service provision data— meaning it can be used to estimate the impact of services provided by an

organisation, or, across the entire country. It is also able to calculate the Disability Adjusted Life Years averted and Couple of Years Protection generated because of specific services provided.

<sup>11</sup> A wide range of sources were used including but not limited to (i) Pakistan Demographic Health Survey, (ii) MICS, (iii) Census of Pakistan, 2017.

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- Cost per CYP of each method [cost per CYP was based on (i) salaries, (ii) commodities, drugs, and supplies; (iii) lab investigation; and (iv) overheads]<sup>12</sup>
- Cost of IEC and additional counselling under the scenario of changing method mix<sup>13</sup>.

Only incremental benefits were valued against the counterfactual. For the purposes of this analysis, the counterfactual is scenario 1 (Business as Usual), i.e., no change in method mix and increase in CPR of 0.7% per annum. There are several gains that will arise because of shifting from short-term to LARCs. Only those gains, which can be valued with reliable estimation and are within the scope of this analysis have been accounted for. The following gains have been valued as part of the benefits valuation:

- Disability Adjusted Life Years (DALY) averted because of (valued at per-capita GDP of Pakistan):
  - Reduction in unwanted pregnancies
  - Reduction in maternal mortality
  - Reduction in unsafe abortions
- Savings associated with reduction in pregnancy related services<sup>14</sup> (e.g. antenatal care, deliveries, and newborn care<sup>15</sup>).

There are other gains, which have not been accounted for in this analysis, but should be further discussed to inform policy decisions

- The reduction in fertility rate reduces pressure on resources, both at a household and national level, including on the environment.
- Fewer orphans due to decreased maternal mortality and as a result, lower social costs to the society.
- Fewer children per household could lead to more savings and increased expenditure on different activities, including education.
- Impact on women of having children by choice rather than by chance.
- Savings resulting from reduced maternal and child mortality which, in turn, will allow resources freed up from household or health sector budgets to be spent on other more productive activities.

We compared the costs and benefits under both the scenarios i.e., the business-as-usual scenario and the shifting from short-term methods to LARC scenario. Following key ratios were calculated to determine which scenario is more cost-effective in comparison.

- Cost to benefit ratio
- Cost per CYP
- Cost per DALY averted

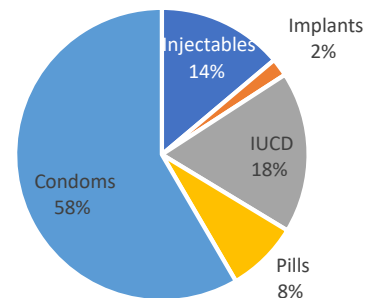
- Cost per death averted
- Ratio of GDP per capita to cost per DALY averted

## RESULTS

### Business-as-Usual Scenario

In the business-as-usual scenario we only increased the CPR by 0.7% per annum, while all remaining parameters were unchanged. According to our calculation this will result in generating an additional 1.73 million CYPs at a cost of US \$6.71 million (PKR 1.11 billion) over the period 2021 to 2025. Lion's share (58%) of CYPs is generated through use of condoms. Total share of short-term methods is 80%, whereas remaining 20% is generated by use of LARC.

Figure 3: Aggregate share of CYPs by method (2021 to 2025)



Source: calculated by author using data from Impact 2.

The table below presents the cost of additional commodities that will be required. Number of commodities were estimated using LiST as detailed in the methodology of this paper.

Table 2: Cost of additional commodities in US \$

Commodities	2021	2022	2023	2024	2025	Total
Injectables	47,598	98,815	153,860	211,221	271,320	782,814
Implants	8,294	17,202	26,111	35,514	45,071	132,192
IUCD	6,049	12,527	18,712	25,298	31,848	94,434
Pills	8,279	17,187	26,761	36,738	47,191	136,155
Condoms	338,474	702,681	1,094,113	1,502,017	1,929,384	5,566,669
<b>Total</b>	<b>408,693</b>	<b>848,413</b>	<b>1,319,557</b>	<b>1,810,787</b>	<b>2,324,814</b>	<b>6,712,265</b>

Source: calculated by author using data from LiST.

<sup>12</sup> Afeef Mahmood, costing of family planning services for an Independent Progress Review (mid-term) of the Programme Partnership Arrangement between IPPF and DFID, 2012. – costs were updated to 2020 price levels.

<sup>13</sup> -do-

<sup>14</sup> Total costs saved were adjusted for the current level of coverage for the service provision, using the algorithm (example of ANC): [number of antenatal care visits

reduced x cost per antenatal care visit x current level of coverage of antenatal care visit]

<sup>15</sup> Afeef Mahmood, costing of Essential Health Services Package, Punjab, GoPb (2012) – costs were updated to 2020 price levels.

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Based on the above service provision we estimate that a total of 4,478 deaths will be averted and more than 370,000 DALYs will be averted.

Table 3: Health impacts

Details	2021	2022	2023	2024	2025	Total
<b>Demographic impacts (averted)</b>						
Unintended pregnancies	35,463	73,638	113,304	154,925	197,979	575,309
Live births	9,934	20,628	31,739	43,398	55,458	161,156
Abortions	21,562	44,773	68,890	94,196	120,373	349,793
<b>Health impacts (averted)</b>						
Maternal death	26	51	75	97	116	365
Child death	254	526	810	1,107	1,415	4,113
Unsafe abortions	12,443	25,837	39,754	54,358	69,464	201,855
<b>DALYs (averted)</b>						
Maternal	1,607	3,173	4,635	5,995	7,225	22,636
Child	21,434	44,508	68,482	93,638	119,660	347,721
Total DALYs	23,041	47,681	73,117	99,633	126,885	370,357
<b>CYPs</b>						
CYPs	106,498	221,215	341,322	467,201	597,865	1,734,101

Source: Impact 2 modelling results

As a result of reduced number of pregnancies and deaths we estimate the following benefits can be attributed to family planning intervention under this scenario.

Table 4: Benefits valued – US \$ in million

Details	2021	2022	2023	2024	2025	Total
DALYs valued	26.59	56.67	89.94	127.46	169.63	470.30
Savings on health care cost	0.75	1.56	2.40	3.29	4.20	12.20
Antenatal Care	0.14	0.30	0.46	0.63	0.80	2.34
Normal delivery	0.46	0.95	1.46	2.00	2.55	7.42
Newborn care	0.15	0.31	0.48	0.66	0.84	2.45
Total	27	58	92	131	174	483

Source: calculations by author.

It is estimated that a total of US \$483 million (PKR 79.61 billion) between 2021 to 2025 will be saved. Approximately US \$ 12.2 million will be saved on healthcare costs.

**This gives an estimated return of US \$72 for each US \$1 invested over the period analysed at an average cost per CYP of US \$3.87. A DALY is averted at a cost of US \$18 and a death averted at a cost of US \$1,499.**

### Shifting from short-term methods to LARC scenario

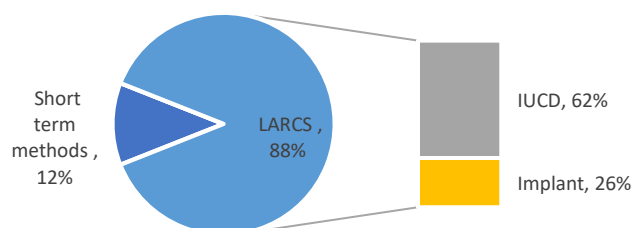
In this scenario we increased the CPR by 0.7% per annum and shifted the method mix from short-term to LARCs. As a result

of this shifting share of short-term methods decreased from 53.1% to 47.4% and of LARCs increased from 9.3% to 15%. The increase was gradually modelled between 2021 to 2025. Remaining all parameters were unchanged.

The change in method mix without any additional users will result in generating an additional 2.01 million CYPs at a cost of US \$6.66 million (PKR 1.10 billion) over the period 2021 to 2025.

Lion's share (62%) of CYPs is generated through use of IUCD. Total share of LARCs is 88%, whereas remaining 12% is generated by use of short-term methods.

Figure 4: Aggregate share of CYPs by type (2021 to 2025)



Source: calculated by author using data from Impact 2.

Table below presents the cost of additional commodities and IEC. Number of commodities were estimated using LiST as detailed in the methodology of this paper.

Table 5: Cost of additional commodities in US \$<sup>16</sup>

Details	2021	2022	2023	2024	2025	Total
Injectables	(2,477)	(3,844)	(4,637)	(5,597)	(7,394)	(23,948)
Implants	136,245	279,894	432,858	596,016	821,063	2,266,075
IUCD	24,246	47,957	73,173	100,089	132,605	378,070
Pills	(12,052)	(24,170)	(37,353)	(51,634)	(67,054)	(192,263)
Condoms	132,621	304,264	476,470	650,681	828,791	2,392,826
Cost of counselling	365,217	366,347	368,420	370,371	372,195	1,842,550
Total	643,800	970,447	1,308,932	1,659,926	2,080,204	6,663,310

Source: calculated by author using data from LiST.

Based on the service provision under this scenario we estimated that a total of 6,653 deaths and more than 551,000 DALYs will be averted.

<sup>16</sup> Negative costs are savings as lesser number of commodities will be required due to method shifting from short to long-term.

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Table 6: Health impacts

Details	2021	2022	2023	2024	2025	Total
<b>Demographic impacts (averted)</b>						
Unintended pregnancies	53,128	108,371	166,567	228,087	304,384	<b>860,537</b>
Live births	14,882	30,357	46,659	63,892	85,264	<b>241,055</b>
Abortions	32,303	65,890	101,274	138,679	185,069	<b>523,215</b>
<b>Health impacts (averted)</b>						
Maternal death	36	70	101	131	164	<b>502</b>
Child death	380	775	1,191	1,630	2,176	<b>6,152</b>
Unsafe abortions	18,641	38,023	58,442	80,028	106,798	<b>301,932</b>
<b>DALYs (averted)</b>						
Maternal	2,237	4,336	6,298	8,116	10,156	<b>31,143</b>
Child	32,111	65,500	100,674	137,858	183,972	<b>520,115</b>
Total DALYs	34,349	69,836	106,972	145,974	194,129	<b>551,259</b>
<b>CYPs</b>						
CYPs	122,653	252,645	388,941	532,390	707,758	<b>2,004,387</b>

Source: Impact 2 modelling results

As a result of reduced number of pregnancies and deaths we estimated that following benefits can be attributed to family planning intervention under this scenario.

Table 7: Benefits valued – US \$ in million

Details	2021	2022	2023	2024	2025	Total
DALYs valued	40	83	132	187	260	<b>701</b>
Savings on health care cost	1.1	2.3	3.5	4.8	6.5	<b>18</b>
Antenatal Care	0.2	0.4	0.7	0.9	1.2	<b>3</b>
Normal delivery	0.7	1.4	2.1	2.9	3.9	<b>11</b>
Newborn care	0.2	0.5	0.7	1.0	1.3	<b>4</b>
<b>Total</b>	<b>41</b>	<b>85</b>	<b>135</b>	<b>192</b>	<b>266</b>	<b>719</b>

Source: calculations by author.

It is estimated that a total of US \$719 million (PKR 118.6 billion) between 2021 to 2025 will be saved. Approximately US \$18 million will be saved in healthcare costs alone.

**This gives an estimated return of US \$108 for each US \$1 invested over the period analysed at an average cost per CYP of US \$3.3. A DALY is averted at a cost of US \$12 and a death averted at a cost of US \$1,000.**

## CONCLUSION – COST EFFECTIVENESS

Both scenarios presented in this paper generate high returns on investment and are highly cost-effective if compared with the GDP per capita of Pakistan<sup>17</sup>.

In this paper we are trying to estimate if shifting from short-term methods to LARCs is a cost-effective approach to follow. Therefore, we will compare the key cost effectiveness and cost benefit indicators of both the approaches presented in this paper to draw a conclusion on cost-effectiveness.

<sup>17</sup> According to the recommendation of Commission on Macroeconomics & Health and WHO an intervention is considered to be very cost-effective and cost-effective if the cost per DALY is less than per capita GDP or between 1- and 3-times per capita GDP, respectively. If the cost per DALY is more than three times the GDP per capita,

## Economic Impacts

Figure 6: Comparison of cost per DALY

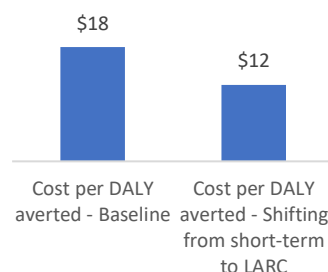
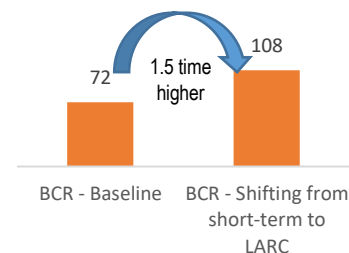


Figure 6: Benefit to Cost Ratio



Source: calculations by author.

Shifting from short-term methods to LARC had a better benefit to cost ratio of **1.5 times higher** and **33% lower cost per DALY averted** in comparison to business-as-usual scenario, which assumed no change in method mix. The cost per CYP was also found 15% lower if there is a shift in methods in comparison to baseline scenario.

## Health Impacts

Scenario 2 produced better health impacts in comparison to the business-as-usual scenario. There were **2,176 fewer deaths** and **additional 270,000 CYPs** generated in comparison to baseline when we modelled the shift from short-term methods to LARCs.

Detailed of these health impacts is given below.

Table 8: Health impact comparison under both scenarios

Details	Baseline Scenario	Shifting from short-term to LARC	Notes
Maternal deaths averted	365	502	<b>137 – more maternal lives saved</b>
Child deaths averted	4,113	6,152	<b>2,039 – more child lives saved</b>
DALYs averted	370,357	551,259	<b>180,902 – more DALYs averted</b>
CYPs generated	1,734,101	2,004,387	<b>270,287 – more CYPs generated</b>

Source: Impact 2 modelling results

From the analysis presented in this paper it can be construed that without any additional new users, the change in method mix from short-term methods to LARC methods can be extremely cost-effective. This shift does not require any additional costs but comes along with cost savings. The additional amounts saved can be invested in further increasing the coverage thus creating efficiency savings.

then the intervention is regarded as not cost-effective. In both scenarios cost per DALY averted is US\$ 18 and US\$ 12, which is much less than per capita GDP of Pakistan (US\$ 1,482)

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We used a conservative approach towards changing the method mix – e.g. in Sri Lanka 33% of the method mix is driven by LARCs. The savings can be huge even if we shift to 20% method mix of LARCs. Similarly, we were conservative in valuing benefits, e.g., we did not account healthcare cost saving for complicated deliveries and for abortions averted. If factored in, this will only improve the effectiveness of shifting from short-term methods to LARCs.

### WAY FORWARD

The analysis presented in this paper clearly demonstrates that Government of Punjab should consider aligning its family planning programmes and strategies to have a greater focus on LARC. Programmatically this will mean three things, (i) ensuring that the relevant service packages at appropriate levels of healthcare have LARCs included, (ii) staff are trained to promote the use of LARCs and also to provide the service when requested; and (iii) non-interrupted availability of LARCs at these facilities.

Availability of LARCs, in particular implants, have been an ongoing issue. Government needs to secure these supplies to ensure continuity in service provision. Punjab, with more than 26 million women of reproductive age had only 3,091 implants inserted during 2019<sup>18</sup>.

Government should consider commissioning a detailed study on barriers to promotion of LARCs in Punjab. This study can then inform development of a strategy focusing on the barriers to LARCs. An area that is usually overlooked is the post-partum use of LARCs. While there is limited information on the subject – a study on cost-effectiveness of PFP LARCS termed the strategy as ‘highly cost-effective’ with a return on investment of US \$4.6 for each US \$ invested<sup>19</sup>.

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<sup>18</sup> Figures extracted from contraceptive logistics management information system. Includes both public and private sector insertions.

<sup>19</sup> Afeef Mahmood, Innovative and Quality Postpartum Family Planning Services in Punjab, 2019, EVA-BHN, DFID.