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Appendix, A, B and E

ADOLESCENTS 360 OUTCOME EVALUATION IN ETHIOPIA

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Authors: Catarina Krug, Christian Bottomley, James Hargreaves, Aoife Doyle and Melissa Neuman
(London School of Hygiene and Tropical Medicine)

Appendix A – Methodology details

Index

Appendix A – Methodology details	1
Index	2
Study design	3
Study populations	3
Study unit inclusion criteria and selection	3
Region 3	
Woredas	3
Selection of study populations	4
Data collection tools	5
Modifications made to the A360 outcome evaluation protocol	5
Changes due to COVID-19 pandemic	5
Other changes	6
Outline of statistical analysis	7
Definitions and data manipulations	7
Main and secondary outcomes	7
Exposure to the A360 intervention	16
Regression framework	17
Analysis of main outcome	17
Analysis of secondary outcomes	18
Sampling weights	18
Sample size calculations	18
Analysis of trends in modern contraceptive use	20
Description of datasets	20
DHS	20
PMA2020	20
HMIS/DHIS	21
Flow diagram	21
References	23

Study design

Study populations

Our first target population were adolescent girls aged 15 to 19 years. However, within this study population, our primary outcome and some of our secondary outcomes was only evaluated in girls who report that they have been sexually active in the 12 months prior to the survey.

To measure community acceptance and social support for adolescent girls to adopt healthy sexual and reproductive health behaviours our target population were adults in the household who may be most influential to a girl's decision making. Therefore, in households where the girl interviewed was married we invited the husband/ male partner to participate. The girl's permission was sought to interview her husband/ male partner. In households where the girl interviewed was unmarried, we asked her to nominate a co-habiting adult (age 20+ years) whose views were most likely to influence her decision-making with regards to sexual health and family planning.

Study unit inclusion criteria and selection

Region

The outcome evaluation study region and Woredas were selected by PSI. Oromia Region was selected because of its relatively low mCPR as compared with other regions in Ethiopia DHS 2011 (24.9%) and its standing as having the highest unmet need for contraception (29.9%) as compared with other regions (DHS).

Woredas

Woredas are the equivalent to districts in Ethiopia. They are further subdivided into Kebeles (or wards) or neighbourhood associations, which are the smallest geographical unit in Ethiopia. From Oromia Region, Were Jarso, Lome, Ada'a and Fentale Woredas were purposively selected to be in the outcome evaluation study by the implementing agencies. Criteria used for selecting Woredas for inclusion in the outcome evaluation study included:

- Good infrastructure and accessible all year round
- Close proximity to PSI head office in Addis Ababa
- No security issues
- Larger population of married adolescent girls

The characteristics of selected Woredas are summarized in **Table 1**.

Table 1: Ethiopia: Characteristics of selected Woredas

WOREDA	Total popn (2007) ¹	Popn 15-19 year old females ¹	Estimated no. of married girls aged 15-19 ² (sexually active) ³	No. of Households ¹	Total no. of Kebele ¹	Average no. of Households per Kebele	Average no. of married girls aged 15-19 per Kebele
East Shewa Administrative Zone							
WERE Jarso	-	-	-	-	-	-	-
North Shewa Administrative Zone							
Lome	152,331	10,134	2,067 (2,005)	35,814	40	895	49
Ada'a	158,572	8,872	1,810 (1,756)	31,754	27	1,176	64
Fentale	104,668	6,083	1,241 (1,204)	25,505	20	1,275	69
Total	497,479	29,530	6,024 (5,844)	110,655	104	1,064	58

¹2007 Ethiopia Census with population projections to 2017; ²Mini DHS 2014 (20.4% of 15-19 year old girls are married); ³Assume 97% of 15-19 year old married girls report having been sexually active in the past 12 months

Selection of study populations

A360 targets married adolescent girls aged 15 to 19 years (**Box 1**). Eligibility criteria does not include any criteria related to contact with or exposure to elements of the A360 programme.

Inclusion criteria

- Adolescent girls aged 15 to 19 years
- Married or living as married
- Living, at the time of the survey, in the study sites
- Voluntarily provides informed consent

Exclusion criteria

- There were no specific exclusion criteria

Box 1 Study eligibility criteria

Population A: 15-19 year old girls

The study population were married girls (or living as married) aged 15–19 years.

Clustered sampling of Kebeles within Woredas (intervention allocation units) was used. At baseline, a probability sample of 57 Kebeles out of 104 Kebeles was selected from across the

four study Woredas with probability proportional to population size.¹ Within the selected Kebele, all households were visited and a questionnaire administered to all eligible married girls aged 15 to 19 years. In households that had more than one eligible married female aged 15 to 19 years, all consenting married adolescent girls were interviewed. At endline we interviewed married females aged 15-19 years living in the 57 Kebeles that were included at baseline. Although the design means that it is possible that in each site the same households and individuals may be included in the baseline and endline surveys, no attempt was made to trace individuals or households from baseline to endline.

Population B: Cohabiting adult

For every 15 sexually active married adolescent girls aged 15 to 19 years interviewed, one was systematically selected and asked permission to interview her husband/male partner.

Data collection tools

The questionnaires were adapted from Demographic and Health Survey (**DHS**) and FP2020 survey instruments. At baseline, cross-sectional population based surveys were administered face-to-face using tablets by female interviewers aged between 18 and 26 years. At endline, cross-sectional population based surveys were administered partially face-to-face and partially by phone (see further details on below).

The questionnaire had five components:

1. Socio-demographic characteristics – age, religion, education, household amenities;
2. Sexuality and fertility characteristics – age at first sexual intercourse, timing of last sexual intercourse, pregnancy and childbearing experiences and intentions;
3. Contraceptive characteristics – knowledge and use of contraception, heard about modern contraception and sources of information on contraception, approval of married/unmarried couples using a modern contraceptive method to avoid or delay pregnancy, where obtained method, knowledge of the benefits of contraception, misconceptions about contraception, self-efficacy to use modern contraception, reasons for not using;
4. Exposure to the A360 intervention
5. Girl's future aspirations

The survey tools were translated into the local languages, pre-tested, and adjusted accordingly. Enumerators received training on the project aims, the content of the surveys, community entry, data collection, and ethics over 5 days. All studies were approved by the London School of Hygiene and Tropical Medicine ethics committee and by the local in-country ethical entity.

Modifications made to the A360 outcome evaluation protocol

Changes due to COVID-19 pandemic

The endline surveys for the A360 outcome evaluation were to be administered through Computer Assisted Personal Interviewing (CAPI; i.e. face-to-face interview) in 2020, as was

¹ The number of Kebeles to be sampled in each of the four Woredas was decided by estimating the proportion of the target population in each Woreda using census population projections and estimates of the proportion of 15-19 year olds who would be married. So, a higher number of Kebeles were a priori allocated to Woredas with a higher estimated proportion of married girls. Then to select the actual Kebeles within each Woreda, Kebeles were selected from across the four study Woredas with probability proportional to population size using data on the number of households in each Kebele.

done during baseline surveys in 2017. Due to the COVID-19 pandemic, we had to ensure that field implementation at endline was carried out with appropriate safeguards in place. Therefore, at endline, CAPI was used for the first part of the survey, and Computer Assisted Telephone Interviewing (CATI; i.e. phone survey) was used for the second part of the survey. Each section took a maximum of 20 minutes duration. Participants had the option to consent only to the first section (i.e. CAPI); in Ethiopia, 3% took this offer. The second part of the survey occurred immediately after the first. The phone survey was conducted immediately after the face-to-face interview, to ensure the identity of participants (interviewer ideally saw the girl in the distance). Answers to sensitive questions were provided in a non-disclosive categorical format (i.e. 1,2,3; or a,b,c). The endline questionnaire was reviewed in detail at the 4th March 2020 meeting, where all the evaluation teams, as well as PSI and donors had opportunity to input into revisions. Table 2 shows which outcomes were collected in CAPI or in CATI. Note that primary outcomes related to mCPR use were all asked in CAPI, so there are no instrumentation differences between baseline and endline.

Other changes

At endline, the questionnaire included questions on the exposure to the intervention and on aspirations as linking contraception use to girls' life goals was a major feature of the intervention.

Table 2: Outcomes measured through CAPI (i.e. face-to-face), during the first section of the interview, and through CATI (i.e. phone), during the second section of the interview

Outcomes collected in full CAPI survey (original pre-COVID questionnaire)	Outcomes collected in CAPI followed by CATI survey (reduced questionnaire due to COVID-19 restrictions)	Section	Notes
mCPR	Yes	1 st CAPI	
% of LARC users among current users	Yes	1 st CAPI	New outcome at endline but can be calculated using baseline data
Use in last 12 mo	Yes	1 st CAPI	New outcome at endline but can be calculated using baseline data
Unmet need	Yes	1 st CAPI	
Age specific fertility rates	Yes (partial; see note)	1 st CAPI	Reduced number of questions compared to full CAPI
Age at first birth	Yes	1 st CAPI	
Aspirations	Yes (partial; see note)	2 nd CATI	New outcome at endline – no baseline data; Reduced number of questions compared to full CAPI
Community acceptance	Yes (partial; see note)	2 nd CATI	
Agency/ Self-efficacy	Yes (partial; see note)	2 nd CATI	Reduced number of questions compared to full CAPI
Attitudes	Yes (partial; see note)	2 nd CATI	
Benefits	Yes	1 st CAPI	
Access to contraceptive services and products	Yes	2 nd CATI	

Outline of statistical analysis

Definitions and data manipulations

This section deals with data manipulation of key variables for analysis. Outcomes are presented in order of their importance in relation to the project aims.

Main and secondary outcomes

Modern contraceptive prevalence rate (**mCPR**) is the main outcome of this evaluation and was defined as follows:

$$\frac{\text{Number of fecund sexually active 15 – 19 year old girls reporting use of modern contraceptives}^2 \text{ at the time of the survey}}{\text{Number of fecund sexually active 15 – 19 year old girls}} \quad [\text{Equation 1. Married girls}]^3$$

Tables 3 to 5 detail variable categorization from questionnaire.

In general, for those variables created based on two or more questions, scale or index scores was calculated using an unweighted procedure. This was done by simply summing raw item scores (Armor, 1973, Boateng et al., 2018). Greater sums were generally be more desirable than lower sums.

² Male and female sterilization, contraceptive implants, intrauterine contraceptive devices, injectables, oral contraceptive pill, emergency contraceptive pill, male condom, female condom, Standard Days Method (SDM), Lactational Amenorrhoea Method (LAM), diaphragm, spermicides, foams, and jelly.

³ Sexually active girls: those who report having sexual intercourse in the last 12 months.

Fecund girls: those who have started menstruating, are not pregnant, and do not report that they are infertile.

Table 3: Outcomes of interest for the A360 Outcome Evaluation related to population A – collected at baseline and endline

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
Prevalence of current modern contraceptive use	Girls who are fecund (started menstruating; not pregnant; not infertile) and sexually active in the last 12 months	<p><i>Variables needed:</i></p> <ul style="list-style-type: none"> ▪ Current use of modern contraception (binary variable: not using or using) ▪ Any known confounders (age, education, religion, parity)
Proportion of current modern contraceptive users who are using a LARC	Girls who are sexually active in the last 12 months and are currently using a modern contraceptive method	Currently using a long-acting (i.e. intrauterine device or implant) or permanent method (i.e. male or female sterilization); (binary variable: not using or using)
Modern contraceptive use in last 12 months⁴	Girls who are sexually active in the last 12 months	Used a modern method in last 12 months
Age at first birth	Girls who gave birth	Age at first birth
Age specific fertility rates	Number of girl-years of exposure 12 months before the survey	Number of births that occurred 12 months before the survey to girls aged 15-19
Total unmet need for modern contraception (a) unmet need for spacing (b) unmet need for limiting	Girls who are sexually active in the last 12 months	<p>The total unmet need is composed of unmet need for spacing plus the unmet need for limiting.</p> <p>The numerator includes only women who were not using contraception at the time of the survey.</p> <p>The nonusers were first split into</p>

⁴ We restricted past use to the last 12 months to decrease recall bias.

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
		<ul style="list-style-type: none"> ▪ Pregnant or postpartum amenorrhoeic (menstrual period not returned following a birth during the 2 years preceding the survey), who are then classified by whether the pregnancy or last birth (last 24 months) was: <ul style="list-style-type: none"> ○ wanted at that time - unmet need for spacing ○ or unwanted - unmet need for limiting; ▪ Women who were neither pregnant nor postpartum amenorrhoeic were then classified into fecund and infecund; fecund women were further split into: <ul style="list-style-type: none"> ○ Fecund women who want children two or more years in the future, or are undecided whether/when they wanted a child - unmet need for spacing; ○ Fecund women who wanted no more children - unmet need for limiting.
Awareness of where to obtain contraceptive services and products	Girls who are sexually active in the last 12 months and are not currently using a contraceptive method (traditional or modern)	<p>Awareness of where to obtain health services was assessed through the question</p> <ul style="list-style-type: none"> ▪ “Do you know of a place where or person from whom you would feel comfortable getting family planning services and products to delay or avoid getting pregnant?” <p>If the girl answers ‘No’, then she is coded 0‘No’ or ‘Don’t know’ for awareness of where to obtain health services. If the girl answers ‘Yes’, then she is coded 1‘Yes’ for awareness of where to obtain health services.</p>
Awareness of contraceptive products	Girls who are sexually active in the last 12 months	<p>Awareness of contraceptive products was assessed through the question</p> <ul style="list-style-type: none"> ▪ “Have you ever heard of contraceptives?” <p>If the girl answers ‘No’, then she is coded 0‘No’ or ‘Don’t know’ for awareness of contraceptive products. If the girl answers ‘Yes’, then she is coded 1‘Yes’ for awareness of contraceptive products.</p>
Benefits of modern contraception	Girls who heard about modern contraceptives	<p>Benefits of modern contraception was assessed through the question “Using modern contraception can allow an adolescent woman girl to complete her education, find a better job and have a better life” with which the respondent must agree or disagree, scored 1 or 0, respectively.</p>

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
Misconceptions about modern contraceptives	Girls which are sexually active in the last 12 months and heard about modern contraceptives	<p>Misconceptions about contraception were assessed through three questions, with each of which the respondent must agree or disagree, scored 0 or 1, respectively. The questions include whether the woman believed that:</p> <ol style="list-style-type: none"> 1. Some modern contraception can stop an adolescent woman from ever being pregnant again even after she stops using it, 2. If a modern contraception changes an adolescent woman’s menstrual bleeding, it’s bad for her health and can harm her womb, and 3. Some modern contraceptives can make adolescent women permanently fat <p>Sum score may therefore range between 0 and 3. With greater scores being more desirable than lower scores.</p>
Agency (self-efficacy) to use modern contraceptives to prevent unintended pregnancies	Girls which are sexually active in the last 12 months and heard about modern contraceptives	<p>Self-efficacy was assessed through four questions relating to the woman’s ability to access and use family planning methods, with each of which the respondent must agree or disagree, scored 1 or 0, respectively. The questions include whether she:</p> <ol style="list-style-type: none"> 1. Felt able to start a conversation with her partner about contraception, 2. Felt able to use a method of contraception even if her partner did not want her to, 3. Felt able to obtain information on contraception services and products if she needed to, and 4. Felt able to obtain a contraception method if she decided to use one. <p>Sum score may therefore range between 0 and 4.</p>
Attitudes towards the use of modern contraceptives to prevent unintended pregnancies	Girls who heard about modern contraceptives	<p>Attitudes towards the use of modern contraceptives was assessed through two questions, with each of which the respondent answers approve or disapprove, scored 1 or 0:</p> <ol style="list-style-type: none"> 1. Do you approve or disapprove of married couples using a modern contraceptive method to avoid or delay pregnancy? 2. Do you approve or disapprove of couples who are not married using a modern contraceptive method to avoid or delay pregnancy? <p>Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.</p>

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
Community acceptance and social support for adolescent girls to adopt healthy sexual and reproductive health behaviours, including use of modern contraceptives	Unmarried girls which are sexually active in the last 12 months and heard about modern contraceptives	<p>Community acceptance towards the use of modern contraceptives was assessed through two questions, with each of which the respondent answers approve or disapprove, scored 1 or 0, respectively:</p> <ol style="list-style-type: none"> 1. Does your mother approve or disapprove of girls your age using a modern contraceptive method to avoid or delay pregnancy? 2. Does your community as a whole approve or disapprove of girls your age using a modern contraceptive method to avoid or delay pregnancy? <p>Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.</p>
	Married girls which are sexually active in the last 12 months and heard about modern contraceptives	<p>Community acceptance towards the use of modern contraceptives was assessed through two questions, with each of which the respondent answers approve or disapprove, scored 1 or 0, respectively:</p> <ol style="list-style-type: none"> 1. Does your husband/partner approve or disapprove of girls your age using a modern contraceptive method to avoid or delay pregnancy? 2. Does your community as a whole approve or disapprove of girls your age using a modern contraceptive method to avoid or delay pregnancy? <p>Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.</p>
Not measured		
Not measured		

LARC, long-acting reversible contraception (i.e. intrauterine device or implant)

Table 4: Other outcomes of interest for the A360 Outcome Evaluation related to population A – only collected at endline

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
Future aspirations	Girls who heard about modern contraceptives	<p>Future aspirations were assessed through four questions, with each of which the respondent indicated her agreement (strongly disagree to strongly agree):</p> <ol style="list-style-type: none"> 1. I have goals for my life 2. I believe I have some tools to help me achieve my goals for my life 3. I have little control over the things that happen to me 4. I believe preventing unintended pregnancy is important to help me achieve my goals for life <p>Questions 1, and 2 were scored 2 if the girl says “strongly agree”, 1 if “agree” or 0 if she says “disagree” or “strongly disagree”.</p> <p>Question 3 was scored 0 if the girl says “agree” or “strongly agree”, 1 if she says “disagree” and 2 if “strongly disagree”.</p> <p>Question 4 was scored 4 if the girl says “strongly agree”, 3 if “agree” or 0 if she says “disagree” or “strongly disagree”.</p> <p>Sum score may therefore range between 0 and 10. With greater scores being more desirable than lower scores.</p>
Benefits on the use of modern contraception to prevent unintended pregnancies	Girls who heard about modern contraceptives	<p>Benefits of contraception were assessed through the question “Using modern contraception can allow a girl to achieve her life goals” with which the respondent must agree or disagree, scored 0 or 1.</p>
Modern contraceptives disadvantages	Girls who heard about modern contraceptives	<p>Modern contraceptives disadvantages were assessed through the question “What do you see as the disadvantages/negative consequences of using modern contraceptive methods?”, which then was coded as 1 if the girl responded ‘none’, and coded 0 if the girl mentioned at least one disadvantage.</p>

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
Descriptive norms	Unmarried girls who heard about modern contraceptives	<p>Descriptive norms towards the use of modern contraceptives was assessed through three questions, with each of which the respondent answers “Most of them”, “Less than half of them”, “None of them” or “Don’t know”:</p> <ol style="list-style-type: none"> 1. How many unmarried girls aged 15-19 years in your community do you believe discuss using a method of contraception with their boyfriend/partner 2. How many unmarried girls aged 15-19 years in your community do you believe use contraceptive methods 3. How many unmarried girls aged 15-19 years in your community do you believe use contraceptive methods in secrecy from their boyfriend or family <p>Questions were scored 2 if the girl says “Most of them”, and 1 if she says “Less than half of them” and 0 if she says “None of them”. Sum score may therefore range between 0 and 6. With greater scores being more desirable than lower scores.</p>
	Married girls who heard about modern contraceptives	<p>Descriptive norms towards the use of modern contraceptives was assessed through three questions, with each of which the respondent answers “Most of them”, “Less than half of them”, “None of them” or “Don’t know”:</p> <ol style="list-style-type: none"> 1. How many married girls (or living as married) aged 15-19 years in your community do you believe discuss using a method of contraception with their husband/partner 2. How many married girls (or living as married) aged 15-19 years in your community do you believe use contraceptive methods 3. How many married girls (or living as married) aged 15-19 years in your community do you believe use contraceptive methods in secrecy from their husband/partner <p>Questions were scored 1 if the girl says “Most of them”, 1 if she says “Less than half of them” and 0 if she says “None of them”. Sum score may therefore range between 0 and 6. With greater scores being more desirable than lower scores.</p>

Table 5: Outcomes of interest for the A360 Outcome Evaluation related to population B, and data collection tools

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
<p>Community acceptance and social support for adolescent girls to adopt healthy sexual and reproductive health behaviours, including use of modern contraceptives</p>	<p>Co-habiting adult who heard about modern contraceptives</p>	<p>Attitudes towards the use of modern contraceptives was assessed through two questions, with each of which the respondent answers approve or disapprove, scored 1 or 0, respectively:</p> <ol style="list-style-type: none"> 1. Do you approve or disapprove of married couples using a modern contraceptive method to avoid or delay pregnancy? 2. Do you approve or disapprove of couples who are not married using a modern contraceptive method to avoid or delay pregnancy? <p>Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.</p>
<p>Descriptive norms*</p>	<p>Co-habiting adult of unmarried girl who heard about modern contraceptives</p>	<p>Descriptive norms towards the use of modern contraceptives was assessed through four questions, with each of which the respondent answers “Most of them”, “Less than half of them”, “None of them” or “Don’t know”:</p> <ol style="list-style-type: none"> 1. How many husbands/partners of girls aged 15-19 years in your community do you believe discuss using a method of contraception with their wife/partner 2. How many parents/guardians of girls aged 15-19 years in your community do you believe discuss using a method of contraception with their daughter 3. How many girls aged 15-19 years in your community do you believe use contraceptive methods 4. How many girls aged 15-19 years in your community do you believe use contraceptive methods in secrecy from their husband/partner or family <p>Questions were scored 1 if the adult says “Most of them”, and 0 if the adult says “Less than half of them” or “None of them”. Sum score may therefore range between 0 and 4. With greater scores being more desirable than lower scores.</p>

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
	Husband/partner of married girl who heard about modern contraceptives	<p>Descriptive norms towards the use of modern contraceptives was assessed through two questions, with each of which the respondent answers “Most of them”, “Less than half of them”, “None of them” or “Don’t know”:</p> <ol style="list-style-type: none"> 1. How many husbands/partners of girls aged 15-19 years in your community do you believe discuss using a method of contraception with their wife/partner 2. How many couples in your community do you believe use contraceptive methods <p>Questions were scored 1 if the adult says “Most of them”, and 0 if the adult says “Less than half of them” or “None of them”. Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.</p>

*Only measured at endline

Exposure to the A360 intervention

We used a series of questions to rank individuals by their level of engagement with the A360 interventions that are available in the place where they live. Exposure questions used in endline surveys in Nigeria were defined by the LSHTM OE team members Catarina Krug, Aoife Doyle and Melissa Neuman with Itad members Melanie Punton, Ellie Brown and Mary Lagaay as well as with Population Services International (PSI) members Claire Cole, Brett Keller, Mathew Wilson and Alexis Coppola in January 2020. **Table 6** shows the final definition of exposed and non-exposed girls according to endline exposure questions.

Table 6: Defining exposure to A360 based on exposure questions

Question	Exposure Questions	Exposed	Not exposed
1	Have you ever heard of 'Smart Start'?	Answers "Yes" to Q1 and "Yes" to Q2/Q3/Q4/Q5	Answers "Yes" to Q1 but not to Q2/Q3/Q4/Q5 or Answers "No", "Don't know" or does not respond to Q1
2	Have you ever seen any of these images? (Fig 1)	Answers "Yes" to Q2 and "Yes" to Q1	
3	Have you ever seen any of these images? (Fig 2)	Answers "Yes" to Q3 and "Yes" to Q1	
4a	Have you heard about or seen a 'goal card'?	Answers "Yes" to Q4a, disagrees with Q4b and answers "Yes" to Q1	
4b	Please tell me if you 'agree' or 'disagree' with the following statement "I heard about the 'goal card' but I do not know what it is"		
5	Do you have a 'goal card'?	Answers "Yes" to Q5 and "Yes" to Q1	

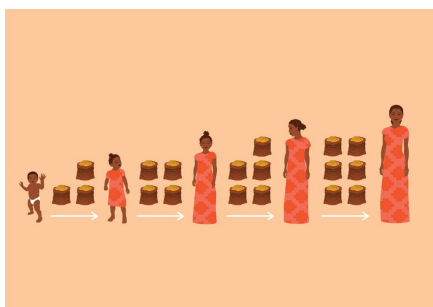


Figure 1: Image presented to endline survey respondents

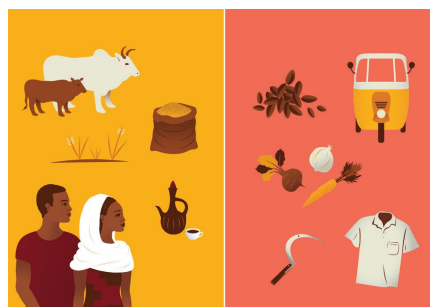


Figure 2: Image presented to endline survey respondents

Regression framework

Analysis of main outcome

The impact of A360 on each outcome was assessed through two analyses. In the first, impact was assessed by quantifying change between baseline and endline. In the second, it was assessed through self-reported exposure to the A360 program at endline.

The association between time (baseline versus endline) and primary and secondary outcomes

Two data sets were used, one with baseline data, and the other with endline data. Datasets were appended, and a dummy variable (e.g. time) identified whether the survey was conducted at baseline (time '0') or at endline (time '1').

We calculated mCPR at the Kebele level, and then used linear regression models with mCPR (at the Kebele level) as the outcome, and Time and Kebele as predictors, as follows:

$$Y_{it} \sim \text{Normal}(\mu_{it}, \sigma^2)$$
$$\mu_{it} = \alpha + \beta \text{Time} + \sum_i \gamma_i \text{Indicator}(\text{Kebele} = i)$$

where μ_{it} is the predicted mCPR for the i^{th} Kebele at time t (baseline or endline); α is the intercept; β represents the effect of Time (endline, Time '1', vs baseline, Time '0'); and γ_i is the effect of Kebele, which is included to account for variation in mCPR between Kebeles and therefore increase precision.

We adjusted for the following demographic variables, which are associated with contraceptive use according to the literature: age, education level, parity, religion and wealth quintile (Greenland et al., 2016). These were added to the model at the Kebele level (e.g. average age per Kebele).

Age ranged from 15-19 years; Wealth Quintile⁵ ranged from lowest (1st and 2nd quintiles) to highest (4th and 5th quintiles); education was categorized into '1' secondary or technical/ vocational and '0' primary or no education; living children was categorised into '1' respondents with at least one child, and '0' for no living children; religion was categorized into '1' Orthodox and '0' Protestant, Catholic, Muslim, Traditional, or no religion.

The association between the A360 program and self-reported exposure to the program, at endline

We first described modern contraceptive use among girls who reported being exposed to A360 and those who reported not being exposed at endline. We then used logistic regression models to assess the strength of association between self-reported exposure (exposure '0', some exposure '1') and the use of modern contraception (outcome):

$$Y_i \sim \text{Bernoulli}(p_i)$$
$$\text{Logit}(p_i) = \alpha + \beta \text{Exposure}_i + \sum_j \gamma_j \text{Indicator}(\text{Kebele} = j)$$

where p_i is the probability of modern contraceptive use for the i^{th} girl, α is the intercept; β is the regression coefficient for Exposure and corresponds to the natural logarithm of the odds ratio between exposed and not exposed girls; and γ_j is the Kebele effect included to account for clustering of

⁵ Wealth Quintile was derived from a series of questions using the 'Ethiopia Equity Tool' TOOL, E. 2018. Ethiopia Equity Tool [Online]. Available: <https://www.equitytool.org/ethiopia> [Accessed November 2020]. In summary, if the population of interest is predominantly urban, results are compared to other urban dwellers for interpretation, by generating urban wealth quintiles. If the population of interest live in rural areas, or a mix of urban and rural areas, results are compared to the national results to understand how relatively wealthy or poor they are, in comparison to the whole country, by calculating national wealth quintiles. Wealth quintiles range from poorest (1st and 2nd quintiles) to richest (4th and 5th quintiles).

observations. We adjusted for the same demographic variables that were included in the primary analysis. We also used logistic regression models to assess the effect of exposure on other binary outcomes such as use within last 12 months and proportion of LARC users.

To assess the effect of exposure on continuous outcomes such as age at first birth and aspirations index score, we first calculated the mean (95%CI) among girls who reported being exposed to A360 and among those who reported not being exposed at endline. We then used linear regression models with exposure as the predictor, as follows:

$$Y_i \sim \text{Normal}(\mu_i, \sigma^2)$$

$$\mu_i = \alpha + \beta \text{Exposure} + \sum_j \gamma_j \text{Indicator}(\text{Kebele} = j)$$

where μ_i is the predicted outcome for the i^{th} girl; α is the intercept; β reflects the effect of Exposure (exposed '1', vs not exposed '0'); γ_j is the Kebele fixed effect included to account for clustering within Kebeles. We adjusted for the same demographic variables mentioned for the model above.

Analysis of secondary outcomes

All secondary outcomes measured at both baseline and endline were evaluated as described for the main outcome:

- (A) The association between time (baseline versus endline) and primary and secondary outcomes
- (B) The association between self-reported exposure to the program and primary and secondary outcomes, at endline

For those outcomes which were only measured at endline, we only analysed them as described in option (B) above, which only uses endline data.

Sampling weights

Ethiopia data was analyzed accounting for sampling weights as follows:

$$W_h = \frac{M_h}{m_h \times n}$$

Where,

W_h = Sampling weight

M_h = Total number of households of Woreda h in the sampling frame

m_h = Total number of households of Kebele h in the sampling frame

n = Number of Kebeles sampled in Woreda h

Sampling weights were calculated by the data collection team at baseline and endline.

Sample size calculations

In the four study Woredas, among sexually active married 15-19 year olds, we have assumed that between 2017 and 2020 mCPR would increase from 44.0% to 50.8% in the presence of A360 (PSI estimate). This represents an absolute increase of 6.8% and a relative increase of 15% between 2017 and 2020 in A360 exposed married girls. A sample size of 1,132 sexually active married girls aged 15-19 years would give us 90% power to detect this difference based on the assumptions in **Table 7**.

Taking into account the sampling design, estimated non-response, and the fact that not all married adolescent girls would be sexually active, the final target sample size was 1,926 married girls aged 15 to 19 years (**Tables 8 and 9**). In this scenario, we have estimated that the design effect would be 1.5. If we took a more conservative design effect of 2 we would have 80% power to detect the same effect size (**Table 8**).

Table 7: Ethiopia: Table of assumptions for key parameters required for sample size calculations

Parameter	Estimate	Source
Proportion of 15-19 year old females who are married (or living together)	20.4%	Mini DHS 2014
Proportion of 15-19 year old females who are unmarried (not currently married)	79.6%	Mini DHS 2014
Proportion of married 15-19 year olds who report sexual activity in the past year	97%	DHS 2011 (all ages married)
Proportion of households with resident who is female aged 15-19 years	26.7%	Estimated using 2007 census data

Table 8: Ethiopia: Final target sample size taking into account design effect

Scenario	Best guess	More conservative estimate
	90% power to detect 15% increase in mCPR	80% power to detect 15% increase in mCPR
Target sample of sexually active married 15-19 year olds	1,132	846
Target sample of all married 15-19 year old girls ¹ includes non-sexually married active girls	1,167	872
Total sample size of 15-19 year old girls (effective sample size) ² effective sample size taking into account estimated non-response	1,284	959
Design effect ³	1.5	2
Sample size (effective sample size * design effect)	1,926	1918

¹Estimate 97% of 15-19 year old married girls will report that they have been sexually active in the past year; ²Estimate 10% of girls approached will refuse to participate; ³Intracluster correlation coefficient=0.02 at Kebele level (PSU), 45 clusters, 28 eligible girls/cluster

Table 9: Ethiopia: sampling strategy

Study sites	Estimated no. of girls aged 15-19 ¹	Estimated no. of married girls aged 15-19 ²	Estimated no. of sexually active married girls aged 15-19 ³	Target sample of married sexually active girls aged 15-19 ⁴	Total no. of married girls aged 15-19 to be interviewed ⁴	Target sample of husbands/male partners
Girar Jarso, Lome, Ada'a and Fentale	29,530	6,024	5,844	1,132	1,926	128

¹2007 Ethiopia Census with population projections to 2017; ²Mini DHS 2014 (20.4% of 15-19 year old girls are married);³From Table 24 assume 97% of married girls report having been sexually active in the past 12 months; ⁴From Table 25

Analysis of trends in modern contraceptive use

In Ethiopia, there is no comparison group and observed changes in mCPR could be due to secular trends or other influences (Atchison et al., 2018). To address this limitation, mCPR data available from other sources for the time period 2015–2018 were examined to assess whether changes in mCPR in A360 communities (2015-2018) reflect the overall trend in mCPR or whether mCPR appears to have increased more than would be expected during this time period.

The primary aim was to estimate the levels and trends of mCPR between 2015 and 2018 in Ethiopia utilizing all available data.

Table 10: Data on modern contraceptive use available in Ethiopia since 2010

Survey	DHS (frequency varies)	PMA2020 (annual)	DHIS2 / HMIS (monthly)	MICS (frequency varies)	HDSS (INDEPTH, 2020) (annual)
Years available	2011, 2016, 2019 Int ¹	2014-8 ²	2018-2020 ³	N.A. ⁴	2012-6 Harar, 2008-16 Kersa, 2010-5 Arba Minch, 2009-15 Dabat, 2006-15 Gilgel Gibe

¹ 2019 DHS (Interim), data was not available when trends were analysed, in July 2020.

² Also called round 1 (2014) to 5 (2018);

³ Data analysed by third party (Ali Karim, BMGF);

⁴ Data only available for 1995.

Description of datasets

DHS

The DHS collect and disseminate nationally representative data on fertility, family planning, maternal and child health, gender, HIV/AIDS, malaria, and nutrition. The primary objective of DHS is to provide up-to-date estimates of basic demographic and health indicators, such as those related to awareness and use of family planning methods. DHS use a two-stage stratified clustered sampling. We analysed DHS datasets from 2016 for Ethiopia. These datasets are publicly available at <https://dhsprogram.com/>. We calculated mCPR by downloading the data and then using the same definition used in the outcome evaluation.

PMA2020

Performance Monitoring for Action 2020 (PMA2020) were launched in 2013 to monitor progress of Family Planning 2020 (FP2020) initiative (Horton and Peterson, 2012). PMA2020 surveys are implemented at the national level in Ethiopia (and also in Burkina Faso, Côte d'Ivoire, Ghana, Indonesia, Kenya, and Uganda). Data collection and monitoring is more frequent than DHS or Multiple Indicator Cluster surveys (MICS). PMA2020 conducts three surveys: female, household and Service Delivery Point. Female surveys include information on fertility, contraceptive use and other related measures. The sampling approach is in all similar to DHS – a multistage stratified clustered sampling is used with EAs as primary units (or clusters). We analysed PMA2020 datasets from 2015 (round 3) to 2018 (round 6). These datasets are publicly available at <https://www.pma2020.org/>. We calculated mCPR by downloading the data and then using the same definition used in the outcome evaluation.

We also used PMA2020 datalab platform to extract time trends in mCPR over time among girls aged 15-19, using PMA2020 definition⁶.

HMIS/DHIS

Health Management Information System (HMIS) aims to provide data for continued monitoring of the health system's performance.. In Ethiopia, HMIS was only implemented in 2009 in SNNPR Region, in 2013 in Oromia and finally in Addis, Amhara, Afar and Tigray in 2018 (APCI).

HMIS collects data on over 100 indicators. Data is collected at the primary level of health service delivery (i.e. primary health care units), and it is forwarded to the district level and zonal health office after being reviewed. In family planning, there are three indicators and around 15 data elements (Olugbade et al., 2019, Team, 2016). Contraceptive prevalence rate and contraceptive acceptance rate (CAR) are the most commonly used indicators for contraceptive use.

When compared to DHS or PMA2020, which are cross-sectional studies, HMIS has the advantage of providing continuous estimates for various health indicators across all levels of a country. However, it has several flaws in terms of completeness, timeliness and accuracy (Ouedraogo et al., 2019, ASANGANSI et al., 2013, Makinde et al., 2012, Belay et al., 2013), which may explain the differences of its estimates of contraceptive use compared to DHS estimates over time (Olugbade et al., 2019, Woldegiorgis et al., 2017). These differences may also be caused by differences in the indicator definition. Nevertheless, DHS is perceived as a more reliable source compared to HMIS data when estimating population level prevalence of modern contraceptive use (Woldegiorgis et al., 2017).

To access HMIS data, an official request has to be made to the Ministry of Health of each country. Patient data is highly confidential, therefore, if provided, data is presented in its aggregated form (facility, district, or regional level), either by month, quarter or year. HMIS data presented in this report was kindly shared by Ali Karim (BMGF) in July 2020. In this analysis of secondary data, CAR was used. It is calculated as follows (Ethiopia, 2013):

$$CAR = 100 \times \frac{\text{Total number of new and repeat users}}{\text{Estimated number of women aged 15-49 years who are not pregnant}}$$

[Equation 1]

Where 'New user' is someone who has not received a contraceptive method from a recognized program before registration and 'Repeat user' is someone who has received a contraceptive method from a recognized program before registration. According to Woldegiorgis et al. (2017), there may sometimes be multiple counting of patients as some health workers may not correctly differentiate the concepts of "new" and "repeat" acceptors. The estimated number of women of reproductive age is based on the population size of the geographical area of interest (e.g. district).

Flow diagram

Eligible girls were identified in 4% (1,098/30,165) of households at endline (**Figure 3**). The mean number of households selected per Kebele was 19 (range: 1-44) and the mean number of Kebeles per Woredas was 14 (range: 9-17).

⁶ Definition of mCPR: Percent of married women aged 15-19 who are using (or whose partners are using) a method of contraception, which includes hormonal and barrier methods, sterilization, emergency contraception, lactational amenorrhea method, and the standard days/cycle beads method.

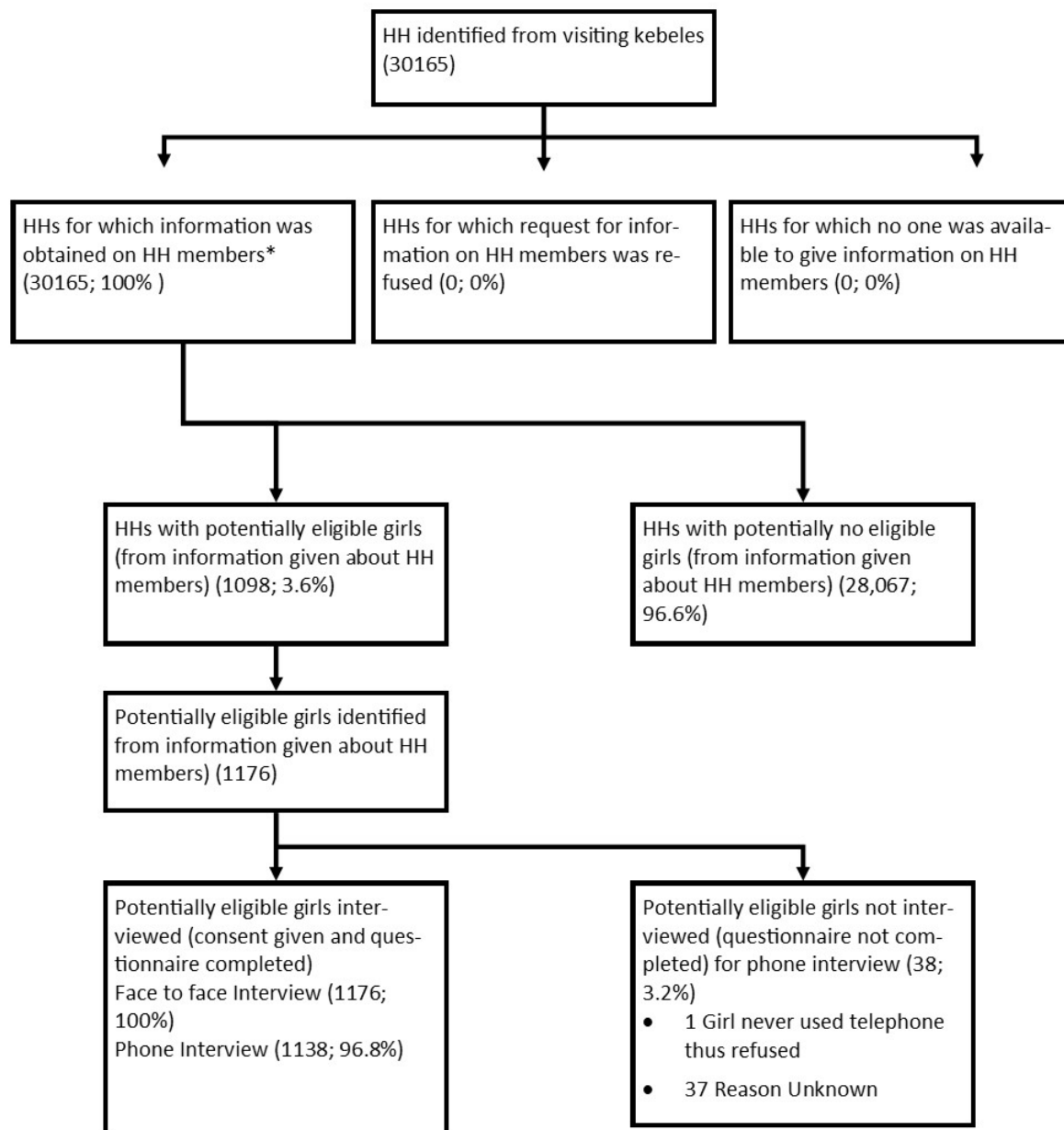


Figure 3: Flow diagram of endline surveys for outcome evaluation Adolescents 360 in Ethiopia

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Appendix B – Exploratory analysis on
modern contraceptive prevalence
rate (mCPR) and self-reported
exposure to the Adolescents 360
(A360) intervention, Oromia,
Ethiopia

Index

Table of contents

Appendix B – Exploratory analysis on modern contraceptive prevalence rate (mCPR) and self-reported exposure to the Adolescents 360 (A360) intervention, Oromia, Ethiopia	1
Index	2
Introduction	4
The impact of A360 intervention on mCPR	4
Hypothesis	4
Primary objectives	4
Methods	5
Statistical analysis	5
Results	5
Conclusion	6
Self-reported exposure to A360	7
Describing self-reported exposure to A360	7
Methods/Tools	7
Results	8
Conclusion	8
The relationship between sociodemographic variables and exposure to A360 (i.e. intervention user analysis)	9
Objectives	9
Results	9
Conclusion	10
Relationship between exposure to A360 and mCPR (i.e. dose-response analysis)	11
Hypothesis	11
Objectives	11
Methods	11
Results	11
Conclusion	13
Sensitivity analysis accounting for migration	14
Hypothesis	14
Methods	14
Statistical analysis	14
Results	14

Ethiopia: Exploratory analysis on mCPR and exposure to Adolescents 360 programme

Migration patterns	14
Sensitivity analysis	15
Conclusion	15
The effect of duration of A360 activities	16
Hypothesis	16
Objectives	16
Methods	16
Statistical analysis	16
Results	16
Sensitivity analysis- keeping communities with longer A360 activities	16
Effect of time on mCPR by levels of duration of A360 activities	17
Conclusion	17
References	19
Appendix I. Exposure questions not used in Ethiopia endline surveys due to change in instrumentation	20
Appendix II. Limitations of exposure questions used in Ethiopia, raised by PSI team (March 2021)	21
Appendix III. Exposure questions used in Ethiopia endline surveys (November 2021)	23
Appendix IV. Descriptive results: the relationship between self-reported exposure and sociodemographic characteristics, in outcome evaluation woredas, Ethiopia	24
Appendix V. Descriptive results: the relationship between self-reported exposure and modern contraceptive use, in outcome evaluation woredas, Ethiopia	26
Appendix VI. Ethiopia PSI monitoring data from kebeles where outcome evaluation happened	27

Introduction

This document begins with the impact of Adolescents 360 (**A360**) on modern contraceptive prevalence rate (**mCPR**) in Ethiopia.

Then, to strengthen the hypothesis that any effect observed is due to A360, this document further summarizes:

- 1) Self-reported exposure to A360 as well as
 - a. its association with sociodemographic factors
 - b. and its impact on mCPR, proportion of long-acting reversible contraception (**LARC**) users among current modern contraceptive users, and use of a modern contraceptive method within last 12 months
- 2) A sensitivity analysis of the effect of time on mCPR accounting for migration
- 3) The effect of duration of A360 activities on the association between time and mCPR

The impact of A360 intervention on mCPR

Hypothesis

As described in the analysis plan

The primary hypothesis is that the intervention leads to an increase in mCPR over time that is greater than the increase that would have been expected to occur in the absence of A360.

Primary objectives

As described in the analysis plan

The primary goal of the outcome evaluation (**OE**) study was to evaluate the effectiveness of the A360 intervention in increasing mCPR among girls aged 15-19 years in study settings in Ethiopia.

mCPR was defined as follows:

Number of fecund sexually active 15 – 19 year old girls reporting use of modern contraceptives¹ at the time of the survey

Number of fecund sexually active 15 – 19 year old girls

[Equation 1. Married or unmarried girls]

¹ Male and female sterilization, contraceptive implants, intrauterine contraceptive devices, injectables, oral contraceptive pill, emergency contraceptive pill, male condom, female condom, Standard Days Method (**SDM**), Lactational Amenorrhoea Method (**LAM**), diaphragm, spermicides, foams, and jelly.

Methods

As described in the analysis plan

In Ethiopia, a before-and-after design without comparison group was used. We used population-based surveys, the baseline survey happened in late 2017 and the endline in late 2020.

Statistical analysis

As described in the analysis plan

Two data sets were used, one with baseline data, and the other with endline data. Datasets were appended, and a dummy variable (e.g. time) identified whether the survey was conducted at baseline (time '0') or at endline (time '1').

We calculated mCPR at the kebele level, and then used linear regression models with mCPR (at the Kebele level) as the outcome, and time as the predictor, as follows:

$$Y_i = \beta_0 + \beta_1 \text{Time} + \beta_2 \text{Kebele}$$

where Y_i is the predicted mCPR for the i^{th} kebele; β_0 is the intercept; β_1 reflects the overall effect of time (endline, time '1', vs baseline, time '0'); β_2 is the kebele fixed effect included to match baseline and endline kebeles, and therefore increase power.

We adjusted for the following demographic variables, which are associated with contraceptive use according to the literature: age, education level, living children, religion and wealth quintile [1]. These were added to the model at the kebele level: average age; average Wealth Quintile; Education was added as the proportion of respondents with secondary or technical/vocational education (vs. primary, and no education); Living children was added as the proportion of respondents with at least one child (vs. respondents with no living children); Religion was added as the proportion of respondents who were Ortodox (vs. Protestant, Catholic, Muslim, Traditional, No religion).

Results

In **Table 1**, we present the prevalence of mCPR modern contraceptive use in baseline and endline surveys. Overall, there was no increase in mCPR (95%CI overlap). At woreda level, there was also no evidence of change (95%CI also overlap).

Table 2 presents the results of the linear regression models, unadjusted and adjusted for confounders. Overall, mCPR increased by 5.1% (0.7% to 9.5%) between baseline and endline surveys. This result was driven by Wara Jarso, where mCPR increased by 12.4% (1.3% to 23.6%). In the other woredas, there was no evidence of change (95%CI includes 0).

Table 1: Descriptive results (weighted): the relationship between mCPR and time

	Baseline	Endline	Difference
Overall	63.8 (56.6-71.0)	68.4 (61.8-74.9)	4.55
Woreda in East Shewa Administrative Zone			
Wara Jarso	73.8 (69.6-78.0)	83.4 (74.4-92.4)	9.61
Woredas in North Shewa Administrative Zone			
Lome	82.6 (74.3-90.8)	77.1 (67.5-86.6)	-5.50
Ada'a	66.4 (50.5-82.2)	76.2 (70.0-82.5)	9.88
Fentale	18.6 (0.3-36.8)	25.6 (10.6-40.5)	7.00

Table 2: Analytical results (weighted): the relationship between mCPR and time, unadjusted and adjusted for confounders

	Weighted and unadjusted		Weighted and adjusted for confounders ¹	
	TIME (Ref: Baseline)	P-value	TIME (Ref: Baseline)	P-value
Overall	5.2% (-0.3% to 10.7%)	0.07	5.1% (0.7% to 9.5%)	0.03
Woreda in East Shewa Administrative Zone				
Wara Jarso	9.6% (0.3% to 18.9%)	0.05	12.4% (1.3% to 23.6%)	0.03
Woredas in North Shewa Administrative Zone				
Lome	-5.4% (-14.3% to 3.5%)	0.22	-0.5% (-7.5% to 6.5%)	0.88
Ada'a	12.6% (-5.8% to 31.0%)	0.16	5.6% (-4.4% to 15.6%)	0.25
Fentale	7% (-3.9% to 17.9%)	0.18	-5.3% (-12.7% to 2.1%)	0.14

¹Age, equity index, education, living children and religion

Conclusion

- Overall, there was some evidence of an impact of A360 on mCPR, with a rise in mCPR by 5.1% (0.7% to 9.5%) from baseline to endline
- This result was mostly due to Wara Jarso, from East Shewa Administrative Zone, where there was evidence that mCPR increased over time by 12.4% (95%CI: 1.3% to 23.6%)
- In the other three woredas, from North Shewa Administrative Zone, there was no evidence of a change in mCPR over time

Self-reported exposure to A360

The impact of the A360 program according to self-reported exposure

Describing self-reported exposure to A360

Methods/Tools

Exposure questions used in endline surveys in Ethiopia were defined by the LSHTM OE team members Catarina Krug, Aoife Doyle and Melissa Neuman with Itad members Melanie Punton, Ellie Brown and Mary Lagaay as well as with Population Services International (PSI) members Claire Cole, Brett Keller, Mathew Wilson and Alexis Coppola in January 2020.

In response to COVID-19, the survey length was reduced from 40-60 min to 20 min per respondent. Therefore, we had to reduce the number of exposure questions in mid-2020. We made this decision based on question specificity – questions removed were more general compared to those kept (e.g. The following question was removed: “In the last 2 years, have you attended a meeting, event or workshop related to family planning / child birth spacing?”, see **Appendix I**).

In the OE analysis plan, we specified an exposure variable with three levels, from lowest, to greatest exposure. However, the low levels of exposure across OE sites, led to the need to create a binary exposure variable – not exposed vs exposed. We discussed the exposure questions with Itad, PSI, and donors on 3rd March 2021, and also received written feedback from PSI on the questions (see **Appendix II**). This feedback was reflected in our final definition.

Table 3 shows the final definition of exposed and non-exposed girls according to endline exposure questions. **Appendix II** presents the set of questions used in endline surveys along with their limitations and specific PSI team recommendations.

Table 3: Defining exposure to A360 based on exposure questions

Question	Exposure Questions	Exposed	Not exposed
1	Have you ever heard of ‘Smart Start’?	Answers “Yes” to Q1 and “Yes” to Q2/Q3/Q4/Q5	
2	Have you ever seen any of these images? (Fig 1)	Answers “Yes” to Q2 and “Yes” to Q1	
3	Have you ever seen any of these images? (Fig 2)	Answers “Yes” to Q3 and “Yes” to Q1	Answers “Yes” to Q1 but not to Q2/Q3/Q4/Q5
4a	Have you heard about or seen a ‘goal card’?		or
4b	Please tell me if you ‘agree’ or ‘disagree’ with the following statement “I heard about the ‘goal card’ but I do not know what it is”	Answers “Yes” to Q4a, disagrees with Q4b and answers “Yes” to Q1	Answers “No”, “Don’t know” or does not respond to Q1
5	Do you have a ‘goal card’?	Answers “Yes” to Q5 and “Yes” to Q1	

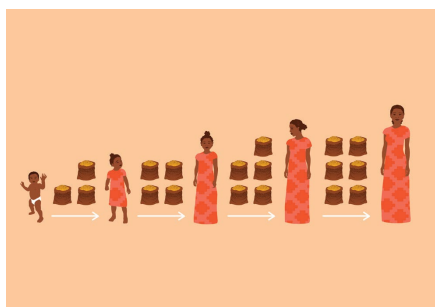


Figure 1: Image presented to endline survey respondents



Figure 2: Image presented to endline survey respondents

Results

Appendix III describes the results per exposure question within each woreda in Ethiopia.

Table 4 describes the results of Q1 and results of Q2/Q3/Q4/Q5 for those who answered positively to Q1. **Table 4** also describes overall exposure, as defined in **Table 3**.

Self-reported exposure was 23.6% (95%CI: 18.0-30.3). It was greatest in Lome (58.7%, 45.2-71.0), where 60.7% of girls heard about Smart Start. Ada'a had the second greatest self-reported exposure (24.4%, 17.0-33.7), but significantly lower than Lome. In Ada'a, all girls who heard of Smart Start recognized both images. In Fentale and Wara Jarso, proportion of self-reported exposure was lowest (Fentale: 13.1%, 5.2-29.2; Wara Jarso: 8.3%, 4.8-13.9; **Table 4**).

Table 4: Self-reported exposure to A360 in Oromia woredas

Woreda	Wara Jarso	Lome	Ada'a	Fentale	Oromia Region
Q1	10.2 (30/346)	60.7 (160/271)	24.4 (64/261)	19.2 (64/269)	26.5 (318/1147)
Q1 and Q2	74.5 (19/30)	96.4 (153/160)	100.0 (64/64)	68.2 (45/64)	88.1 (281/318)
Q1 and Q3	74.0 (19/30)	94.7 (152/160)	100.0 (64/64)	68.2 (45/64)	87.2 (280/318)
Q1 and Q4 ¹	40.0 (12/30)	51.3 (82/160)	42.2 (27/64)	39.1 (25/64)	45.9 (146/318)
Q1 and Q5	8.4 (2/30)	1.3 (3/160)	1.2 (1/64)	1.2 (1/64)	2.0 (7/318)
Overall exposure	8.3 (22/345)	58.7 (154/271)	24.4 (64/261)	13.1 (45/269)	23.6 (285/1146)

¹ To be considered a positive answer, girls also had to disagree with the sentence "I heard about the 'goal card' but I do not know what it is"

Q1: Have you heard of 'Smart Start'?; Q2: Have you ever seen any of these images? (Fig 1), Q3: Have you ever seen any of these images? (Fig 2), Q4: Have you heard about or seen a 'goal card'?, Q5: Do you have a 'goal card'?

Conclusion

Self-reported exposure was highly variable across the woredas included in the OE in Ethiopia, varying from 59% in Lome to 8% in Wara Jarso.

The relationship between sociodemographic variables and exposure to A360 (i.e. intervention user analysis)

Objectives

We aimed to describe self-reported exposure to A360 (percentages) at endline, by sociodemographic variables.

Results

Table 5: Descriptive results: the relationship between self-reported exposure and sociodemographic characteristics, in Oromia, Ethiopia

	Oromia	
	Exposed n=285	Not exposed n=861
Age (years), mean (SD)	17.9 (1)	17.9 (1)
Age (years), Proportion (95%CI)		
15	3.6 (1.5-8.1)	3.6 (1.7-7.2)
16	9.1 (6.1-13.2)	9.6 (7.1-12.8)
17	17.9 (13.2-23.9)	18 (14.1-22.7)
18	40.0 (33.6-46.7)	41.6 (37.5-45.8)
19	29.5 (22.2-38.1)	27.3 (21.8-33.4)
Number of living children, Proportion (95%CI)		
No children	33.1 (24.0-43.7)	47.7 (41.2-54.3)
1 or more children	66.9 (56.3-76.0)	52.3 (45.7-58.8)
Education level, Proportion (95%CI)		
No education or Primary	84.1 (77.0-89.3)	84.1 (78.8-88.3)
Secondary or Technical/Vocational	15.9 (10.7-23.0)	15.9 (11.7-21.2)
Religion, Proportion (95%CI)		
Orthodox	72.5 (58.1-83.4)	60.1 (47.0-72.0)
Protestant, Catholic, Muslim, Traditional, No religion	27.5 (16.6-41.9)	39.9 (28.0-53.0)
Wealth quintile, mean (SD)	3.9 (1.2)	3.3 (1.5)
Mobile phone access, Proportion (95%CI)		
Any phone access	82.0 (74.2-87.8)	92.7 (88.5-95.4)
No mobile phone access	18.0 (12.2-25.8)	7.3 (4.6-11.5)

Interpretation: In Oromia, exposed girls were similar to non-exposed girls. However, there was a trend for lower phone access in exposed girls than in non-exposed. There was also a trend for lower proportion of Protestant, Catholic, Muslim, Traditional, No religion in exposed girls than in non-exposed (**Table 5**). **Appendix IV** shows relationship between self-reported exposure and sociodemographic characteristics per woreda.

Discussion

The age distribution across all regions in Ethiopia was described by CK in mid-2020, as an independent analysis of PSI's monitoring data. Girls reached by A360, according to PSI monitoring data, had the following age: 4% (2,558/57,097) were aged 15 years, 11% (5,997/57,097) were aged 16, 18% (10,249/57,097) were aged 17, 33% (18,618/57,097) were

aged 18, and 34% (19,695/57,097) were aged 19. Therefore, similarly to the OE findings, most girls reached by A360 activities were aged 18 and 19 years, according to PSI monitoring data.

Conclusion

In Oromia, exposed girls had similar sociodemographic characteristics to non-exposed girls.

Relationship between exposure to A360 and mCPR (i.e. dose-response analysis)

Hypothesis

As described in the analysis plan

We hypothesized that respondents reporting some exposure to A360 are more likely to use modern contraceptives compared to respondents that report no exposure.

Objectives

As described in the analysis plan

We aimed to quantify the impact of the A360 program according to respondents' self-reported exposure to A360.

Methods

As described in the analysis plan

We first described modern contraceptive use among girls who reported being exposed to A360 and those who reported not being exposed at endline. We then used logistic regression models to assess the strength of association between self-reported exposure (exposure '0', some exposure '1') and the use of modern contraception (outcome), as follows [2]:

$$Y_i \sim \text{bin}[P(\lambda_i)]$$

$$\text{Logit}[P(\lambda_i)] = \beta_{0i} + \beta_1 \text{Exposure}_i + \beta_2 \text{Kebele}$$

where $P(\lambda_i)$ is the probability of modern contraceptive use for the i^{th} girl – it is a function of Exposure through the logit function, and it follows a binary distribution; β_0 is the intercept; β_1 is the regression coefficient for Exposure and corresponds to the natural logarithm of the odds ratio between exposed and not exposed girls; β_2 is the Kebele fixed effect included to account for clustering of observations. We adjusted for the following demographic variables: age, education level, living children, religion and wealth quintile [1]. The analysis was restricted to endline data.

We used similar models to the one above to assess the effect of exposure on use within last 12 months and on proportion of LARC users.

Results

The relationship between self-reported exposure and current modern contraceptive use

In Ethiopia, mCPR (95%CI) was 80.5 (73.7-85.9) among exposed girls and 54.5 (44.2-64.5) among non-exposed. There was, therefore, greater mCPR in exposed than in non-exposed girls. In Fentale woreda, mCPR was also greater in exposed girls than in non-exposed, but not in other woredas (95%CI overlap; **Appendix V**). Exposed girls used more implants than non-exposed girls. Use of injectables was similar across exposure levels (**Table 6**).

The results of the Logistic regression models confirmed the descriptive findings. Odds of modern contraceptive use for girls exposed were twice (OR, 95% CI: 2.1, 1.3-3.3; $p < 0.01$) those of girls not exposed to A360 (**Table 7**).

Table 6: Descriptive results: the relationship between self-reported exposure and modern contraceptive use, in Oromia, Ethiopia

	Oromia	
	<i>Exposed</i> n=217	<i>Not exposed</i> n=640
No. of girls		
Any method	81 (74.5-86.2)	54.5 (44.2-64.5)
Any modern method	80.5 (73.7-85.9)	54.5 (44.2-64.5)
Modern method		
Implant	29.1 (21.7-37.8)	11.5 (7.9-16.4)
Intra-uterine device	0.9 (0.2-4.1)	0.1 (0.0-0.5)
Injectables	45.7 (34.7-57)	40.1 (31.4-49.4)
Daily pills	4.3 (2.2-8.2)	1.5 (0.8-2.7)
Emergency pills	0 (0-0)	0.4 (0.1-1.5)
LARC ¹	37.3 (26.8-49.1)	21.2 (15.3-28.6)
Any traditional method	0.5 (0.1-3.8)	0 (0-0)
Not currently using	19 (13.8-25.5)	45 (35.2-55.1)
Don't know	0 (0-0)	0 (0-0)
No response	0 (0-0)	0.5 (0.2-1.7)
Any modern method in past 12 months	83.9 (76.9-89.2)	57.0 (46.3-67.1)

¹% of Long-Acting Reversible Contraceptive (LARCs) users among all modern contraceptive users, which includes implant and IUD

Table 7: Analytical results: the relationship between self-reported exposure and modern contraceptive use in Oromia, Ethiopia

Oromia	Unadjusted		Adjusted	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Not exposed	Ref		Ref	
Exposed	2.5 (1.5-4.2)	<0.01	2.1 (1.3-3.3)	<0.01

Ref: reference level for the odds ratio; i.e. OR=2.5 is the odds of mCPR in the exposed compared to girls not exposed to A360.

The relationship between self-reported exposure and proportion using a LARC

In Ethiopia, proportion of LARC users among modern contraceptive users was 37.3 (26.8-49.1) among exposed girls and 21.2 (15.3-28.6) among non-exposed (**Table 6**). There were no differences in LARC use in any of the four woredas (95%CI overlap; **Appendix V**).

Odds of using a LARC among modern contraceptive user was the same for girls exposed or not exposed to A360 (OR, 95%CI: 1.5, 0.7-3.1; **Table 8**).

Table 8: Analytical results: the relationship between self-reported exposure and proportion using a LARC in Oromia, Ethiopia

Oromia	Unadjusted		Adjusted	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Not exposed	Ref		Ref	
Exposed	1.8 (1.0-3.2)	0.07	1.5 (0.7-3.1)	0.24

Ref: reference level for the odds ratio; i.e. OR=1.8 is the odds of LARC use in the exposed compared to girls not exposed to A360.

The relationship between self-reported exposure and use of a modern contraceptive within the last 12 months

The relationship between use of modern method within the last 12 months and exposure level was very similar to the relationship between mCPR and exposure level, which resulted in similar model-results (**Tables 6 and 9**).

Table 9: Analytical results: the relationship between self-reported exposure and use of a modern contraceptive within the last 12 months in Oromia, Ethiopia

Oromia	Unadjusted		Adjusted	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Not exposed	Ref		Ref	
Exposed	2.1 (1.2-3.8)	0.01	1.8 (1.1-2.9)	0.03

Ref: reference level for the odds ratio; i.e. OR=2.1 is the odds of use in past 12 months in the exposed compared to girls not exposed to A360.

Conclusion

In Oromia, respondents reporting some exposure to A360 were more likely to use modern contraceptives compared to respondents that reported no exposure. The same was true for use within last 12 months.

Respondents reporting some exposure to A360 were as likely to use a LARC as respondents reporting no exposure.

Sensitivity analysis accounting for migration

Degree of self-reported length of time living in the community

Hypothesis

As described in the analysis plan

We hypothesised that there would be a greater intervention impact when only keeping individuals who did not leave the survey area for more than 3 months during the 12 months previous to the survey.

Methods

As described in the analysis plan

Migration was assessed through the following questions:

- In the last 12 months, have you stayed/lived in a place other than this woreda for one month or more?
- In total approximately how long have you spent outside this woreda in the last 12 months?

Being absent for at least three months in the past 12 months was used as a proxy for absence in the previous 24 months (i.e. estimated time between start of the A360 intervention and endline surveys).

Statistical analysis

As described in the analysis plan

This was a sensitivity analysis, in which girls who reported having spent more than 3 months out of the survey areas in the past 12 months, were excluded from the analysis. We then conducted the same analysis as in Section 1, and observed any changes in statistical conclusions and in point estimates.

Results

Migration patterns

Table 10: Migration patterns in Ethiopia, in A360 OE endline surveys (Nov-Dec 2020)

		Migration, % (n)	
		No	Yes ¹
Oromia (all woredas)	n=1116	99.2 (1104)	0.72 (10)
Woreda			
Wara Jarso	n=322	99.1 (318)	0.57 (2)
Lome	n=268	98.9 (265)	1.12 (3)
Ada'a	n=258	99.5 (257)	0.50 (1)
Fentale	n=268	99.3 (264)	0.71 (4)

¹Being absent from Woreda for at least three months in the past 12 months.

Interpretation: Migration patterns were extremely low in all OE woredas.

Sensitivity analysis

Table 11: Analytical results adjusted for confounders¹, excluding girls who migrated²

	Weighted and adjusted for confounders ¹	
	TIME (Ref: Baseline)	P-value
Overall	5.1% (0.7% to 9.5%)	0.03

¹Age, equity index, education, living children and religion

²Absent for at least three months in the past 12 months

Interpretation: The model without girls that migrated (**Table 11**) led to the same point estimates and statistical conclusions as the main analysis (in section 1, **Table 2**).

Conclusion

Removing girls who reported having spent 3 months or more out of the survey areas in the past 12 months, did not lead to any changes in the statistical conclusions or in point estimates. In other words, the impact of A360 on mCPR was not affected by girls' migration.

The effect of duration of A360 activities

Hypothesis

As described in the analysis plan

We hypothesized that respondents living in areas where there was longer period of A360 activity were more likely to use modern contraceptives compared to respondents in areas with a shorter period of activity. In other words, we hypothesized that the relationship between A360 programme and mCPR could change by the duration of A360 activities in each kebele.

Objectives

As described in the analysis plan

We aimed to quantify the impact of the A360 program according to the implementer reports of duration of A360 activities between January 2018 and October 2020.

Methods

A360 was implemented by PSI, who shared start and end dates of activities in each of the 57 OE kebeles in March 2021. The earliest start date was January 2018, in Alge kebele (Fentale woreda) and the latest start date was October 2020, in Wele Chilelo kebele (Wara Jarso woreda).

Duration of A360 activities (in days) was calculated by subtracting end date of activities by start date of activities (see **Appendix VI** for duration by kebele). The minimum duration of activities was 29 days (Bola Buta kebele, Lume woreda) and the maximum was 407 days (Kolba Gode kebele, Lume woreda). Median (IQR) duration of activities was 42 (39-44) days.

We matched PSI data with OE data by kebele name. There were no missing observations. To quantify the impact of the A360 program according to the implementer reports of duration of A360 activities, we used two methods, detailed below.

Statistical analysis

Sensitivity analysis- keeping kebeles with longer A360 activities

To do this sensitivity analysis, we first categorised duration in three levels defined by using median (42 days), second quartile (39 days) and third quartile (44 days; variable `Dur_cat` in **Appendix VI**). We then removed from full OE dataset (n=57) observations from kebeles with short duration of activities (n=16; i.e. up to 39 days duration), creating a reduced OE dataset (n=42). We then ran the model used in Section 1 and checked if this led to any changes in the statistical conclusions and in the point estimates.

Effect of time on mCPR by duration of A360 activities

In this analysis, we evaluated if change in mCPR over time varied by levels of duration of A360 activities. We did this by testing the interaction term between duration of A360 activities (short, medium and high) and time before and after the intervention.

Results

Sensitivity analysis- keeping communities with longer A360 activities

Table 12: Analytical results adjusted for confounders¹, excluding kebeles with short duration of activities²

	Weighted and adjusted for confounders ¹	
	TIME (Ref: Baseline)	P-value
Overall	4.8% (-0.7% to 10.3)	0.09

¹Age, equity index, education, living children and religion

²Duration below 40 days

Interpretation: The model without kebeles with short duration of activities led to the same point estimate, but wider 95%CI, which led to a change in p-value from 0.03 to 0.09.

Effect of time on mCPR by levels of duration of A360 activities

Table 13: Average (SD) mCPR across kebeles with short, medium or long duration of A360 activities, at baseline and endline

Duration of A360 activities	Baseline	Endline
Short (<40 days) ¹	74.2 (24.0)	68.5 (22.5)
Medium (40-43 days) ²	64.2 (26.3)	70.3 (23.0)
Long (>43 days) ³	64.8 (32.0)	71.5 (29.5)

¹n=16 kebeles, ²n=25 kebeles, ³n=16 kebeles

Table 14: The effect of time on mCPR by levels of duration of A360 activities, adjusted for confounders¹

Variable	Model estimates	P-value
Duration of A360 activities		
Short	Ref	
Medium	-0.3% (-14.7% to 14.2%)	0.97
Long	23.0% (11.9% to 34.1%)	<0.001
TIME		
Baseline	Ref	
Endline	2.5% (-11.4% to 16.5%)	0.72
Duration*TIME		
Short*Endline	Ref	
Medium*Endline	4.5% (-11.5% to 20.6%)	0.57
Long*Endline	1.7% (-14.9% to 18.3%)	0.84

¹Age, equity index, education, living children and religion

Ref: reference level for the model estimates; i.e. At baseline, mCPR was 23% greater in kebeles with long duration of A360 activities compared to kebeles with short duration of A360 activities.

Interpretation: Trends in mCPR were the same in communities with short, medium, or long duration of A360 activities.

Conclusion

Contrary to our hypothesis, removing kebeles with short duration of activities changed the statistical conclusion from an evidence of an effect of time on A360 (p=0.03) to only a tendency for an effect (p=0.09). This was likely due to a lower sample size and therefore lower power to detect a difference in mCPR before and after A360.

Trends in mCPR were the same in communities with short, medium, or long duration of A360 activities.

References

Greenland, S., R. Daniel, and N. Pearce, *Outcome modelling strategies in epidemiology: traditional methods and basic alternatives*. International journal of epidemiology, 2016. **45**(2): p. 565-575.

Zou, G., *A modified poisson regression approach to prospective studies with binary data*. American journal of epidemiology, 2004. **159**(7): p. 702-706.

Appendix I. Exposure questions not used in Ethiopia endline surveys due to change in instrumentation

- “In the last 2 years, have you attended a discussion/meeting with a health worker that combined financial planning with family planning/child birth spacing?”
- “What kind of Health Worker did you have the discussion/meeting with?”
- “Was ‘Smart Start’ mentioned during that discussion/meeting?”
- “What information did you get about family planning / child birth spacing?”

Appendix II. Limitations of exposure questions used in Ethiopia, raised by PSI team (March 2021)

Ethiopia- Smart Start

Question	Consideration	Recommendation
Q401- Have you ever heard of 'Smart Start'?	<p>This question would be relevant to measure exposure to Smart Start. The translation was also correct.</p> <p>Recall and familiarity with Smart Start could have been affected by the significant reduction of mobilization activities due to COVID 19.</p> <p>Furthermore, SS implements in a kebele for a period of 6 weeks before exiting to other kebeles. Some of the kebeles selected for the evaluation were exited in as early as 2018. Recall bias would be a bigger problem in these kebeles compared to those where SS was still operating just before or during the evaluation.</p>	<p>Could be retained as a measure of "potential exposure".</p> <p>Consider acknowledging potential for underreporting as a limitation - due to recall bias.</p>
Q402a- Have you ever seen any of these images?	<p>The two images displayed in the question are on the front page of the SS HEW discussion guide which has six images (still unclear how these two images were selected)¹. All these six images may not be visible to girls unless one receives the comprehensive SS intervention through the HEW.</p>	<p>A "yes" response for one image is interpreted as low exposure and a "yes" response on two images as high exposure.</p>
Q402b - Have you ever seen any of these images?	<p>The WDA and SS navigators conduct the bulk of mobilization under SS. The images on the WDA and SS guide are different from the images displayed in the evaluation. The images in the guides were selected because they create a call-to-action impression to the girls. It would have been possible for more girls to recall the images contained in these two guides.</p> <p>Finally, the translation omits the first part of the question, 'have you ever heard...'. This could affect how the question was understood by respondents.</p>	<p>Only two out of the six images relevant to Smart Start were displayed to the girls during the evaluation.</p> <p>We cannot confidently decide how to handle this question.</p>
Q403 - Have you heard about or seen a 'goal card'?	<p>This is a complex question with three components (i.e. have you heard, have you seen and do you have a goal card).</p>	<p>As long as the A360 team does not have sufficient information on the qualifications and calibre of enumerators, the kind of training provided (depth and practice given COVID 19) and the pre-test outcomes of this question it is difficult to make a verdict on this question (which is being depended on to determine both extremes of exposure)²</p>
Do you have a 'goal card'?	<p>It would require a high degree of accuracy on the enumerators to correctly read out the questions (in parts and sequentially) to elicit interpretable responses and also to capture responses appropriately.</p> <p>The point at which the goal card is displayed can also affect the responses (higher propensity for desirability bias as long as participants can see the goal card).</p>	

Ethiopia: Exploratory analysis on mCPR and exposure to Adolescents 360 programme

Q404 - Please tell me how you would 'agree' or 'disagree' with the following statements [agree, disagree, don't know]		
a) "The 'goal card' helps a girl to initiate a conversation with her husband about contraception"	The translation is correct	These statements generate high affirmative responses since they were administered only to girls who responded with a "yes" to Q403. In determining exposure, the responses to these statements are linked with the responses in Q403. The utility of the responses to these statements is subject to the reservations raised for Q403.
b) "The 'goal card' helps a girl to keep track her life goals"	The translation speaks about planning rather than tracking. That has potential to generate different responses.	
c) "I heard about the 'goal card' but I do not know what it is"	The translation is correct	

¹Note from the LSHTM team: As mentioned at the beginning of this exploratory analysis, exposure questions (including images) were selected by LSHTM with collaboration of Itad and PSI members in January 2020.

²Note from the LSHTM team: All questions were pre-tested at endline; the outcome evaluation team and data collection collaborators took a series of measures to ensure data quality; these measures will be shared with PSI team during March 2021.

Appendix III. Exposure questions used in Ethiopia endline surveys (November 2021)

Question	Wara Jarso n=346	Lome n=271	Ada'a n=261	Fentale n=269	Oromia n=1147
A	Have you ever heard of 'Smart Start'?				
Yes	10.2 (30)	60.7 (160)	24.4 (64)	19.2 (64)	26.5 (318)
No	78.0 (274)	39.0 (110)	58.2 (151)	68.1 (172)	62.8 (707)
B	Have you ever seen any of these images?				
Yes	16.9 (46)	63.0 (166)	30.5 (79)	21.2 (64)	30.6 (355)
No	79.1 (284)	36.2 (102)	61.2 (159)	77.1 (201)	65.9 (746)
C	Have you ever seen any of these images?				
Yes	18.8 (52)	61.6 (164)	30.3 (78)	22.7 (67)	31.4 (361)
No	74.9 (268)	35.7 (100)	56.0 (147)	75.5 (198)	63.2 (713)
D	Have you heard about or seen a 'goal card'? Do you have a 'goal card'?				
Yes, heard about only	6.2 (19)	31.4 (88)	15.1 (40)	17.7 (51)	16.9 (198)
Yes, have seen but don't have	7.0 (18)	13.1 (35)	2.8 (7)	1.8 (8)	5.9 (68)
Yes, have a 'goal card'	1.1 (3)	0.8 (3)	0.3 (1)	0.2 (1)	0.6 (8)
No	71.0 (246)	49.7 (134)	64.3 (168)	72.9 (189)	65.8 (737)
Ea	The 'goal card' helps a girl to initiate a conversation with her husband about contraception				
Agree	98.8 (39)	98.6 (124)	92.2 (44)	83.0 (52)	93.5 (259)
Disagree	0 (0)	1.4 (2)	1.9 (1)	2.2 (1)	1.4 (4)
Eb	The 'goal card' helps a girl to keep track of her life goals				
Agree	95.3 (38)	97.6 (122)	88.8 (42)	85.2 (53)	92.6 (255)
Disagree	3.0 (1)	2.4 (4)	3.8 (2)	2.0 (1)	2.6 (8)
Ec	I heard about the 'goal card' but I do not know what it is				
Agree	72.4 (29)	66.2 (83)	65.6 (30)	55.4 (31)	64.3 (173)
Disagree	19.7 (8)	33.8 (43)	28.7 (15)	33.8 (24)	30.6 (90)

Note: Questions Ea and Eb were not used in the final definition of exposure due to high levels of agreement throughout all woredas.

Appendix IV. Descriptive results: the relationship between self-reported exposure and sociodemographic characteristics, in outcome evaluation woredas, Ethiopia

	Wara Jarso		Lome		Ada'a		Fentale	
	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>
	n=22	n=323	n=154	n=117	n=64	n=197	n=45	n=224
Age (years), mean (SD)	18.2 (0.7)	18.1 (0.9)	17.9 (0.9)	17.5 (1)	18.1 (1.2)	18.2 (0.9)	17.6 (1.2)	17.6 (1.1)
Age (years), Proportion (95%CI)								
15	0 (0-0)	0.8 (0.2-2.9)	1.7 (0.4-7.1)	6.4 (2.5-15.7)	4.6 (0.6-27.2)	1.2 (0.3-5.1)	9.9 (4.5-20.4)	6.4 (2.6-14.7)
16	0 (0-0)	6.6 (3.2-13)	8.2 (5.1-12.9)	13.6 (6.8-25.6)	6.6 (2-19.4)	4.1 (1.8-8.8)	19.4 (11.5-31)	13.8 (10.4-18.2)
17	13.4 (4.6-32.9)	11.9 (7.8-17.6)	21.3 (14.4-30.1)	26.8 (18.6-36.9)	15.1 (8.8-24.6)	15.7 (9.9-23.9)	13.3 (4.4-33.9)	22.1 (14.3-32.6)
18	60.0 (39.3-77.7)	42.9 (38-48)	44.8 (36.5-53.3)	46.2 (33.5-59.5)	21.8 (14.7-30.9)	33.1 (26.9-39.9)	33.8 (17.7-54.9)	43.2 (34.2-52.7)
19	26.7 (9.9-54.6)	37.8 (28.2-48.4)	24 (13.2-39.7)	6.9 (1.6-26)	51.9 (40.8-62.8)	46 (39.7-52.4)	23.6 (13.4-38.2)	14.5 (8.9-22.7)
Number of living children, Proportion (95%CI)								
No children	40.3 (17.3-68.6)	51.1 (41.3-60.8)	30.7 (19.6-44.6)	53.1 (34.8-70.6)	23.2 (13.2-37.5)	38.1 (30.1-46.8)	46.9 (22.2-73.3)	47.7 (34.5-61.2)
1 or more children	59.7 (31.4-82.7)	48.9 (39.2-58.7)	69.3 (55.4-80.4)	46.9 (29.4-65.2)	76.8 (62.5-86.8)	61.9 (53.2-69.9)	53.1 (26.7-77.8)	52.3 (38.8-65.5)
Education level, Proportion (95%CI)								
No education or Primary	35.8 (20.9-54.1)	74.0 (65.1-81.3)	90.7 (82.1-95.4)	91.1 (82.6-95.7)	90.9 (81.3-95.8)	84.8 (78.5-89.5)	83.9 (62.2-94.3)	91.0 (82.2-95.7)
Secondary or Technical/Vocational	64.2 (45.9-79.1)	26.0 (18.7-34.9)	9.3 (4.6-17.9)	8.9 (4.3-17.4)	9.1 (4.2-18.7)	15.2 (10.5-21.5)	16.1 (5.7-37.8)	9.0 (4.3-17.8)
Religion, Proportion (95%CI)								
Orthodox	97.1 (77.8-99.7)	93 (87.1-96.4)	75.6 (54.3-88.9)	84.6 (65.1-94.2)	98 (85.9-99.7)	91.3 (80.8-96.3)	22.2 (5.5-58.4)	5.8 (2.1-14.9)

Ethiopia: Exploratory analysis on mCPR and exposure to Adolescents 360 programme

Protestant, Catholic, Muslim, Traditional, No religion	3.0 (0.3-22.3)	7.0 (3.6-12.9)	24.5 (11.1-45.7)	15.4 (5.8-34.9)	2 (0.3-14.1)	8.7 (3.7-19.2)	77.8 (41.6-94.5)	94.2 (85.2-97.9)
Wealth quintile, mean (SD)	4.0 (0.8)	3.4 (1.3)	3.9 (1.2)	4.4 (0.9)	3.6 (1.1)	3.7 (1.2)	4.0 (1.6)	2.2 (1.6)
Mobile phone access, Proportion (95%CI)								
Any phone access	98.3 (85.4-99.8)	91.3 (78.8-96.7)	75.1 (63.1-84.1)	92.3 (80.9-97.1)	94.6 (86.1-98.0)	90.0 (84.8-93.5)	80.0 (52.0-93.6)	95.6 (90.2-98.1)
No mobile phone access	1.7 (0.2-14.6)	8.7 (3.3-21.2)	24.9 (15.9-36.9)	7.7 (2.9-19.1)	5.4 (2.0-13.9)	10.0 (6.5-15.2)	20.0 (6.4-48.0)	4.4 (1.9-9.8)

Appendix V. Descriptive results: the relationship between self-reported exposure and modern contraceptive use, in outcome evaluation woredas, Ethiopia

	Wara Jarso		Lome		Ada'a		Fentale	
	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>	<i>Exposed</i>	<i>Not exposed</i>
No. of girls	n=22	n=238	n=154	n=117	n=64	n=197	n=45	n=224
Any modern method	97.3 (77.8-99.7)	79.1 (67.9-87.2)	77.5 (68.1-84.8)	63.4 (50.2-74.8)	88.1 (61.8-97.1)	71.8 (63.5-78.8)	63.0 (50.6-73.9)	19.5 (9.7-35.4)
Long-Acting Reversible Contraceptive	15.9 (4.4-43.9)	10.1 (4.1-23)	39.0 (23.1-57.6)	32.6 (19.9-48.4)	36.3 (21.5-54.3)	25.8 (17.3-36.8)	67.0 (30.5-90.4)	42.9 (25.2-62.5)
Any traditional method	0 (0-0)	0 (0-0)	1 (0.1-7.4)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
Not currently using	2.7 (0.3-22.2)	20.9 (12.8-32.1)	21.5 (14.7-30.3)	35.0 (24.7-46.9)	11.9 (2.9-38.2)	27.6 (20.7-35.7)	37.1 (26.2-49.5)	79.8 (65.5-89.2)
No response	0 (0-0)	0 (0-0)	0 (0-0)	1.6 (0.2-10.8)	0 (0-0)	0.6 (0.1-4.8)	0 (0-0)	0.7 (0.1-5.3)
Any modern method in past 12 months	97.3 (77.8-99.7)	79.4 (68.9-86.9)	83.7 (72.6-90.9)	70.3 (55-82.1)	88.1 (61.8-97.1)	79.1 (73.4-83.7)	63.0 (50.6-73.9)	19.7 (9.7-35.8)

Appendix VI. Ethiopia PSI monitoring data from kebeles where outcome evaluation happened

SN	Woreda	Kebele	Duration (days) ¹	Dur_cat ²
1	Ada'a	ANBELTA	40	1
2	Ada'a	DENKAKA	42	1
3	Ada'a	DERE	42	1
4	Ada'a	DERE SHOKI	42	1
5	Ada'a	GERBICHA	39	0
6	Ada'a	GICHO GERBABO	40	1
7	Ada'a	GODINO	42	1
8	Ada'a	GOLO DIRTU	42	1
9	Ada'a	HIDI	39	0
10	Ada'a	KERFE	405	2
11	Ada'a	KETEBA	41	1
12	Ada'a	KOFTU	39	0
13	Ada'a	KATILA	52	2
14	Ada'a	WAJITUNA DEBAN DEBE	38	0
15	Ada'a	YERER SELASE	38	0
16	Fentale	ALGE	40	1
17	Fentale	EBITI	405	2
18	Fantale	GELCHA	43	1
19	Fantale	GIDARA	42	1
20	Fantale	HARO ADI-TOWN-KEBELE 1	42	1
21	Fantale	KOBO	44	2
22	Fantale	METEHARA-TOWN-KEBELE 1	39	0
23	Fantale	SARANA WEBA	39	0
24	Fantale	TUTUTI	52	2
25	W/Jarso	ABUYA YANBENA	42	1
26	W/Jarso	ABU KUKE	42	1
27	W/Jarso	AWARE GOLJE	42	1
28	W/Jarso	BITO MILKI	42	1
29	W/Jarso	BOBE LIBEN	42	1
30	W/Jarso	DEYE TUTI	42	1
31	W/Jarso	FILIKLIK-TOWN KEBELE 1	42	1
32	W/Jarso	HOSE	42	1
33	W/Jarso	JARSO TUTI	35	0
34	W/Jarso	JEMO BERDADA	40	1
35	W/Jarso	KOLA BORSO	39	0
36	W/Jarso	LENCHO BORSO	60	2
37	W/Jarso	MELIYOU CHEWA	32	0
38	W/Jarso	WELE CHILELO	48	2
39	W/Jarso	GOHA TSIYON-TOWN KEBELE 1	45	2
40	W/Jarso	TULU MILKI-TOWN-KEBELE 1	57	2
41	Lume	ADADA DEMBEL	44	2
42	Lume	BOLA BUTA	29	0

Ethiopia: Exploratory analysis on mCPR and exposure to Adolescents 360 programme

43	Lume	DEKABORA KARA	40	1
44	Lume	DILDILA GONBORE	40	1
45	Lume	DONI JATENI	39	0
46	Lume	EJERE-TOWN-KEBELE 1	45	2
47	Lume	EJERSA GORO	45	2
48	Lume	EJERSA-TOWN KEBELE 1	39	0
49	Lume	JIRMI ENSLALE	43	1
50	Lume	KARA FINCHAWA	39	0
51	Lume	KILTU BEJA	44	2
52	Lume	QOQA-TOWN-KEBELE 1	44	2
53	Lume	KOLBA GODE	407	2
54	Lume	NANAWA	71	2
55	Lume	SHERA DIBANDIBA	39	0
56	Lume	TAFI ABO	40	1
57	Lume	TEDE BILDIMA	39	0

¹ Calculated by subtracting end date of activities by start date of activities

² Categorised in three levels defined by using median (42 days), second quartile (39 days) and third quartile (44 days)

Appendix E – DHS mCPR definition and results table

Index

Index	1
How does the A360 outcome evaluation define modern contraceptive prevalence (mCPR)?	2
How do Demographic and Health Survey (DHS) define modern contraceptive prevalence (mCPR)?	2
What are the main differences between the definitions?	3
Why is the A360 outcome evaluation using a different definition?	3
Which definition of mCPR will be used in the OE analysis?	3
Other ways to define modern contraception	3
mCPR results at baseline (2017) and endline (2020) surveys according to A360 and DHS definitions	4

How does the A360 outcome evaluation define modern contraceptive prevalence (mCPR)?

Number of fecund sexually active 15 – 19 year old girls reporting use of modern contraceptives at the time of the survey

Number of fecund sexually active 15 – 19 year old girls

[Equation 1. Married or unmarried girls]

- **Modern contraception** includes male and female sterilisation, contraceptive implants, intrauterine contraceptive devices, injectables, contraceptive pill/oral contraceptives, emergency contraceptive pill, male condom, female condom, Standard Days Method, Lactational Amenorrhoea Method, diaphragm, spermicides, foams and jelly
- **Fecund** girls are those who have started menstruating, are not pregnant and do not report that they are infertile
- **Sexually active** girls are those who report having sexual intercourse in the last 12 months

How do Demographic and Health Survey (DHS) define modern contraceptive prevalence (mCPR)?

Number of married 15 – 19 year old girls reporting use of modern contraceptives at the time of the survey

Number of married 15 – 19 year old girls

[Equation 2. Married girls]

Number of unmarried sexually active 15 – 19 year old girls reporting use of modern contraceptives at the time of the survey

Number of unmarried sexually active 15 – 19 year old girls

[Equation 3. Unmarried girls]

- **Modern contraception:** same definition as A360 applies
- **Sexually active** girls are those who report having sexual intercourse in the last 30 days

What are the main differences between the definitions?

- The main difference between DHS mCPR definition and A360 outcome evaluation (OE) definition is that the A360 OE definition excludes pregnant girls, infertile girls, and those girls who have not started menstruating.
- Also, DHS only includes unmarried girls who report having had sexual intercourse in the last month, while the A360 OE definition considers all unmarried girls reporting sexual intercourse in the last year.

Why is the A360 outcome evaluation using a different definition?

The outcome evaluation team has decided to use a more programmatic definition of mCPR as the denominator then reflects the population that the A360 interventions are targeting i.e. the population at risk of pregnancy. By using this definition, we can examine separately the impact of A360 on:

- (1) Contraceptive use among the A360 target population i.e. those at risk of pregnancy
- (2) Number of pregnancies (age-specific fertility rates are a secondary outcome in A360)

Which definition of mCPR will be used in the OE analysis?

The A360 OE definition of mCPR will be used for the primary outcome evaluation analysis. We will also describe the prevalence of modern contraceptives using the DHS definition to allow direct comparison with studies that have used the DHS definition.

Other ways to define modern contraception

Contraceptives are commonly classified into modern or traditional, but there remain inconsistencies in the definition and criteria for classifying modern contraceptive methods as such (Festin et al., 2016). For example:

- The Lactational Amenorrhea Method and the Standard Days Method are classified as modern by some organizations and countries (e.g. DHS) and as traditional by others (e.g. Multiple Indicator Cluster Surveys).
- Emergency contraceptives are also generally considered a modern method, but it is sometimes difficult to quantify their use.

These differences in modern contraception definition cause confusion and make it difficult to compare mCPR between studies. We will describe method-specific use to facilitate comparisons with other studies.

mCPR results at baseline (2017) and endline (2020) surveys according to A360 and DHS definitions

Oromia, Ethiopia

The target population in Oromia were married girls, for which the DHS definition considers the whole sample of girls surveyed, as shown in the previous equations. Hence, whereas in A360 definition, overall mCPR at endline was 68.4%, using the DHS definition it was 56.0%. The difference was due to 322 girls who were not fecund or sexually active but were considered in the DHS calculation. **Table 1** shows mCPR at baseline and endline using A360 definition. **Table 2** shows mCPR at baseline and endline, in comparison and intervention sites, using DHS definition.

Table 1: A360 definition, Oromia Region, Ethiopia

	Baseline (846 individuals, 57 kebeles)	Endline (854 individuals, 57 kebeles)	Difference
Overall	63.8 (56.6-71.0)	68.4 (61.8-74.9)	4.55
Wara Jarso	73.8 (69.6-78.0)	83.4 (74.4-92.4)	9.61
Lome	82.6 (74.3-90.8)	77.1 (67.5-86.6)	-5.50
Ada'a	66.4 (50.5-82.2)	76.2 (70.0-82.5)	9.88
Fentale	18.6 (0.3-36.8)	25.6 (10.6-40.5)	7.00

Table 2: DHS definition, Oromia Region, Ethiopia

	Baseline (846 individuals, 57 kebeles)	Endline (854 individuals, 57 kebeles)	Difference
Overall	52.0 (45.6-58.3)	56.0 (50.1-61.9)	4.01
Wara Jarso	61.7 (58.0-65.4)	56.3 (47.7-65.0)	-5.35
Lome	71.9 (61.2-82.6)	71.1 (60.6-81.6)	-0.84
Ada'a	47.7 (34.5-60.9)	67.5 (59.3-75.7)	19.80
Fentale	12.6 (1.5-23.7)	20.9 (9.3-32.4)	8.30