Appendix A, B and D

Outcome Evaluation of Adolescents 360 in Nigeria

Date: July 2021 (revised October 2021)

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

Submitted by Itad in association with London School of Hygiene and Tropical Medicine

Appendix A – Methodology details

Index

Study design

Study populations

Our first target population were adolescent girls aged 15–19 years. However, within this study population, our primary outcome and some of our secondary outcomes were 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 behaviors 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

Eligible girls were identified using a cluster sampling design. The primary sampling unit were enumeration areas (**EA**) within local government areas (**LGA**); all households were selected per EA and one or more eligible girls were selected per household.

State

The intervention was evaluated in Nasarawa (North Nigeria) and Ogun (South Nigeria). Study states were selected by the Society for Family Health (**SFH**). The selected states were chosen because of the absence of

other adolescent focused sexual and reproductive health activities and because of SFH's previous experience working in these states.

Local government area – allocation to intervention and comparison arms

Study LGAs were selected by SFH in collaboration with the state Ministry of Health and local government officials. Within a pair, allocation of an LGA to the intervention or comparison arm of the outcome evaluation study was purposively selected by SFH in collaboration with the state Ministry of Health and local government officials. Intervention LGAs were selected first, and then paired LGAs recommended by SFH. The LGAs were selected from areas with no security concerns, and comparison-intervention pairs were selected to be similar in the following criteria:

- Population density;
- Estimated modern contraceptive prevalence rate (mCPR) among 15- to 49-year-olds (DHIS2, 2016);
- Number of health facilities;
- Presence of World Bank support for Maternal and Child Health activities.

In Ogun, the evaluation was conducted in two LGAs (one intervention and one comparison). In Nasawara, four LGAs consisting of two similar pairs have been selected for evaluation. Two of these received the intervention (one in each pair) and two did not—i.e. they act as comparisons. The size of selected LGAs is presented in **Table 1**.

Table 1: Comparability of outcome evaluation study intervention and comparison LGAs in Ogun and Nasarawa states

LGA	Total pop. (2006)[1]	Estimated number of household[2]	Pop. 15–19-year-old females[1]	Estimated mCPR (15-49 years)[3]	Pop. Density (/km^2)	No. of EAs[1]	Ratio of health facilities public: private[4]	Health facilities[5]	
								Public[4]	Private[4]
Ogun State									
Ado-Ota Oda (I)	527,242	131,811	24,100	2.2	600.5	2,253	0.3	8	28
Shagamu (C)	255,885	51,177	12,443	2.5	416.8	1,117	0.3	24	80
Nasarawa State - pair 1									
Doma (I)	174,046	34,806	8,702	6.3	59.5	993	1.3	56	
Toto (C)	148,452	29,690	7,422	8.3	47.6	513	4.8	76	
Nasarawa State - pair 2									
Karu (I)	256,166	51,233	12,808	34.6	95.2	1209	1.9	197	
Nasarawa (C)	236,665	47,333	11,833	11.8	38.1	1116	1.8	84	

LGA, local government area, HH, household, mCPR, modern contraceptive use, EA, enumeration area, I, Intervention arm, C, Comparison arm

1Estimated population (pop.) in 2013 based on 2006 Nigeria Population Census; 24/household in Ogun and 5/household in Nasarawa; 3HMIS Nigeria (2015); 42011 MEASURE Evaluation Health Facility Mapping; 5DHIS2 (2016)

Selection of study populations

A360 targeted different subpopulations of adolescent girls in the two States (**Box 1**). Eligibility criteria did not include any criteria related to contact with or exposure to elements of the A360 program.

Box 1 Study eligibility criteria

Inclusion criteria

- Adolescent girls aged 15–19 years;
- Unmarried (Ogun, Southern Nigeria);
- Married or living as married (Nasarawa, Northern Nigeria);
- Living, at the time of the survey, in the study sites;
- Voluntarily provides informed consent;
- If unmarried and under 18 years of age, guardian/parent voluntarily provides informed consent.

Exclusion critieria

- There were no specific exclusion criteria.

Population A: 15–19-year-old girls

In Nasawara, the study population were married girls (or living as married) aged 15–19 years. In Ogun, the study population were unmarried girls aged 15–19 years.

EAs within LGAs (intervention allocation units) were randomly sampled at baseline (through simple random sample). A simple random sample of 1,150 enumeration areas (EA) in Nasarawa and 710 EAs in Ogun and was obtained. The same EAs visited at baseline, were visited at endline; the exception was 235 EAs in Nasarawa State that were randomly selected from the same LGAs, either because baseline EAs could not be visited at endline (e.g. for security reasons; n=106 EAs), or to reach the target sample of eligible girls (n=129 extra EAs).

In Nasawara State, Nasawara LGA (comparison LGA) shares a border with Karu and Doma (intervention LGAs). Therefore, to reduce spill-over due to girls travelling to work or school across LGA boundaries, a "buffer zone" were created such that EAs within localities (larger geographic areas containing many EAs) in Nasarawa LGA that border either Karu or Doma were excluded from the sampling frame.

Within each EA we sampled (simple random sample) clusters of approximately 100 households. If a selected EA contained fewer than 100 households, then we continued the data collection in an adjoining EA until 100 households were selected. The questionnaire was administered to all eligible unmarried girls aged 15–19 years in the selected households in Ogun and all eligible married girls aged 15–19 years in Nasarawa. 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: Cohabitating adult

We interviewed a cohabitating adult in 20% of the study households in Ogun and the husband/male partner of 10% of the married girls interviewed in Nasarawa.

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 method was obtained, 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 five 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 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 Nigeria, 20% took this offer, and 3% in Ethiopia. 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 will ideally see 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 a meeting held on 4 March 2020, 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	1st CAPI	
% of LARC users among current users	Yes	1st CAPI	New outcome at endline but can be calculated using baseline data
Use in last 12 months	Yes	1st CAPI	New outcome at endline but can be calculated using baseline data
Unmet need	Yes	1st CAPI	
Age specific fertility rates	Yes (partial; see note)	1st CAPI	Reduced number of questions compared to full CAPI
Age at first birth	Yes	1st CAPI	
Aspirations	Yes (partial; see note)	2nd CATI	New outcome at endline – no baseline data; Reduced number of questions compared to full CAPI
Community acceptance	Yes (partial; see note)	2nd CATI	Reduced number of questions compared to full CAPI
Agency/ Self-efficacy	Yes (partial; see note)	2nd CATI	
Attitudes	Yes (partial; see note)	2nd CATI	
Benefits	Yes	1st CAPI	
Access to contraceptive services and products	Yes	2nd 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:

$$\frac{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls\ reporting\ use\ of\ modern\ contraceptives[1]\ at\ the\ time\ of\ the\ survey}{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls}$$

[Equation 1. Married or unmarried girls*][2]*

Table 3 to **Table 5** detail variable categorization from questionnaire.

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

[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.

[2] 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	Variables needed: ▪ 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 months[3]	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	The total unmet need is composed of unmet need for spacing plus the unmet need for limiting. The numerator includes only women who were not using contraception at the time of the survey. The non-users were first split into

[3] **We restricted past use to the last 12 months to decrease recall bias.**

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
		○ 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: ○ wanted at that time - unmet need for spacing ○ or unwanted - unmet need for limiting; ▪ Women who were neither pregnant nor postpartum amenorrhoeic will then be classified into fecund and infecund; fecund women are further split into: ○ 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)	Awareness of where to obtain health services was assessed through the question ▪ "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?" 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.
Awareness of contraceptive products	Girls who are sexually active in the last 12 months	Awareness of contraceptive products was assessed through the question ▪ "Have you ever heard of contraceptives?" 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.

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
Benefits of modern contraception	Girls who heard about modern contraceptives	**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.
Misconceptions about modern contraceptives	Girls who are sexually active in the last 12 months and heard about modern contraceptives	**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: 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 is bad for her health and can harm her womb; and 3. Some modern contraceptives can make adolescent women permanently fat. Sum score may therefore range between 0 and 3. With greater scores being more desirable than lower scores.
Agency (self-efficacy) to use modern contraceptives to prevent unintended pregnancies	Girls who are sexually active in the last 12 months and heard about modern contraceptives	**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: 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. Sum score may therefore range between 0 and 4. With greater scores being more desirable than lower scores.

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
Attitudes towards the use of modern contraceptives to prevent unintended pregnancies	Girls who heard about modern contraceptives	**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: 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? Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.
Community acceptance and social support for adolescent girls to adopt healthy sexual and reproductive health behaviors, including use of modern contraceptives	Unmarried girls who are sexually active in the last 12 months and heard about modern contraceptives	**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: 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? Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.
	Married girls who are sexually active in the last 12 months and heard about modern contraceptives	**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: 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?

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	NUMERATOR
		Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.
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	**Future aspirations** were assessed through four questions, with each of which the respondent indicated her agreement (strongly disagree to strongly agree): 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. 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". Question 3 was scored 0 if the girl says "agree" or "strongly agree", 1 if she says "disagree" and 2 if "strongly disagree". Question 4 was scored 4 if the girl says, "strongly agree", 3 if "agree" or 0 if she says "disagree" or "strongly disagree". Sum score may therefore range between 0 and 9. With greater scores being more desirable than lower scores.
Benefits on the use of modern contraception to prevent unintended pregnancies	Girls who heard about modern contraceptives	**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.
Modern contraceptives disadvantages	Girls who heard about modern contraceptives	**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 "none" and 1 to 7 depending on the number of disadvantages mentioned. Greater scores were thus less desirable than lower scores.

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
Descriptive norms	Unmarried girls who heard about modern contraceptives	**Descriptive norms** towards the use of modern contraceptives were assessed through three questions, to which the respondent answers "Most of them", "Less than half of them", "None of them" or "Don't know": 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? Questions were scored 1 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.
	Married girls who heard about modern contraceptives	**Descriptive norms** towards the use of modern contraceptives were assessed through three questions, to which the respondent answers "Most of them", "Less than half of them", "None of them" or "Don't know": 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? 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.

Table 1 Outcomes of interest for the A360 Outcome Evaluation related to population B, and data collection tools

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
Community acceptance and social support for adolescent girls to adopt healthy sexual and reproductive health behaviors, including use of modern contraceptives	Co-habiting adult who heard about modern contraceptives	**Attitudes** towards the use of modern contraceptives were assessed through two questions, to which the respondent answers approve or disapprove, scored 1 or 0, respectively: 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? Sum score may therefore range between 0 and 2. With greater scores being more desirable than lower scores.
Descriptive norms*	Co-habiting adult of unmarried girl who heard about modern contraceptives	**Descriptive norms** towards the use of modern contraceptives were 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”: 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? 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.

OUTCOMES	DEFINITIONS AND DATA COLLECTION TOOLS	
	DENOMINATOR	**NUMERATOR**
	Husband/partner of married girl who heard about modern contraceptives	**Descriptive norms** towards the use of modern contraceptives were 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”: 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? 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.

*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, Meghan Cutherel, Mathew Wilson and Graham Smith in February 2020. **Table 6** shows the final definition of exposed and non-exposed girls according to endline exposure questions.

Figure 1: Adolescents 360 logo for 9ja girls, the intervention name in Ogun State

Figure 2: Adolescents 360 logo for MMA, the intervention name in Nasarawa State

Table 5: Defining exposure to A360 based on exposure questions

Q	OGUN STATE EXPOSURE QUESTIONS	EXPOSED GIRL IN OGUN	NASARAWA STATE EXPOSURE QUESTIONS	EXPOSED GIRL IN NASARAWA	GIRL NOT EXPOSED
1	Have you heard about a program called 9JA girls?	Answers "Yes" to Q1 and "Yes" to Q2 or Q4	Have you heard about a program called Matasa Matan Arewa (MMA)?	Answers "Yes" to Q1 and "Yes" to Q3 or Q4	Answers "Yes" to Q1 but not to Q4 or Q2 (Ogun)/Q3 (Nasarawa)
2	Do you recognize this logo? (**Figure 1**)	Answers "Yes" to Q2 and "Yes" to Q1	Do you recognize this logo? (**Figure 2**)	N/A [2]	Answers "No", "Don't know" or does not respond to Q1
3	Have you participated in Life, Love & Health (LLH) classes?	N/A [1]	Have you participated in Life, Family, Health (LFH) sessions?	Answers "Yes" to Q3 and "Yes" to Q1	
4	Did you receive one-on-one counselling from a trained provider?	Answers "Yes" to Q4 and "Yes" to Q1	Did you have a one-on-one counselling with a trained provider?	Answers "Yes" to Q4 and "Yes" to Q1	

[1] Due to the similarity in reported exposure to this question among those who answered "Yes" to Q1 in comparison (17.5%) and intervention sites (19.6%), only Q1 and Q2 as well as Q1 and Q4 were used to determine exposure in Ogun State.

[2] Due to the similarity between MMA symbol and Arewa symbol, only Q1 and Q3 as well as Q1 and Q4 were used to determine exposure in Nasarawa State.

Regression framework

Analysis of main outcome

To evaluate the impact of A360 on these outcomes, two types of analysis were conducted. The main analysis measured the impact of the A360 program from baseline to endline on each outcome. In this analysis regression models were fitted with three explanatory variables – time (0 baseline and 1 endline), A360 (0 comparison and 1 intervention area) and an interaction term between time and A360. The secondary analysis, measured the impact of self-reported exposure to the A360 program at endline, having therefore one explanatory variable – exposure (0 not exposed and 1 exposed), and contained only data from intervention areas at endline. These are described below.

The impact of the A360 program from baseline to endline

Two datasets were used per State (Ogun and Nasarawa), one with baseline data from the intervention and comparison sites, and the other with endline data from the two sites. Datasets were appended, and a dummy variable (i.e. time) identified whether the survey was conducted at baseline or at endline. Another dummy variable identified whether respondents were interviewed in an intervention or comparison site (i.e. A360).

Following (Zou, 2004), we used modified Poisson regression models with robust standard errors (at the enumeration area, **EA**, level):

$$\log(\lambda_i) = \beta_0 + \beta_1 \text{Time}_i + \beta_2 \text{A360}_i + \beta_3 \text{Time}_i \times \text{A360}_i$$

- λ_i = risk of outcome for individual i
- $\exp(\beta_0)$ is the risk at baseline (time '0') in a comparison area (A360 '0');
- $\exp(\beta_1)$ is the risk ratio comparing contraceptive use between endline (time '1') and baseline (time '0') in a comparison area;
- $\exp(\beta_2)$ is the risk ratio comparing contraceptive use in the intervention area (A360 '1') or in the comparison area (A360 '0') at baseline (time '0');
- and $\exp(\beta_3)$ is the effect of A360 beyond the time effect (Villa, 2016).

Comparison and intervention local government areas (**LGA**) were selected in pairs, therefore the (descriptive and regression) analysis were conducted separately for each matched pair. The pairs were Ado-Odo/Ota (Ix) and Shagamu LGAs (Cx) in Ogun state, Doma (Ix) and Toto (Cx), as well as Karu (Ix) and Nasarawa LGAs (Cx) in Nasarawa state. For Nasarawa state, the main result was the effect of time (endline, time '1', compared to baseline, time '0') on mCPR over all intervention (A360 '1') and comparison LGAs (A360 '0'), i.e. the four LGAs were analysed together in one model. The reason for this was that the study was powered to detect an impact overall for all four LGAs. A variable indicating pair (Toto and Doma '1' and Nasarawa and Karu '2') was added to the model to identify the paired comparison and intervention sites.

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 (Greenland

et al., 2016). Age ranges from 15–19 years; Wealth Quintile[4] ranges from poorest (1st and 2nd quintiles) to richest (4th and 5th quintiles); education was categorised into '1' secondary or higher education and '0' qur'anic only, primary, and no education; living children was categorised into '1' respondents with at least one child, and '0' for no living children; religion was categorised into '1' Catholic or Protestant/Other Christian and '0' Muslim, Traditional, No religion, or others.

The impact of the self-reported exposure to the A360 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 Poisson regression models with robust standard errors (at EA level) to assess the strength of association between self-reported exposure (exposure '0', some exposure '1') and the use of modern contraception (outcome):

$\log(\lambda_i) = \beta_0 + \beta_1 \text{Exposure}_i$

We adjusted for the following demographic variables: age, education level, living children, religion and wealth quintile (Greenland et al., 2016). The analysis was restricted to endline data, and to intervention areas only.

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.

Analysis of secondary outcomes

Binary secondary outcomes were evaluated as described for the main outcome:

1. The impact of the A360 program from baseline to endline.
2. The impact of the A360 program at endline among that reported exposure to the program.

For continuous outcomes we used linear regression models:

$Yi = \beta0 + \beta1\text{Predictor}$

where Yi is the predicted outcome for the ith girl; β0 is the predicted value when β1=0 and β1 is the change in outcome associated with a one-unit increase in the predictor. As with the Poisson regression models, we used robust standard errors to adjust for clustering at the level of the EA.

Sampling weights

The probability of selection was the same for all households because the same number of households was selected from each EA, and each EA has approximately 100 households. Therefore, since all eligible girls were selected per household there was no need to use sampling weights.

Sample size calculations

In Nasarawa State, among sexually active married 15–19-year-olds, we assumed that between 2017 and 2021 mCPR increased from 12.9% to 14.2% in the absence of A360, and from 16.0% to 23.8% in the presence of A360. A sample size of 2,732 sexually active married girls was needed to have 90% power to

[4] Wealth Quintile was derived from a series of questions using the 'Nigeria Equity Tool' TOOL, E. 2015. Nigeria Equity Tool [Online]. Available: https://www.equitytool.org/nigeria [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).

detect difference in differences of 6.5% between 2017 and 2021 in A360 exposed girls. Taking into account the sampling design, estimated non-response, and the fact that not all married girls are currently sexually active, the final target sample size was 4,870 married 15–19-year-old girls.

In Ogun State, among sexually active unmarried 15–19-year-olds, we assumed that between 2017 and 2021 mCPR increased from 49.8% to 53.8% in the absence of A360 and 44.7% to 55.7% in the presence of A360. Based on these assumptions, we estimated that interviewing 1,747 sexually active unmarried girls would provide 90% power to detect an effect of A360. Taking into account the sampling design, estimated non-response, and the fact that not all unmarried girls are currently sexually active, the final target sample size was 12,048 unmarried 15–19-year-old girls.

Table 6: Revised mCPR estimates

SETTING	NOTES	ORIGINAL ESTIMATED STUDY WOULD HAVE 90% POWER TO DETECT EFFECT SIZE OF…	INTERVENTION OR COMPARISON COMMUNITY	ACTUAL BASELINE MCPR (2017)	ESTIMATED ENDLINE MCPR (2020)	REVISED ESTIMATED STUDY WOULD HAVE 90% POWER TO DETECT EFFECT SIZE OF…
OGUN		Difference in differences of 7%	Intervention	44.7%	55.7%	Difference in differences of 7.0%
			Comparison	49.8%	53.8%	
NASARAWA	Both pairs together	Difference in differences of 2.0%	Intervention	16.0%	23.8%	Difference in differences of 6.5%
			Comparison	12.9%	14.2%	
	Pair 1: Doma/Toto		Intervention	7.6%	17.5%	Difference in differences of 8.6%
			Comparison	12.8%	14.1%	
	Pair 2: Karu/Nasarawa		Intervention	21.3%	30.2%	Difference in differences of 7.6%
			Comparison	13.0%	14.3%	

Note: (1)The endline mCPR are estimates and represent one possible scenario at endline. The study power is based on the difference in the differences in mCPR between baseline and endline and not on the actual values of mCPR at endline. There are many scenarios of endline mCPR which would give a difference in difference of e.g. 7%. (2)In Nasarawa, the original sample size calculation was not based on the two matched pair design. The table shows the study power to estimate intervention effect in each matched pair separately.

Table 7: Estimated mCPR and sample size needed for sexually active 15–19-year-olds

	MCPR 2017 (BASELINE)	MCPR 2020	DID IN MCPR	SAMPLE SIZE (NUMBER OF SEXUALLY ACTIVE GIRLS) FOR 90% POWER TO

					DETECT DIFFERENCE
OGUN	Intervention	44.7%	55.7%	7.0%	
	Comparison	49.8%	53.8%		1,747
NASARAWA	Intervention	16.0%	23.8%		
	Comparison	12.9%	14.2%	6.5%	2,732

Table 8: Summary of endline survey design

REGIONAL STATE	SAMPLE SIZE (POP. A- WOMEN AGED 15–19 YEARS)	TARGET SAMPLE OF GIRLS AGED 15–19 TO BE INTERVIEWED	SAMPLE SIZE (POP. B)	SAMPLING AREA
OGUN	1,747	12,048	250	716 EAs
NASARAWA	2,732	4,870	250	621 EAs

Table 9: Details of sample size calculation for Nasarawa, Nigeria

	90% POWER TO DETECT DID 7% INCREASE IN MCPR
TARGET SAMPLE OF SEXUALLY ACTIVE 15–19-YEAR-OLDS (EFFECTIVE SAMPLE SIZE)	1,366
DESIGN EFFECT*	2
SAMPLE SIZE OF SEXUALLY ACTIVE FECUND 15–19-YEAR-OLD GIRLS **(EFFECTIVE SAMPLE SIZE * DESIGN EFFECT)**	2,732 (4,417 sexually active girls)
TARGET NUMBER OF 15–19-YEAR-OLD GIRLS **-ESTIMATE 56.1 % WILL REPORT THAT THEY HAVE BEEN SEXUALLY ACTIVE IN THE PAST YEAR BASED ON A360 BASELINE DATA & ARE FECUND**	4,870
TARGET SAMPLE OF 15–19-YEAR-OLDS GIRLS **ACCOUNTING FOR AN ESTIMATED 3% NON-RESPONSE BASED ON A360 BASELINE SURVEY**	5,016

Table 10: Details of sample size calculation for Ogun, Nigeria

	90% POWER TO DETECT DID 7% INCREASE IN MCPR
TARGET SAMPLE OF SEXUALLY ACTIVE 15–19-YEAR-OLDS (EFFECTIVE SAMPLE SIZE)	1,588

DESIGN EFFECT[1]	1.1
SAMPLE SIZE OF SEXUALLY ACTIVE FECUND 15–19-YEAR-OLD GIRLS **(EFFECTIVE SAMPLE SIZE * DESIGN EFFECT)**	1747 (1843 sexually active girls)
TARGET NUMBER OF 15–19-YEAR-OLD GIRLS **-ESTIMATE 14.5 % WILL REPORT THAT THEY HAVE BEEN SEXUALLY ACTIVE IN THE PAST YEAR BASED ON A360 BASELINE DATA & ARE FECUND**	12,048
TARGET SAMPLE OF 15–19-YEAR-OLDS GIRLS **ACCOUNTING FOR AN ESTIMATED 11% NON-RESPONSE BASED ON A360 BASELINE SURVEY**	13,373

[1]Intracluster correlation coefficient=0.01, 708 clusters, 17 eligible girls/cluster; DID, difference in differences

Flow diagram

In Nasarawa, eligible girls were identified in 6% (4,608/78,812) of households at baseline and in 6% (5,098/92,482) of households at endline (**Figure 3**). At baseline, the mean number of households selected per EA was seven (range: 1-21) and the mean number of EAs per LGA was 154 (range: 129-193) (**Table 12**). In Ogun, an eligible girl was identified in 13% (11,251/89,630) of households at baseline and in 15% (13,148/87,531) of households at endline (**Figure 4**). The mean number of households per EA was 16 (range: 1-61) and the mean number of EAs per LGA was 354 (range: 331-377) (**Table 13**).

Table 11: Structure of datasets in Nasarawa State at baseline (2017) and endline (2020)

	Baseline			Endline		
Level	Number of units	Replication within higher level [1]		Number of units	Replication within higher level [1]	
		Mean	Range		Mean	Range
LGA	4	-	-	4	-	-
EA	616	154	129 - 193	851	213	134 - 284
Households	4,608	7	1 - 21	5,098	6	1 - 19
15–19-year-old girls	4,816	1	1 - 4	5,199	1	1 - 3

[1]Number of units per cluster. For instance, number of girls per household, or number of households per EA

Table 12: Structure of datasets in Ogun State at baseline (2017) and endline (2020)

	Baseline			Endline		
Level	Number of units	Replication within higher level [1]		Number of units	Replication within higher level [1]	
		Mean	Range		Mean	Range
LGA	2	-	-	2	-	-
EA	708	354	331 - 377	658	329	320 - 338

Households	11,251	16	1 - 61	13,148	20	1 - 86
15–19-year-old girls	12,053	1	1 - 4	13,750	1	1 - 4

Number of units per cluster. For instance, number of girls per household, or number of households per EA

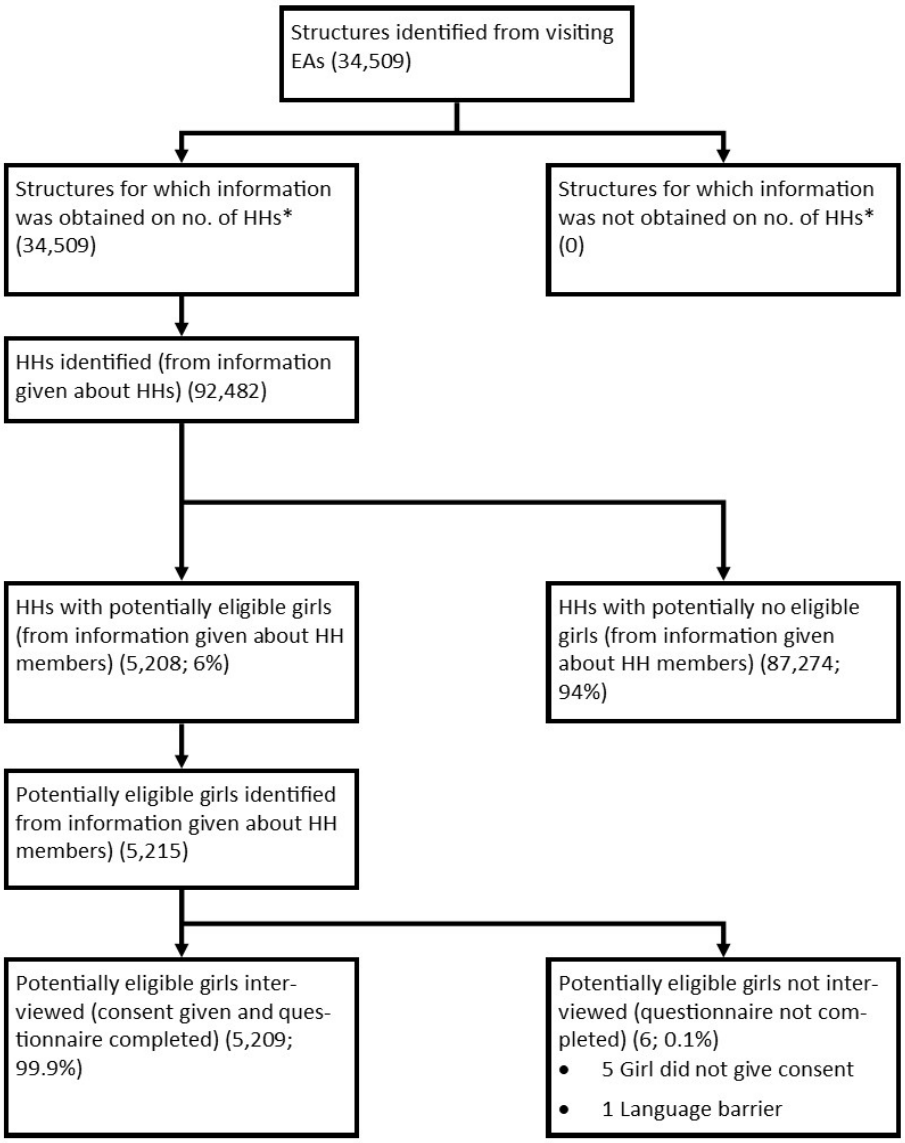

Figure 3: Flow diagram for endline surveys in Nasarawa State, Nigeria

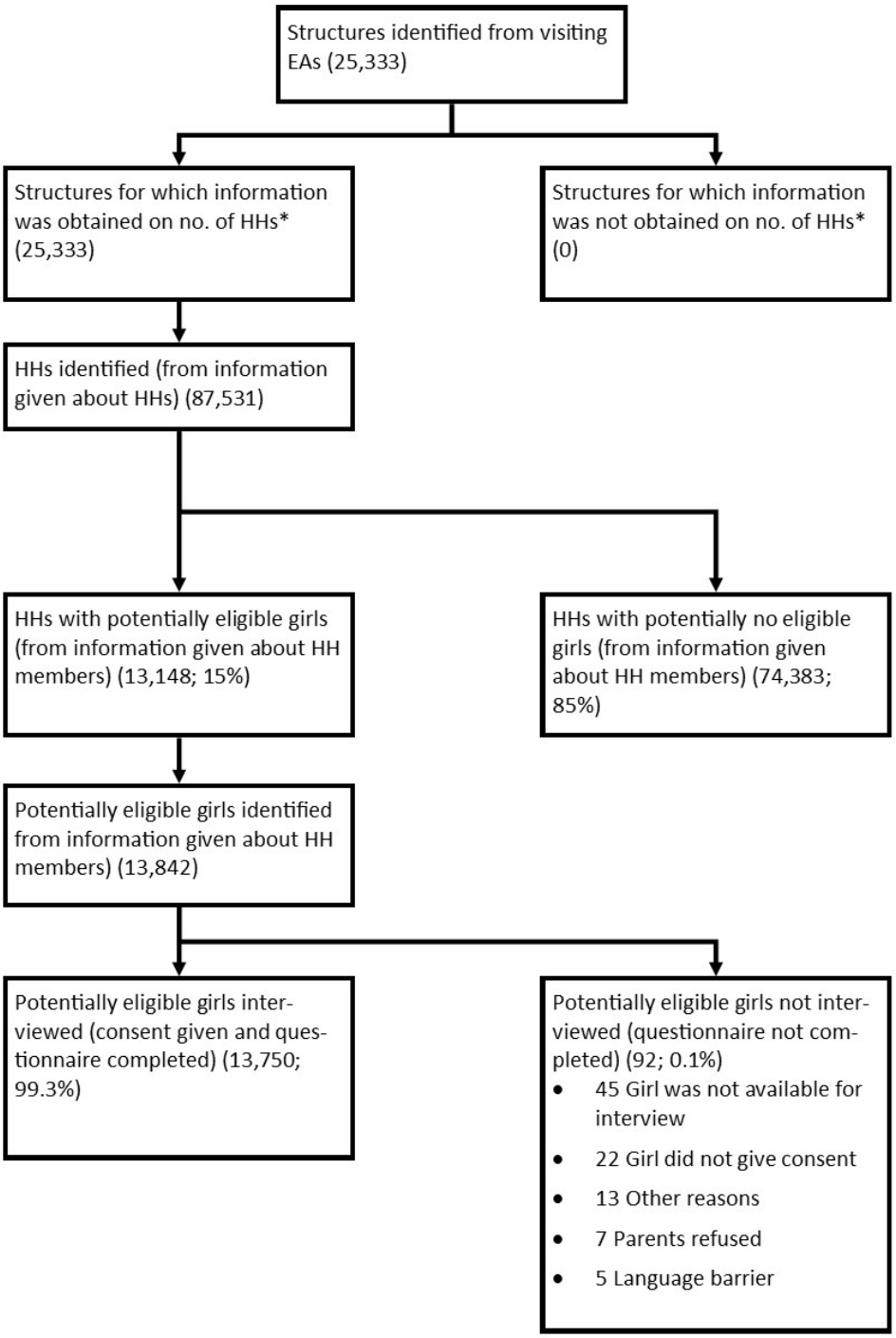

Figure 4: Flow diagram for endline surveys in Ogun State, Nigeria

References

ARMOR, D. J. 1973. Theta Reliability and Factor Scaling. *Sociological Methodology,* 5**,** 17-50.

BOATENG, G. O., NEILANDS, T. B., FRONGILLO, E. A., MELGAR-QUIÑONEZ, H. R. & YOUNG, S. L. 2018. Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Frontiers in public health,* 6**,** 149.

GREENLAND, S., DANIEL, R. & PEARCE, N. 2016. Outcome modelling strategies in epidemiology: traditional methods and basic alternatives. *International journal of epidemiology,* 45**,** 565-575.

TOOL, E. 2015. *Nigeria Equity Tool* [Online]. Available: https://www.equitytool.org/nigeria [Accessed November 2020].

VILLA, J. M. 2016. diff: Simplifying the estimation of difference-in-differences treatment effects. *The Stata Journal,* 16**,** 52-71.

ZOU, G. 2004. A modified poisson regression approach to prospective studies with binary data. *American journal of epidemiology,* 159**,** 702-706.

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

Table of contents

Introduction

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

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 A360 on mCPR accounting for migration
3. The effect of duration (i.e. number of dates on which contact with clients was reported in a given area) of A360 activities on the association between A360 and mCP

The impact of A360 intervention on mCPR

Hypothesis

As described in the analysis plan:

In Nigeria, the primary hypothesis was that mCPR in intervention communities at endline was higher than mCPR in comparison communities, after adjustment for baseline differences and confounding factors.

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 Nigeria.

mCPR was defined as follows:

$$\frac{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls\ reporting\ use\ of\ modern\ contraceptives[1]\ at\ the\ time\ of\ the\ survey}{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls}$$

[Equation 1. Married or unmarried girls]

Methods

As described in the analysis plan:

[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.

In Nigeria, a quasi-experimental design with comparison group was used. Quasi-experimental because random assignment of intervention and comparison sites was not possible. We used before-and-after population-based surveys, one happening in late 2017 and the other in late 2020.

Statistical analysis

As described in the analysis plan

Two datasets were used per State (Ogun and Nasarawa), one with baseline data from the intervention and comparison sites, and the other with endline data from the two sites. Datasets were appended, and a dummy variable (i.e. time) identified whether the survey was conducted at baseline or at endline. Another dummy variable identified whether respondents were interviewed in an intervention or comparison site (i.e. A360).

We used modified Poisson regression models with robust standard errors (at the enumeration area, **EA**, level), as follows [1]:

$$Y_i \sim \text{Poisson}(\lambda_i)$$

$$\log(\lambda_i) = \beta_0 + \beta_1 \text{Time}_i + \beta_2 \text{A360}_i + \beta_3 \text{Time}_i \times \text{A360}_i$$

- β_0 is the outcome at baseline (time '0') in a comparison area (A360 '0');
- $\exp(\beta_1)$ is the risk ratio for contraceptive use between endline (time '1') and baseline (time '0') in a comparison area;
- $\exp(\beta_2)$ is the risk ratio for contraceptive use between being in an intervention area (A360 '1') or in a comparison area (A360 '0') at baseline (time '0');
- and $\exp(\beta_3)$ is the effect of A360 beyond the time effect [2].

Comparison and intervention local government areas (**LGA**) were selected in pairs, therefore the (descriptive and regression) analysis were conducted separately for each matched pair. The pairs were Ado-Odo Ota (Ix) and Shagamu LGAs (Cx) in Ogun state, Doma (Ix) and Toto (Cx), as well as Karu (Ix) and Nasarawa LGAs (Cx) in Nasarawa state. For Nasarawa state, the main result was the effect of time (endline, time '1', compared to baseline, time '0') on mCPR over all intervention (A360 '1') and comparison LGAs (A360 '0'), i.e. the four LGAs were analysed together in one model. The reason for this was that the study was powered to detect an impact overall for all four LGAs. A variable pair (Toto and Doma '1' and Nasarawa and Karu '2') was added to the model to identify paired comparison and intervention sites.

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 [3]. Age ranges from 15-19 years; Wealth Quintile ranges from 1 lowest to 5 highest; education was categorised into '1' secondary or higher education and '0' qur'anic only, primary, and no education; living children was categorised into '1' respondents with at least one child, and '0' for no living children; religion was categorised into '1' Catholic or Protestant/Other Christian and '0' Muslim, Traditional, No religion, or others.

Results

Table 1: Descriptive results: the relationship between mCPR and time, by comparison and intervention sites

	Comparison sites			Intervention sites			Risk ratio
	Baseline	Endline	Ratio C	Baseline	Endline	Ratio I	Ratio I / Ratio C
Ogun							
Shagamu (Cx) vs Ado-Odo Ota (Ix)	49.8 (46.5-53.1)	51.0 (47.1-54.9)	1.0	44.7 (41.1-48.3)	48.8 (44.3-53.3)	1.1	1.1
Nasarawa							
Toto (Cx) vs Doma (Ix)	12.8 (9.5-17.2)	20.4 (17.0-24.2)	1.7	7.6 (5.5-10.3)	22.0 (18.8-25.6)	2.9	1.7
Nasarawa (Cx) vs Karu (Ix)	13.0 (10.6-15.8)	31.4 (28.1-34.9)	2.4	21.3 (18.5-24.5)	47.2 (43.2-51.3)	2.2	0.9

Ratio was calculated by dividing endline mCPR by baseline mCPR.

Table 2: Analytical results: the relationship between mCPR and time, by levels of A360, unadjusted for confounders

	A360 (Ref: Comparison Sites)	P-value	TIME (Ref: Baseline)	P-value	A360*TIME	P-value
Ogun						
Shagamu (Cx) vs Ado-Odo Ota (Ix) (model I)	0.9 (0.8-1.0)	0.04	1.0 (0.9-1.1)	0.88	1.1 (0.9-1.3)	0.43
Nasarawa (model II)	1.2 (1.0-1.5)	0.06	2.1 (1.7-2.5)	<0.001	1.1 (0.9-1.4)	0.32
Toto (Cx) vs Doma (Ix) (model III)	0.6 (0.4-0.9)	0.01	1.5 (1.1-2.2)	0.02	1.9 (1.2-3.1)	0.01
Nasarawa (Cx) vs Karu (Ix) (model IV)	1.6 (1.3-2.0)	<0.001	2.3 (1.9-2.9)	<0.001	0.9 (0.7-1.2)	0.65

Table 3: Analytical results: the relationship between mCPR and time, by levels of A360, adjusted for confounders[1]

	A360 (Ref: Comparison Sites)	P-value	TIME (Ref: Baseline)	P-value	A360*TIME	P-value

Ogun						
Shagamu (Cx) vs Ado-Odo Ota (Ix) (model I)[2]	0.9 (0.8-1.0)	0.12	1.0 (0.9-1.1)	0.70	**1.1 (0.9-1.3)**	**0.34**
Nasarawa (model II)[3]	1.1 (0.9-1.4)	0.28	2.1 (1.8-2.5)	<0.001	**1.0 (0.8-1.2)**	**0.74**
Toto (Cx) vs Doma (Ix) (model III)[4]	0.8 (0.5-1.2)	0.24	1.7 (1.2-2.4)	<0.01	**1.5 (0.9-2.5)**	**0.10**
Nasarawa (Cx) vs Karu (Ix) (model IV)[5]	1.3 (1.0-1.6)	0.03	2.4 (1.9-2.9)	<0.001	**0.8 (0.6-1.0)**	**0.10**

[1]Age, wealth quintile, education, living children and religion

[2]n=3,230, [3]n=5,414, [4]n=2,069, [5]n=3,345

Interpretation of these Tables is presented in **Appendix I**.

Conclusion

- In Ogun, there was a slight increase in mCPR over time in both intervention and comparison areas but no evidence of difference between areas
  - The RR for the interaction term between A360 and Time was 1.1, and the 95%CI included the null value (0.9-1.3)
- In Nasarawa, there were important increases in mCPR over time in both intervention and comparison sites but no evidence of difference between areas overall
  - The RR (95%CI) for the interaction term between A360 and Time was 1.0 (0.8-1.2)
  - There was no evidence of change in mCPR due to A360 in Toto (Cx)/Doma(Ix) pair or in Nasarawa (Cx) vs Karu (Ix) pair

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 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, Meghan Cutherel, Mathew Wilson and Graham Smith in February 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 II**).

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 III**). This feedback was reflected in our final definition. **Table 4** shows the final definition of exposed and non-exposed girls according to endline exposure questions. **Appendix III** presents the set of questions used in endline surveys along with their limitations and specific PSI team recommendations.

Figure 1: Adolescents 360 logo for 9ja girls, the intervention name in Ogun State

Figure 2: Adolescents 360 logo for MMA, the intervention name in Nasarawa State

Table 4: Defining exposure to A360 based on exposure questions

Question	Ogun State Exposure Questions	Exposed girl in Ogun	Nasarawa State Exposure Questions	Exposed girl in Nasarawa	Girl not exposed
1	Have you heard about a programme called 9JA girls?	Answers "Yes" to Q1 and "Yes" to Q2 or Q4	Have you heard about a programme called MATASA MATAN AREWA (MMA)?	Answers "Yes" to Q1 and "Yes" to Q3 or Q4	Answers "Yes" to Q1 but not to Q4 or Q2 (Ogun)/Q3 (Nasarawa)
2	Do you recognize this logo? (Fig 1)	Answers "Yes" to Q2 and "Yes" to Q1	Do you recognize this logo? (Fig 2)	N/A [2]	Answers "No", "Don't know" or does not respond to Q1
3	Have you participated in Life, Love & Health (LLH) classes?	N/A [1]	Have you participated in Life, Family, Health (LFH) sessions?	Answers "Yes" to Q3 and "Yes" to Q1	
4	Did you receive one-on-one counselling from a trained provider?	Answers "Yes" to Q4 and "Yes" to Q1	Did you have a one-on-one counselling with a trained provider?	Answers "Yes" to Q4 and "Yes" to Q1	

[1] Due to the similarity in reported exposure to this question among those who answered "Yes" to Q1 in comparison (17.5%) and intervention sites (19.6; Table 5), only Q1 and Q2 as well as Q1 and Q4 were used to determine exposure in Ogun State.

[2] Due to the similarity between MMA symbol and Arewa symbol, only Q1 and Q3 as well as Q1 and Q4 were used to determine exposure in Nasarawa State. See Appendix III for further details.

Results

Appendix IV describes the results per exposure question within each LGA in Nigeria.

Ogun

Table 5 describes overall exposure, as defined in **Table 4**. Self-reported exposure was 7.5% (95%CI: 5.8-9.8) in Ado-odo/Ota(Ix) and 2.1% (95%CI: 1.4-3.1) in Shagamu(Cx). **Table 5** also describes the results of Q1 and results of Q2/Q3/Q4 for those who answered positively to Q1.

Table 5: Table 1 Self-reported exposure to A360 in Ogun State

	Ado-odo/Ota(Ix)	Shagamu(Cx)	Ogun State
Q1	8.5 (97/1142)	3.7 (40/1090)	6.1 (137/2232)
Q1 and Q2	88.7 (86/97)	55.0 (22/40)	78.8 (108/137)
Q1 and Q3[1]	19.6 (19/97)	17.5 (7/40)	19.0 (26/137)
Q1 and Q4	21.7 (21/97)	5.0 (2/40)	16.8 (23/137)
Overall exposure	7.5 (86/1142)	2.1 (23/1090)	4.9 (109/2232)

1 Due to the similarity in reported exposure to this question among those who answered "Yes" to Q1 in comparison (17.5%) and intervention sites (19.6), only Q1 and Q2 as well as Q1 and Q4 were used to determine exposure in Ogun State.

Q1: Have you heard about a programme called [9JA girls]?, Q2: Do you recognize this logo?, Q3: Have you participated in Life, Love & Health (LLH) classes?, Q4: Did you receive one-on-one counselling from a trained provider?

Nasarawa

Table 6 describes overall exposure, as defined in **Table 4**. Self-reported exposure was 6.6% (95%CI: 4.5-9.5) in Doma(Ix), 4.9% (3.7-6.3) in Karu(Ix), 0.4% (0.1-0.9) in Nasarawa(Cx) and 0.8% (0.4-1.6) in Toto(Cx). **Table 6** also describes the results of Q1 and results of Q2/Q3/Q4 for those who answered positively to Q1.

Table 6: Self-reported exposure to A360 in Nasarawa State

	Doma (Ix)	Karu (Ix)	Nasarawa (Cx)	Toto (Cx)	Nasarawa State
Q1	14.7 (149/1016)	19.9 (307/1546)	2.9 (47/1628)	6.3 (64/1009)	10.9 (567/5199)
Q1 and Q2[1]	75.8 (113/149)	95.4 (293/307)	83.0 (39/47)	82.8 (53/64)	87.8 (498/567)
Q1 and Q3	40.3 (60/149)	17.3 (53/307)	10.6 (5/47)	6.3 (4/64)	21.5 (122/567)
Q1 and Q4	40.9 (61/149)	15.3 (47/307)	4.3 (2/47)	9.4 (6/64)	20.5 (116/567)
Overall exposure	6.6 (67/1016)	4.9 (75/1546)	0.4 (6/1628)	0.8 (8/1009)	3.0 (156/5199)

1Due to the similarity between MMA symbol and Arewa symbol, only Q1 and Q3 as well as Q1 and Q4 were used to determine exposure in Nasarawa State. See Appendix III for further details.

Q1: Have you heard about a programme called [MATASA MATAN AREWA (MMA)]?, Q2: Do you recognize this logo?, Q3: Have you participated in Life, Family, Health (LFH) classes?, Q4: Did you receive one-on-one counselling from a trained provider?

Discussion

Exposure levels from the OE in intervention areas from both Ogun and Nasarawa States are lower than PSI A360 report from September 2020, where A360 was said to have reached 14% of the population of adolescent girls in 9ja girls areas (15% of unmarried girls), and 5% of the population of adolescent girls in MMA areas (18% of married girls). However, OE and PSI exposure were not measured in the same way so may not be directly comparable.

Conclusion

Self-reported exposure was very low (<10%) in intervention areas from both Ogun and Nasarawa States. Nevertheless, these were greater in intervention areas than in comparison areas (no overlap of 95%CI).

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

Ogun

Table 7: Descriptive results: the relationship between self-reported exposure and sociodemographic characteristics, in intervention LGA in Ogun State, Nigeria

	Ado-odo/Ota (Ix)	
	Exposed	*Not exposed*
	n=86	n=1056
Age (years), mean (SD)	17.9 (1.1)	17.8 (1.2)
Age (years), Proportion (95%CI)		
15	3.5 (1.1-10.2)	6.2 (4.9-7.8)
16	11.6 (6.3-20.6)	11.6 (9.7-13.7)
17	16.3 (9.9-25.7)	17.6 (15.5-19.9)
18	32.6 (24.7-41.6)	28.6 (26.1-31.2)
19	36.1 (27.8-45.2)	36.1 (33.3-39.0)
Number of living children, Proportion (95%CI)		
No children	91.9 (83.9-96.1)	92.1 (90.3-93.7)

1 or more children	8.1 (3.9-16.1)	7.9 (6.3-9.7)
Education level, Proportion (95%CI)		
No education, Qur'anic only or Primary	8.1 (4-15.8)	9.8 (7.9-12.2)
Secondary or Higher	91.9 (84.2-96)	90.2 (87.9-92.1)
Religion, Proportion (95%CI)		
Roman Catholic or Protestant/other Christian	65.1 (54.8-74.2)	63.4 (59.9-66.6)
Muslim, Traditional, No religion, Other	34.9 (25.8-45.2)	36.7 (33.4-40.1)
Wealth quintile, mean (SD)	4.7 (0.6)	4.6 (0.6)
Mobile phone access, Proportion (95%CI)		
Any phone access	96.5 (89.3-98.9)	93.7 (91.8-95.1)
No mobile phone access	3.5 (1.1-10.7)	6.3 (4.9-8.2)

Interpretation: In Ogun, girls who reported being exposed were in all similar to girls who reported not being exposed to A360 (**Table 7**).

Nasarawa

Table 8: Descriptive results: the relationship between self-reported exposure and sociodemographic characteristics, by intervention LGAs in Nasarawa State, Nigeria

	Doma (Ix)		**Karu (Ix)**		**Nasarawa State**	
	Exposed	Not exposed	Exposed	Not exposed	Exposed	Not exposed
	n=67	n=947	n=75	n=1471	n=142	n=2,418
Age (years), mean (SD)	17.8 (1.3)	17.6 (1.3)	18.4 (1)	18.2 (1)	18.1 (1.2)	18.0 (1.1)
Age (years), Proportion (95%CI)						
15	9.0 (4.5-17.2)	7.7 (6.2-9.6)	2.7 (0.7-9.9)	1.2 (0.7-2.0)	5.6 (3.0-10.3)	3.8 (3.0-4.7)
16	11.9 (6.8-20.1)	13.9 (11.9-16.3)	2.7 (0.7-10.1)	5.3 (4.2-6.7)	7.0 (4.0-12.0)	8.7 (7.5-10.0)

17	14.9 (7.7-27.0)	19.3 (17.1-21.8)	10.7 (5.0-21.3)	14.6 (12.9-16.4)	12.7 (7.7-20.1)	16.4 (15.1-17.8)
18	22.4 (13.4-35.1)	26.1 (23.8-28.5)	21.3 (13.2-32.6)	26.9 (25.1-28.7)	21.8 (15.5-29.9)	26.6 (25.2-27.9)
19	41.8 (31.1-53.3)	33.0 (30.1-35.9)	62.7 (49.9-73.9)	52.1 (49.4-54.7)	52.8 (43.9-61.5)	44.6 (42.4-46.7)
Number of living children, Proportion (95%CI)						
No children	35.8 (25.7-47.4)	41.4 (38.2-44.7)	29.3 (20.3-40.4)	51.9 (49.3-54.6)	32.4 (25.4-40.3)	47.8 (45.7-49.9)
1 or more children	64.2 (52.6-74.3)	58.6 (55.3-61.8)	70.7 (59.6-79.7)	48.1 (45.4-50.7)	67.6 (59.7-74.6)	52.2 (50.1-54.3)
Education level, Proportion (95%CI)						
No education, Qur'anic only or Primary	88.1 (77.1-94.2)	77 (73.2-80.4)	30.7 (21.2-42.1)	34.9 (31.6-38.3)	57.8 (47.4-67.4)	51.4 (48.1-54.6)
Secondary or Higher	11.9 (5.8-23)	22.9 (19.5-26.7)	69.3 (57.9-78.8)	65.1 (61.7-68.4)	42.3 (32.6-52.6)	48.6 (45.4-51.8)
No response	0 (0-0)	0.1 (0.0-0.7)	0 (0-0)	0 (0-0)	0 (0-0)	0.0 (0.0-0.3)
Religion, , Proportion (95%CI)						
Roman Catholic or Protestant/ Other Christian	47.8 (35.7-60.1)	55.8 (51.7-59.7)	45.3 (34.2-57)	54.1 (50.4-57.7)	46.5 (38.3-54.9)	54.8 (52-57.5)
Muslim, Traditional, No religion, Other	52.2 (39.9-64.3)	44.1 (40.2-48.2)	54.7 (43-65.9)	45.9 (42.3-49.6)	53.5 (45.1-61.7)	45.2 (42.5-47)
Don't know	0 (0-0)	0.1 (0-0.7)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0.1)
Wealth quintile, mean (SD)	2.5 (0.8)	2.0 (0.9)	4.6 (0.7)	4.3 (0.9)	3.6 (1.3)	3.4 (1.4)
Mobile phone access, Proportion (95%CI)						
Any phone access	53.7 (42.7-64.4)	81.0 (77.3-84.2)	94.7 (86.9-97.9)	93.5 (91.6-95.0)	75.4 (67.6-81.7)	88.6 (86.7-90.3)
No phone access	46.3 (35.6-57.3)	19.0 (15.8-22.7)	5.3 (2.1-13.1)	6.5 (5.0-8.4)	24.7 (18.3-32.4)	11.4 (9.7-13.3)

Interpretation: In Nasarawa, exposed girls had generally more children (Karu) and lower phone access (Doma) compared to non-exposed (**Table 8**). All other factors were similar across exposure levels.

Discussion

The age distribution across all regions in Nigeria 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: 7% (10,604/146,985) were aged 15 years, 7% (9,720/146,985) were aged 16, 11% (16,017/146,985) were aged 17, 32% (46,739/146,985) were aged 18, and 43% (63,905/146,985) were aged 19. Therefore, similar to the OE findings, most girls reached by A360 activities were aged 18 and 19 years, according to PSI monitoring data.

Conclusion

In both Ogun and Nasarawa States, exposed girls had similar sociodemographic characteristics to non-exposed girls, except for number of children and phone access in Nasarawa.

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 respondent's 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 Poisson regression models with robust standard errors (at EA level) to assess the strength of association between self-reported exposure (exposure '0', some exposure '1') and the use of modern contraception (outcome), as follows [1]:

$$Y_i \sim \text{Poisson}(\lambda_i)$$
$$\log(\lambda_i) = \beta_0 + \beta_1 \text{Exposure}_i$$

where β_0 is the outcome at no exposure; β_1 reflects the overall effect of exposure. We adjusted for the following demographic variables: age, education level, living children, religion and wealth quintile [3]. The analysis was restricted to endline data, and to intervention areas only.

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

Ogun

In Ogun, exposed and non-exposed girls had a mCPR (95%CI) of 40.7 (28.2-54.6) and 49.4 (44.7-54.1), respectively. There was, therefore, the same mCPR across different levels of exposure. Exposed girls used more injectables compared to girls not exposed. Exposed girls also had a trend for lower emergency pill use compared to girls not exposed to A360. Use of daily pill and male condom was similar across exposure levels (**Table 9**).

The results of the Poisson regression models confirmed the descriptive findings. Overall, in Ado-odo/Ota, there was no effect of exposure to A360 on mCPR (RR, 95%CI: 0.8, 0.6-1.1; **Table 10**)

Table 9: Descriptive results: the relationship between self-reported exposure and modern contraceptive use, in intervention LGA in Ogun State, Nigeria

	Ado-odo/Ota (Ix)	
	Exposed	*Not exposed*
No. of girls	n=107	n=2889
Any method	57.4 (41.9-71.6)	63.6 (58.8-68.1)
Any modern method	40.7 (28.2-54.6)	49.4 (44.7-54.1)
Modern method		
Implant	0 (0-0)	1.0 (0.5-2.1)
Intra-uterine device	0 (0-0)	0.2 (0.0-1.0)
Injectables	5.6 (1.8-16.2)	0.7 (0.3-1.7)
Daily pills	1.9 (0.3-12.3)	1.0 (0.5-2.1)
Emergency pills	3.7 (0.9-13.9)	15.64 (12.7-19.1)
Male condom	29.6 (18.5-43.8)	29.8 (26.3-33.6)
Other modern method	0 (0-0)	1.0 (0.5-2.1)
Long-Acting Reversible Contraceptive[1]	0 (0-0)	2.4 (1.2-4.6)
Any traditional method	16.7 (8.8-29.3)	14.2 (11.3-17.7)
Not currently using	42.6 (28.4-58.2)	36.4 (31.9-41.2)
Don't know	0 (0-0)	0 (0-0)

No response	0 (0-0)	1.3 (0.9-1.8)
Any modern method in past 12 months	42.6 (30.6-55.6)	51.3 (46.6-56)

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

Table 10: Analytical results: the relationship between self-reported exposure and modern contraceptive use, by intervention LGA in Ogun State, Nigeria

Ado-odo/Ota (Ix)	Unadjusted		Adjusted for confounders[1]	
	RR (95%CI)	p-value	RR (95%CI)	p-value
Not exposed	Ref		Ref	
Exposed	0.8 (0.6-1.2)	0.27	0.8 (0.6-1.1)	0.23

[1]Age, wealth quintile, education, living children and religion

Ref: reference level for the risk ratio; i.e. RR=0.8 is the risk of mCPR in the exposed compared to girls not exposed to A360.

Nasarawa

In Nasarawa, exposed and non-exposed girls had a mCPR (95%CI) of 51.0 (40.1-61.8) and 36.7 (33.6-40.0), respectively. Greater contraceptive use in exposed compared to not exposed was driven by Doma LGA (**Table 11**).

Exposed girls used more implants and less emergency pills compared to girls not exposed. Use of injectables, daily pill and condoms was similar across exposure levels (**Table 11**).

The results of the Poisson regression models confirmed the descriptive findings. The positive relationship between exposure and mCPR remained in Doma, after adjusting for confounding factors. In Karu, even though there was a tendency for a positive effect of exposure on mCPR in the unadjusted model, it disappeared after adjusting for confounding factors. Overall, in Nasarawa State, there was a positive effect of exposure on mCPR (RR, 95%CI: 1.4, 1.1-1.8; **Table 12**).

Table 11: Descriptive results: the relationship between self-reported exposure and modern contraceptive use, by intervention LGAs in Nasarawa State, Nigeria

	Doma (Ix)		**Karu (Ix)**		**Nasarawa State**	
	Exposed	*Not exposed*	*Exposed*	*Not exposed*	*Exposed*	*Not exposed*
No. of girls	n=45	n=494	n=53	n=832	n=98	n=1326
Any method	42.2 (28.4-57.4)	21.3 (17.9-25.0)	60.4 (45.2-73.8)	50.0 (45.9-54.1)	52.0 (41.1-62.8)	39.3 (36.1-42.6)
Any modern method	42.2 (28.4-57.4)	20.2 (16.9-24.0)	58.5 (43.4-72.2)	46.5 (42.4-50.7)	51.0 (40.1-61.8)	36.7 (33.6-40.0)
Modern method						
Implant	4.4 (1.1-16.7)	5.9 (4.2-8.2)	34.0 (22.0-48.5)	13.8 (11.3-16.8)	20.4 (12.9-30.7)	10.9 (9.1-12.9)
Intra-uterine device	0 (0-0)	0 (0-0)	0 (0-0)	0.1 (0.0-0.9)	0 (0-0)	0.1 (0.0-0.5)
Injectables	8.9 (3.2-22.4)	1.8 (1.0-3.4)	11.3 (5.2-22.8)	7.0 (5.4-9.0)	10.2 (5.5-18.1)	5.1 (3.9-6.5)
Daily pills	2.2 (0.3-14.1)	2.0 (1.1-3.7)	0 (0-0)	6.1 (4.7-8.0)	1.0 (0.1-6.8)	4.6 (3.6-5.9)
Emergency pills	0 (0-0)	1.6 (0.8-3.2)	0 (0-0)	5.3 (3.9-7.1)	0 (0-0)	3.9 (3.0-5.2)
Male condom	26.7 (15.8-41.3)	8.7 (6.6-11.3)	9.4 (3.4-23.7)	12.3 (10.1-14.8)	17.4 (10.8-26.8)	10.9 (9.4-12.7)
Other modern method	0 (0-0)	0.2 (0.0-1.4)	3.8 (1.0-13.4)	1.9 (1.1-3.3)	2.0 (0.5-7.7)	1.3 (0.8-2.2)
LARC[1]	10.5 (2.6-34.6)	29.0 (21.1-38.3)	58.1 (39.1-74.9)	30.0 (25.2-35.1)	40.0 (26.7-54.9)	29.8 (25.6-34.3)

Any traditional method	0 (0-0)	1.0 (0.4-2.4)	1.9 (0.3-12.4)	3.5 (2.3-5.2)	1.0 (0.1-7.0)	2.6 (1.8-3.7)
Not currently using	57.8 (42.6-71.6)	75.9 (71.9-79.5)	39.6 (26.2-54.8)	49.0 (44.9-53.2)	48.0 (37.2-58.9)	59.1 (55.7-62.3)
Don't know	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
No response	0 (0-0)	2.8 (1.6-4.9)	0 (0-0)	1.0 (0.5-1.9)	0 (0-0)	1.7 (1.1-2.5)
Any modern method in past 12 months	44.4 (30.0-59.9)	20.5 (17.1-24.2)	62.3 (47.3-75.2)	47.5 (43.3-51.7)	44.4 (30.0-59.9)	20.5 (17.1-24.2)

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

Table 2 Analytical results: the relationship between self-reported exposure and modern contraceptive use, by intervention LGAs in Nasarawa State, Nigeria

	Unadjusted		Adjusted for confounders[1]	
	RR (95%CI)	p-value	RR (95%CI)	p-value
Nasarawa State (model I)				
Not exposed	Ref		Ref	
Exposed	1.4 (1.1-1.7)	<0.01	1.4 (1.1-1.8)	<0.01
Doma LGA (model II)				
Not exposed	Ref		Ref	
Exposed	2.0 (1.4-3.0)	<0.001	2.2 (1.5-3.1)	<0.001
Karu LGA (model III)				
Not exposed	Ref		Ref	
Exposed	1.2 (1.0-1.6)	0.10	1.2 (0.9-1.6)	0.14

[1]Age, wealth quintile, education, living children and religion

Ref: reference level for the risk ratio; i.e. RR=1.4 is the risk of mCPR in the exposed compared to girls not exposed to A360.

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

In Ogun, there were no LARC users among modern contraceptive users among exposed girls (**Table 9**). In Nasarawa, the proportion of LARC users among modern contraceptive users was the same across exposure levels. In Karu LGA, however, there was greater LARC use among exposed (58.1, 39.1-74.9) compared to non-exposed (30.0, 25.2-35.1; **Table 11**). The results of the Poisson regression models showed the same, with no association between exposure to A360 overall, but an evidence of a positive association in Karu LGA (**Table 13**).

Table 12: Analytical results: the relationship between self-reported exposure and proportion using a LARC in Ogun and Nasarawa States, Nigeria

	Unadjusted		**Adjusted for confounders[1]**	
	RR (95%CI)	p-value	RR (95%CI)	p-value
Ogun State (model I)[2]	-	-	-	-
Nasarawa State (model II)				
Not exposed	Ref		Ref	
Exposed	1.3 (0.9-2.0)	0.13	1.3 (0.9-1.8)	0.23
Doma LGA (model III)				
Not exposed	Ref		Ref	
Exposed	0.4 (0.1-1.5)	0.15	0.3 (0.1-1.4)	0.14
Karu LGA (model IV)				
Not exposed	Ref		Ref	
Exposed	1.9 (1.4-2.8)	<0.001	1.6 (1.2-2.3)	<0.01

[1]There were no LARC users among modern contraceptive users among exposed girls

[2]Age, wealth quintile, education, living children and religion

Ref: reference level for the risk ratio; i.e. RR=1.3 is the risk 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

As in the results for mCPR in Ogun State, there was no effect of exposure on use of a modern method within the last 12 months.

In Nasarawa State, there was a positive effect of exposure on use of a modern method within the last 12 months. The same positive effect was observed in both LGAs (**Table 14**) in Nasarawa (not the case for mCPR).

Table 13: Analytical results: the relationship between self-reported exposure and use of a modern contraceptive within the last 12 months in Ogun and Nasarawa States, Nigeria

	Unadjusted		**Adjusted**	
	RR (95%CI)	p-value	RR (95%CI)	p-value
Ogun State (model I)				
Not exposed	Ref		Ref	
Exposed	0.8 (0.6-1.1)	0.24	0.8 (0.6-1.1)	0.21
Nasarawa State (model II)				
Not exposed	Ref		Ref	
Exposed	1.4 (1.1-1.8)	<0.01	1.5 (1.2-1.8)	<0.001
Doma LGA (model III)				
Not exposed	Ref		Ref	
Exposed	2.1 (1.4-3.1)	<0.001	2.3 (1.6-3.3)	<0.001
Karu LGA (model IV)				
Not exposed	Ref		Ref	
Exposed	1.3 (1.0-1.6)	0.031	1.3 (1.0-1.6)	0.04

[1]Age, wealth quintile, education, living children and religion.

Ref: reference level for the risk ratio; i.e. RR=0.8 is the risk of use in past 12 months in the exposed versus not exposed.

Conclusion

In Ogun, respondents reporting some exposure to A360 were as likely to use modern contraceptives as respondents reporting no exposure.

In Nasarawa, 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 of modern contraceptives in last 12 months. Although there was no association between LARC use and exposure at the State level, there was evidence of a positive association in Karu LGA.

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 intervention 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 LGA for one month or more?
- In total approximately how long have you spent outside this LGA 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 14: Migration patterns in Ogun and Nasarawa States, Nigeria, in A360 OE endline surveys (Nov-Dec 2020)

		Migration, % (n)	
		No	Yes[1]
Ogun State	n=1954	96.5 (1886)	3.48 (68)
Ado-odo/(Ix)	n=970	97.8 (949)	2.17 (21)
Shagamu(Cx)	n=984	95.2 (937)	4.78 (47)
Nasarawa State	n=4152	99.2 (4118)	0.82 (34)
Doma(Ix)	n=670	99 (663)	1.05 (7)
Karu(Ix)	n=1452	99.2 (1441)	0.76 (11)
Nasarawa(Cx)	n=1300	99.5 (1293)	0.54 (7)
Toto(Cx)	n=730	98.8 (721)	1.23 (9)

[1]Being absent from LGA for at least three months in the past 12 months.

Interpretation: Migration patterns were extremely low in all OE LGAs. Overall, Ogun State had greater migration compared to Nasarawa State.

Sensitivity analysis

Table 15: Analytical results adjusted for confounders[1], excluding girls who migrated[2]

	A360 (Ref: Comparison Sites)	P-value	TIME (Ref: Baseline)	P-value	A360*TIME	P-value
Ogun						
Shagamu (Cx) vs Ado-Odo Ota (Ix) [3]	0.9 (0.8-1.0)	0.12	1.0 (0.9-1.1)	0.72	1.1 (0.9-1.3)	0.32
Nasarawa (model II) [4]	1.1 (0.9-1.4)	0.26	2.1 (1.8-2.5)	<0.001	1.0 (0.8-1.2)	0.70
Toto (Cx) vs Doma (Ix) (model III) [5]	0.8 (0.5-1.2)	0.25	1.7 (1.2-2.4)	0.005	1.5 (0.9-2.5)	0.10
Nasarawa (Cx) vs Karu (Ix) (model IV) [6]	1.3 (1.0-1.6)	0.03	2.4 (1.9-2.9)	<0.001	0.8 (0.6-1.0)	0.10

[1]Age, wealth quintile, education, living children and religion

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

[3]n=3,181, [4]n=5,393, [5]n=2,062, [6]n=3,331

Interpretation: In both Ogun and Nasarawa States, the models without girls that migrated (**Table 16**) led to the same point estimates and statistical conclusions as models with all girls (in section 1, **Table 3**).

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 number of contact dates 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 number of contact dates of A360 activities in each LGA (Nigeria).

Objectives

As described in the analysis plan

We aimed to quantify the impact of the A360 program according to the implementer reports of number of contact dates of A360 activities between December 2017 and March 2020.

Methods

PSI monitoring data

A360 was implemented by PSI. Their monitoring data had info about the following geographical areas: State, LGA, Ward, Community, and Facility. It also had data on A360 activity date, girl's age, current method used, pregnancy status and method received. It contained 148,011 observations of girls reached by A360 between 10 June 2017 and 28 April 2020 across eight Nigerian States.

LGAs where the OE did not happen were removed from the dataset, which led to 23,345 remaining observations. In Ogun State (Ado-Odo/Ota LGA), dates ranged between 6 December 2017 and 30 December 2019, and 22 communities were identified. In Nasarawa State, the period of A360 activity ranged between 19 April 2018 and 31 March 2020, and 6 and 11 communities were identified in Doma and Karu LGAs, respectively. Overall, there were 39 communities identified within these intervention LGAs (See **Appendix V** for full list of communities).

The number of girls reached per community was calculated by summing up the number of records within all activity-days in that community. The number of recorded activity-days per community was calculated by counting the number of days of activities from Dec/17 to Dec/19 in Ogun and Apr/18 to Mar/20 in Nasarawa. These are presented in **Table 17** for OE and non-OE sites in Ogun, Nasarawa, or over eight Nigerian States.

PSI reporting systems were set up prior to implementation and the monitoring and evaluation data and are understood to be an accurate reflection of implementation.

Table 16: Number of girls reached and number of activity days per State in OE and non-OE sites in Ogun, Nasarawa, or over eight Nigerian States

State	All 8 States Together[1]	Ogun	Nasarawa
Number of girls reached	148,011	23,629	6,327
OE-sites	23,345	17,018	6,327
Non-OE sites	124,666	6,611	0
Median (IQR) number of activity-days	8 (4-30.5)	4 (1-6)	7 (4-10)
OE-sites	5 (3-9)	4 (2-6)	7 (4-10)
Non-OE sites	9 (4-127)	3 (1-6)	N/A

[1]Ogun, Nasarawa, Delta, Edo, Kaduna, Lagos, Osun, Oyo

Outcome evaluation (OE) data

Outcome evaluation data had the following geographical areas: State, LGA, Locality and EA. Locality names were obtained from the National Population Commission, and linked to EA names. There were 189 localities identified: 80 localities in Doma, 53 localities in Karu LGA and 56 localities in Ado-Odo/Ota LGA.

Matching PSI and OE data by locality/community

By comparing locality and community names, these appeared to be the same geographical unit. This assumption is difficult to verify, as Nigeria tends to have many different administrative areas and levels. An additional challenge is that the data and spelling tends to be poorly managed (personal communication, BOL, February 2021).

Out of 39 communities identified in PSI data and 189 localities identified in OE data, 14 were matched between the two datasets, using their names. Two localities were from Doma (Idadu and Okpata), 4 from Karu (Aso pada, Gitata, Masaka and Uke) and 8 from Ado-Odo/Ota LGA (Atan, Ijoko-ota, Ilogbo, Iyana iyesi, Iyesi, Osuke, Owode-ota and Sango-ota). Table 18 summarizes number of contact dates for A360 activity and girls reached in each LGA, according to PSI monitoring data.

Table 17: Median (IQR) days of A360 activities and girls reached per matched community according to PSI monitoring data from Apr/18 to Mar/20 in Nasarawa and from Dec/17 to Dec/19 in Ogun State, presented by LGA

LGA, State	Localities, n	Days, Median (IQR)		Girls reached, n
Doma, Nasarawa	2	4	(4-4)	296
Karu, Nasarawa	4	8.5	(5.75-10.5)	957
Ado-Odo/Ota, Ogun	8	5.5	(3.75-7.5)	6,181

Statistical analysis

To quantify the impact of the A360 program according to the implementer reports of number of contact dates of A360 activities, we used two methods, detailed below.

Sensitivity analysis- keeping communities with longer A360 activities

In Ogun, number of contact dates of A360 activities was defined as low in Ijoko-ota, Ilogbo, Iyana iyesi, Iyesi, Osuke, Owode-ota (See **Appendix V** for number of contact dates), for which number of contact dates ranged between 2 and 6 days. Number of contact dates was defined as high in Sango-Ota (565 days) and Atan (12 days).

In Nasarawa, number of contact dates of A360 activities was defined as low in Idadu (4 days), Okpata (4 days) and Uke (2 days), and high in Gitata (10 days), Masaka (12 days) , and Aso pada (7 daya) communities.

In this sensitivity analysis, we did the following:

1. Removed from the OE dataset observations (n=600 in Ogun; n=2,184 in Nasarawa) from those communities for which we did not know the number of contact dates for A360 activities, creating a "Full" OE dataset; then ran the model used in Section 1.
2. Removed from "Full" OE dataset observations (n=345 in Ogun, n=167 in Nasarawa) from those communities short number of contact dates, creating a reduced OE dataset; 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 compared to a).

Table 19 describes the number of communities and observations present in each model.

We used a dataset containing both comparison and intervention communities. Only intervention communities for which number of contact dates of activities was known were kept.

Table 18: Describing number of communities and observations in each model

		Ogun State		Nasarawa State	
	LGA	**Communities**	**Observations**	**Communities**	**Observations**
Original OE dataset	Intervention	56 in Ado-Odo/Ota LGA	1,478	80 in Doma and 53 in Karu LGA	2,615
	Comparison	76 in Shagamu LGA	1,752	91 in Nasarawa and 66 in Toto LGA	2,799
	All	132	3,230	290	5,414
"Full" OE dataset[1]	Intervention	8 in Ado-Odo/Ota LGA	878	2 in Doma and 4 in Karu LGA	431
	Comparison	76 in Shagamu LGA	1,752	91 in Nasarawa and 66 in Toto LGA	2,799
	All	84	2,630	163	3,230
Reduced OE dataset[2]	Intervention	2 in Ado-Odo/Ota LGA	533	0 in Doma and 1 in Karu	264
	Comparison	76 in Shagamu LGA	1,752	91 in Nasarawa and 66 in Toto LGA	2,799
	All	78	2,285	158	3,063

[1]Excluding communities for which number of contact dates of A360 activities was unknown, i.e. all comparison communities were kept, and only 8 intervention communities were kept in Ogun and 6 in Nasarawa. [2]Excluding communities for which number of contact dates of A360 activities was short '0'.

Effect of time on mCPR by number of contact dates of A360 activities

In this analysis, we evaluated if change in mCPR over time varied by short vs long number of contact dates of A360 activities. To do this, we tested the interaction term between number of contact dates of A360 activities (low and high) and time before and after the intervention.

We used a dataset containing intervention communities only (i.e. no comparison communities were kept), for which number of contact dates of activities was known.

Results

Sensitivity analysis- keeping communities with longer A360 activities

Table 19: Analytical results adjusted for confounders [1], comparing the results using a dataset containing all communities (full [2]) to those using a dataset only containing communities with long A360 activities (reduced [3])

	Dataset	A360 (Ref: Comparison Sites)	P-value	TIME (Ref: Baseline)	P-value	A360*TIME	P-value
Ogun (model I)	Full[2,5]	1.0 (0.8-1.1)	0.49	1.0 (0.9-1.1)	0.78	1.1 (0.9-1.3)	0.26
	Reduced[3,6]	1.0 (0.8-1.1)	0.57	1.0 (0.9-1.1)	0.74	1.1 (0.9-1.4)	0.34
Nasarawa (model II) [4]	Full[2,7]	1.6 (1.2-2.2)	0.002	2.1 (1.8-2.5)	<0.001	0.6 (0.5-0.9)	0.01
	Reduced[3,8]	1.7 (1.2-2.4)	0.005	2.1 (1.7-2.5)	<0.001	0.6 (0.4-0.9)	0.02

[1]Age, wealth quintile, education, living children and religion

[2]Excluding communities for which number of contact dates of A360 activities was unknown, i.e. all comparison communities were kept, and only 8 intervention communities were kept in Ogun and 6 in Nasarawa.

[3]Excluding communities for which number of contact dates of A360 activities was short '0'

[4]Note that when using a dataset with all comparison communities but only a few intervention communities, the increase in mCPR over time becomes more evident in comparison than in intervention communities. i.e. Negative effect of A360 in mCPR.

[5]n=2,630 , [6]n=2,285, [7]n=3,230, [8]n=3,063.

Interpretation: In both States, full and reduced models led to the same point estimates and statistical conclusions. This was true for both Ogun and Nasarawa states.

Effect of time on mCPR by levels of number of contact dates of A360 activities

Table 20: The effect of time on mCPR by levels of number of contact dates of A360 activities, adjusted for confounders[1], among intervention communities only (i.e. as in a before and after design)

	Number of contact dates (Ref: Low)	P-value	TIME (Ref: Baseline)	P-value	Number of contact dates*TIME	P-value
Ogun (model I) [2]	1.0 (0.8-1.2)	0.91	1.1 (0.9-1.4)	0.38	1.0 (0.8-1.3)	0.99
Nasarawa (model II) [3]	1.0 (0.6-1.8)	0.93	1.5 (0.9-2.4)	0.12	0.9 (0.5-1.7)	0.73

[1]Age, wealth quintile, education, living children and religion

[2]n=878, [3]n=431

Interpretation: Trends in mCPR were the same in communities with long number of contact dates or in those with short number of contact dates. This was true for both Ogun (RR, 95%CI): 1.0, 0.8-1.3) and Nasarawa states (RR, 95%CI: 0.9, 0.5-1.7).

Conclusion

This analysis did not confirm our hypothesis 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.

References

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

2. Villa, J.M., *diff: Simplifying the estimation of difference-in-differences treatment effects.* The Stata Journal, 2016. **16**(1): p. 52-71.

3. 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.

Appendix I. Further interpretation of results tables

Interpretation of Table 1:

- In this Table you may see the prevalence of current modern contraceptive use in 2017 and 2020 surveys in comparison and intervention sites
- In Ogun State, where unmarried girls were targeted, in both comparison and intervention areas there was no evidence of an increase in mCPR (95%CI for prevalence of mCPR at baseline and endline overlap)
- In Nasarawa State, there were important increases in mCPR in both comparison and intervention areas
    - In pair 1, the increase in mCPR was greater in Doma, the intervention site, than in Toto, the comparison site
    - You can confirm this by the greater risk ratio (**RR**) obtained in this pair (1.7), compared to the other sites (1.1 in Ogun and 0.9 in Nasarawa vs Karu)
    - In summary, in Nasarawa, we appear to observe a positive effect of the intervention in one pair (RR>1), but not in the other (RR<1)

Interpretation of Table 2:

- In this Table you may see the results of the Poisson regression models, where coefficients were transformed in risk ratios
- If you compare the risk ratios from models, and those calculated in the previous table, they are fairly similar
- The interaction term gives us the information of the effect of A360 beyond the time trend
    - In Ogun, the increase in mCPR from 2017 to 2020 was the same in comparison and intervention sites, so the RR for the interaction term between A360 and Time includes 1 (no effect of A360 beyond time trend)
    - In Nasarawa State, the increase in mCPR from 2017 to 2020 was the same in comparison and intervention sites, when these are grouped together (RR for the A360*TIME includes 1, i.e. no effect of A360 beyond time trend)
    - In pair 1, however, as in the previous Table, there was a greater increase in mCPR in Doma, the intervention site, than in Toto, the comparison site. You can confirm this by the A360*TIME that does not include one. A360 increased the risk of contraceptive use by 1.9 times (1.2-3.1 times) beyond the time trend. P-value is 0.01.
- The risk ratios for A360 are the risk of mCPR in intervention vs comparison sites at baseline e.g.RR>1, the risk of mCPR was greater in intervention than in comparison sites, at baseline. i.e. In Pair 2, RR for A360 is 1.6, which means than Ix mCPR> Cx mCPR; indeed Karu (Ix) had mCPR 21.3, and Nasarawa (Cx) had mCPR 13 at baseline.
- The risk ratios for Time are the risk of mCPR in 2020 vs 2017 in comparison sites E.g.RR>1, there was an increase in risk of mCPR over time in comparison sites. i.e. In Nasarawa overall, RR for Time is 2, which means than mCPR at endline> mCPR at baseline; indeed in Toto (Cx) mCPR increased from 12 to 20; in Nasarawa (Cx) mCPR increased from 13 to 31.

Appendix II. Exposure questions not used in Nigeria endline surveys due to change in instrumentation

- "Who did you hear about it [MMA/9ja girls] from?"
- "In the last 2 years, have you attended a meeting, event or workshop related to family planning / child birth spacing?"
- "Was 'MMA/9ja girls' mentioned?"
- "What information did you get about family planning / child birth spacing?"
- In Ogun, there was also the following question: "During the Life, Love & Health (LLH) classes, which of the following activities did you engage with?"

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

Ogun, Nigeria – 9ja girls

Question	Consideration	Recommendation
Q401 - Have you heard about the program called 9ja Girls?	Question had a huge potential to elicit exposure to 9ja Girls. Adding information about what the 9ja Girls program does or a follow up probe for those who respond in the affirmative would have improved the question (e.g., adding '….the program called 9ja Girls that offers skills classes and contraception to girls" or a probe, 'What does the program do?'). This addition would have supported the elicitation of authentic responses about the program in two fronts. First, the 9ja girls name is not consciously shared during programming and girls who have interacted with the program might not relate the interaction with the program name. Girls who walk into government facilities (after being mobilized) without attending classes will miss an additional opportunity to interact with the brand. Second, the absence of clarifying information about the program could have elicited inappropriate responses as the '9ja' term is used for many circumstances in Nigeria. The second explanation could explain the comparable exposure in Shagamu.	We would recommend this is retained as a measure with two provisos: 1. Frame as "some potential exposure" because in the absence of probing questions to validate responses we have no certainty that those who responded in the affirmative did so with a good understanding of what they were responding to. 2. Include a disclaimer that it is likely to underrepresent the exposure due to walk-in clients' low dose exposure to 9ja Girls brand.
Q402 - Do you recognize this logo?	Question could have provided assisted recall of the 9ja girls logo. However, towards the end of 2018, A360 implemented '*bridging the gap plus*' during which intensive branding was reduced and the program shifted to using the green dot logo (below). Since then, the 9ja girls' logo is not displayed during activities at facilities. The green dot logo has multiple images and girls who might have seen it might not relate it to the image displayed during data collection, culminating to under reporting.	As per Q401. We would recommend providing the contextual information about the change of logos to support the interpretation.

		
Q403 - Have you heard about Life, Love & Health (LLH) classes?	During implementation, the teams mostly use the term "skills classes" as compared to LLH classes. This has been informed by field experiences. There is an implication that girls who could have gone through the 'skills' classes might have failed to relate to the language used in the question. Further addition of …offered by the 9ja Girls program" would have made the question more specific. Further adding a brief description of the topics covered through the classes would have provided clarity for girls to respond appropriately.	Handling this question is complex given that a higher proportion is reported for the control LGA than the intervention LGA (possibly explained by explanation in Q404). We defer it to the evaluation team to decide about how to handle this question.
Q404 - Have you participated in Life, Love & Health (LLH) classes?	Modifications similar to what is proposed for Q403 would have provided clarity and aided girls to respond appropriately. In addition, to the response above, The Challenge Initiative (TCI) in Nigeria implements Life Planning for Adolescent (LPA) program in some LGAs in Ogun. Sagamu LGA is one of these. The LPA program has some semblance to the interventions implemented by A360.	A higher reporting rate is observed for the control LGA than the intervention LGA possibly due to conflation of the LPA program and 9ja Girls. To measure high exposure, this question is employed on condition that the girl has heard about A360. We are unable to find an answer on how accurate it would have been for more girls in the control LGA to report attending the 9ja Girls classes. We defer it to the evaluation team to decide about how to handle this question.
Q405 - Did you receive one-on-one counselling from a trained provider?	This question has potential for misinterpretation by respondents. First, a provider-client interaction to discuss contraception, might not be construed as counselling.	In the slide deck, we understood that this question was employed conditionally to girls who reported to meeting a provider. To the extent that girls might have been unable to tell who a provider is

	Counselling is understood as what is provided in schools as part of guidance, for individual with substance use problems or stress and not in the context of receiving clinical services. Second, the term 'provider' is generally not a familiar terminology for lay persons, other terms such as auntie, nurse, doctor are more specific. Third, adding the specific detail of the topic covered during the interaction to the question would have provided clarity to respondents. For example after counselling adding the statement, "….about how you can delay/prevent pregnancy…". Finally, this question is translated to read, "….have you had one-on-one counselling with a "teacher" instead of provider.	and given that the subject of the provider-client interaction is not specified, using this question might be problematic. We defer it to the evaluation team to decide about how to handle this question.
Q406 - Did any of the one-on-one counselling happen by phone call or text?	In the 9ja Girls program counselling is not provided via text nor phone calls. Counselling requires the girls to be physically present at the health facility. Only follow-up reminders are conducted through phone calls or texting.	Apart from the reservation highlighted under consideration, it is unclear to us what the denominator of this question is (whether this is a subset of those who reported exposure to counselling). In the event that is the case, this question might not add value.

Nasarawa, Nigeria - MMA

Question	Consideration	Recommendation
Q401 - Have you heard about a programme called [MATASA MATAN AREWA (MMA)]?	Similar consideration to the 9ja girls' question, would have benefitted from adding more information to the question such as "……..a program called MMA that offers 'mentorship' classes and birth spacing to girls" or added a probe, 'What does the program do?' with choices to facilitate responses.	Similar to Q401 for 9ja girls

Q402 - Do you recognize this logo? [show MMA logo] 	This logo closely resembles the Arewa logo. A probe would have been needed to validate all affirmative responses and remove the possibility of inaccurate responses that would result from conflating the two logos.  The confusion of the MMA and Arewa logos are likely to have contributed to the high affirmative responses reported in control (Toto and Nasawara) LGAs. Additionally, in Nasarawa between 2015 – 2019 an SRH program called Matasan 360 program was aired on Arewa 24 (a radio station). This program's name is close to the name of our program (Matasan Mata Arewa) and could have influenced the responses for Toto and Nasarawa. This may explain the high number of persons who recognised the MMA logo.	Handling this question to measure exposure could be problematic. We defer it to the evaluation team to decide. The decision about whether or not to use this question would have benefitted from an inquiry involving the field data collection team (especially those who worked in the control LGAs) as suggested in a previous response to concerns raised.
Q403 - Have you participated in Life, Family, Health (LFH) sessions?	The MMA team popularly uses the language of "mentorship" classes rather than 'LFH' classes when engaging girls. This adaptation makes it easier when communicating about the LFH classes to the girls and their community influencers. Further, the question would have benefited from additional words describing the topics covered during the classes to make it easier for the girls to relate with their experiences. Adding MMA in the questions would also have created clarity about the program through which these classes are delivered and reduced confusion with programs that provide interventions close to MMA. For instance, Centre for Communication and Social Impact (CCSI) is involved in a consortium as a demand generation partner to improve post-partum family planning targeting 15–24-year-olds through compound planning meetings (meetings held in the community) as are some of the mentorship sessions in MMA. Another program (SHIPS) that includes messaging on FP, nutrition and immunization implements in the control LGAs. These programs might easily be conflated for MMA.	There are fairly different patterns of responses for this question between the intervention and control LGAs- might imply that this question might have correctly been understood. Underreporting cannot be excluded given that this applies to girls who reported familiarity to the MMA brand (and therefore subject to the biases in Q401 & 402) and who met a provider (subject to biases reported on Q405)

Q404 - Have you participated in Health, nutrition and interpersonal (HNI) skills classes?	In MMA, A360 provides only the mentorship classes. There are no Health, Nutrition and Interpersonal skills classes provided. However, nutrition and health are covered as part of routine FP and MNCH programs.	Could be difficult to interpret since these classes don't exist as part of the MMA program.
Q405 - Did you have a one-on-one counselling with a trained provider?	As explained for 9ja Girls in Q405, the term "provider" is not naturally used and participants might not know if a provider is trained or not making this question difficult to respond to. Further, the translation in the local language reads as "…. a professional provider" which would made the question even harder to comprehend.	Similar to the recommendation for the same question for 9ja Girls the decision about whether to use this question is difficult to make.
Q406 - Did any of the one-on-one counselling happen by phone call or text?	MMA does not provide counselling through phone or text. Instead, MMA sends text messages to clients for follow-up. During the COVID 19 pandemic girls might also have received referrals to in-person counselling via WhatsApp or text.	Same recommendation as for 9ja Girls

Appendix IV. Exposure questions used in Nigeria endline surveys (November 2021)

Table 21: Ogun State: Answers to exposure questions

Question		Ado-odo/Ota (Ix)	Shagamu (Cx)	Ogun State
		n=1142	n=1090	n=2232
A	**Have you heard about a programme called [9JA girls]?**			
	Yes	8.5 (97)	3.7 (40)	6.1 (137)
	No	91.5 (1045)	96.2 (1049)	93.8 (2094)
B	**Do you recognize this logo? [show 9ja Girls logo]**			
	Yes	9.2 (105)	2.9 (32)	6.1 (137)
	No	90.7 (1036)	97.1 (1058)	93.8 (2094)
C	**Have you heard about Life, Love & Health (LLH) classes?**			
	Yes	6.2 (71)	7.0 (76)	6.6 (147)
	No	93.8 (1071)	92.8 (1011)	93.3 (2082)
D	**Have you participated in Life, Love & Health (LLH) classes?**			
	Yes	2.2 (25)	3.5 (38)	2.8 (63)
	Yes, via text	0.9 (10)	0.5 (5)	0.7 (15)
	No	96.9 (1107)	96.1 (1047)	96.5 (2154)
E	**Did you receive one-on-one counselling from a trained provider?**			
	Yes, 1 time	2.1 (24)	1.9 (21)	2 (45)
	Yes, 2-5 times	1.8 (20)	2.6 (28)	2.2 (48)
	Yes, >5 times	0.4 (5)	1 (11)	0.7 (16)
	No	95.6 (1092)	94.4 (1029)	95 (2121)
F	**Did any of the one-on-one counselling happen by phone call or text?**			
	Yes	53.1 (26)	23.3 (14)	36.7 (40)
	No	46.9 (23)	76.7 (46)	63.3 (69)

Note 1: Some columns do not equal 100% because of a % that answered Don't know or Did not respond

Note 2: Question C was not used in the final definition of exposure due to concerns over the terminology (see limitations raised by PSI in Appendix III). Question F was not used in the final definition of exposure due to issue raised by PSI on counselling not being provided via text nor phone calls.

Table 22: Nasarawa State: Exposure questions and answers

Question		Doma (Ix)	Karu (Ix)	Nasarawa (Cx)	Toto (Cx)	Nasarawa State
		n=1016	n=1546	n=1628	n=1009	n=5199
A	**Have you heard about a programme called [MATASA MATAN AREWA (MMA)]?**					
	Yes	14.7 (149)	19.9 (307)	2.9 (47)	6.3 (64)	10.9 (567)
	No	85.1 (865)	80.1 (1239)	97.1 (1581)	93.3 (941)	89 (4626)
B	**Do you recognize this logo? [show MMA logo]**					
	Yes	19.5 (198)	35.6 (551)	3.9 (64)	17.9 (181)	19.1 (994)
	No	80.5 (818)	64.2 (993)	95.8 (1559)	81.8 (825)	80.7 (4195)
C	**Have you participated in Life Family Health (LFH) sessions? (in person, Whatsapp)**					
	Yes, in person	10.3 (105)	7.7 (119)	1.5 (24)	0.6 (6)	4.9 (254)
	Yes, via Whatsapp	0 (0)	0 (0)	0.3 (5)	0.1 (1)	0.1 (6)
	No	89.2 (906)	92.2 (1426)	98.1 (1597)	98.9 (998)	94.8 (4927)
D	**Have you participated in health, nutrition and interpersonal (HNI) skills classes?**					
	Yes	7.6 (77)	6.5 (100)	1.4 (23)	0.6 (6)	4 (206)
	No	91.3 (928)	93.1 (1440)	98.4 (1602)	99 (999)	95.6 (4969)
E	**Did you receive one-on-one counselling from a trained provider?**					
	Yes, 1 time	7.2 (73)	3.6 (56)	2.2 (36)	1.4 (14)	3.4 (179)
	Yes, 2-5 times	2.6 (26)	2.6 (40)	1.8 (29)	0.6 (6)	1.9 (101)
	Yes, >5 times	0.4 (4)	0.1 (1)	0.2 (3)	0 (0)	0.2 (8)
	No	89.2 (906)	93.5 (1446)	95.8 (1560)	97.6 (985)	94.2 (4897)
F	**Did any of the one-on-one counselling happen by phone call or text?**					
	Yes	13.6 (14)	20.6 (20)	14.7 (10)	10 (2)	16 (46)
	No	86.4 (89)	78.4 (76)	85.3 (58)	90 (18)	83.7 (241)

Note 1: Some columns do not equal 100% because of a % that answered Don't know or Did not respond

Note 2: Question B was not used in the final definition of exposure due to similarity between MMA symbol and Arewa symbol. Question D was not used in the final definition of exposure due to issue raised by PSI on the inexistence of these classes. Question F was not used in the final definition of exposure due to issue raised by PSI on counselling not being provided via text nor phone calls (see limitations raised by PSI in Appendix III).

Appendix V. Nigeria PSI monitoring data from LGAs where outcome evaluation happened

Table 23: Nigeria PSI monitoring data from LGAs where outcome evaluation happened (n=23,345 observations) in Ogun and Nasarawa States.

State	LGA	Community	Days	Girls Reached
Nasarawa	Doma	Arumangye	142	936
Nasarawa	Doma	Effugobringo	5	147
Nasarawa	Doma	Idadu	4	130
Nasarawa	Doma	Kanganuwa	4	173
Nasarawa	Doma	Okpatta	4	166
Nasarawa	Doma	Rukubi	4	157
Nasarawa	Karu	Angwan tiv	113	663
Nasarawa	Karu	Aso pada	7	221
Nasarawa	Karu	Giatata	10	469
Nasarawa	Karu	Gunduma	8	186
Nasarawa	Karu	Jankawa	1	22
Nasarawa	Karu	Luvu madaki	2	65
Nasarawa	Karu	Mararaba gurku	333	2205
Nasarawa	Karu	Masaka	12	225
Nasarawa	Karu	Rugan juli	9	250
Nasarawa	Karu	Uke	2	42
Nasarawa	Karu	Zhewun kokoro	8	270
Ogun	Ado-odo/ota	Alapoti	4	163
Ogun	Ado-odo/ota	Atan	12	697
Ogun	Ado-odo/ota	Dalemo	1	52
Ogun	Ado-odo/ota	Igberen	6	298
Ogun	Ado-odo/ota	Ijaye	1	9
Ogun	Ado-odo/ota	Ijoko	5	283
Ogun	Ado-odo/ota	Iju	7	386
Ogun	Ado-odo/ota	Ikorita	1	88
Ogun	Ado-odo/ota	Ilogbo	4	222
Ogun	Ado-odo/ota	Itele	5	241
Ogun	Ado-odo/ota	Iyana - iyesi	6	265

Ogun	Ado-odo/ota	Iyesi	3	135
Ogun	Ado-odo/ota	Joju	1	62
Ogun	Ado-odo/ota	Lafenwa	2	75
Ogun	Ado-odo/ota	Obasanjo	566	5036
Ogun	Ado-odo/ota	Osi	3	178
Ogun	Ado-odo/ota	Osuke ota	3	116
Ogun	Ado-odo/ota	Ota	5	155
Ogun	Ado-odo/ota	Otun	552	4059
Ogun	Ado-odo/ota	Owode	6	265
Ogun	Ado-odo/ota	Sango	565	4266
Ogun	Ado-odo/ota	The bells	1	35

Note: The number of girls reached per day per community was calculated by counting the number of records within a day. The number of recorded activity-days per community was calculated by counting the number of days of activities from Dec/17 to Dec/19 in Ogun and Apr/18 to Mar/20 in Nasarawa. Yellow rows identify communities matched to OE data.

Appendix D – DHS mCPR definition and results table

Index

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

$$\frac{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls\ reporting\ use\ of\ modern\ contraceptives\ at\ the\ time\ of\ the\ survey}{Number\ of\ fecund\ sexually\ active\ 15-19\ year\ old\ girls}$$

[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)?

$$\frac{Number\ of\ married\ 15-19\ year\ old\ girls\ reporting\ use\ of\ modern\ contraceptives\ at\ the\ time\ of\ the\ survey}{Number\ of\ married\ 15-19\ year\ old\ girls}$$

[Equation 2. Married girls*]*

$$\frac{Number\ of\ unmarried\ sexually\ active\ 15-19\ year\ old\ girls\ reporting\ use\ of\ modern\ contraceptives\ at\ the\ time\ of\ the\ survey}{Number\ of\ unmarried\ sexually\ active\ 15-19\ year\ old\ girls}$$

[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

Nasarawa State, Nigeria

The target population in Nasarawa 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 32.0% (959/3,000), using the DHS definition it was 19.3% (1,004/5,199). The difference was due to 2,199 girls who were not fecund or sexually active but were considered in the DHS calculation. Specifically, 190 girls were not sexually active in the last 12 months, 1,843 were pregnant girls, and 166 were not fecund. **Table 1** shows mCPR at baseline and endline, in comparison and intervention sites, using A360 definition. **Table 2** shows mCPR at baseline and endline, in comparison and intervention sites, using DHS definition.

Table 1: A360 definition, Nasarawa State, Nigeria

	Comparison sites			**Intervention sites**			**Risk ratio**
	Baseline	Endline	Risk C	Baseline	Endline	Risk I	Risk I / Risk C
Toto (C) vs Doma (I)							
mCPR	12.8 (9.5-17.2)	20.4 (17-24.2)	1.6	7.6 (5.5-10.3)	22.0 (18.8-25.6)	2.9	1.8
Observations	66/514	133/653		38/503	119/541		
Nasarawa (C) vs Karu (I)							
mCPR	13.0 (10.6-15.8)	31.4 (28.1-34.9)	2.4	21.3 (18.5-24.5)	47.2 (43.2-51.3)	2.2	0.9
Observations	114/879	289/921		172/806	418/885		

Table 2: DHS definition, Nasarawa State, Nigeria

	Comparison sites			**Intervention sites**			**Risk ratio**
	Baseline	Endline	Risk C	Baseline	Endline	Risk I	Risk I / Risk C
Toto (C) vs Doma (I)			1.8			2.6	1.5
mCPR	7.7 (5.8-10.1)	13.9 (11.7-16.5)		4.7 (3.5-6.3)	12.4 (10.6-14.5)		

Observations	73/952	140/1,009		43/908	126/1,016		
Nasarawa (C) vs Karu (I)			2.3			2.2	0.9
mCPR	8.1 (6.6-9.8)	19.0 (16.9-21.3)		12.6 (10.9-14.4)	27.8 (25.2-30.5)		
Observations	123/1,522	309/1,628		180/1,434	429/1,546		

Ogun State, Nigeria

The target population in Ogun were unmarried girls, for which DHS definition only considers girls who had sex in the 30 days before the survey, as shown in the previous equations. Hence, whereas in A360 definition, overall mCPR at endline was 49.9% (773/1,548), using the DHS definition, it was 51.0% (455/893). The difference was due to 655 girls who were sexually active in the last 12 months, but not in last month, thus not being considered in the DHS calculation. **Table 3** shows mCPR at baseline and endline, in comparison and intervention sites, using A360 definition. **Table 4** shows mCPR at baseline and endline, in comparison and intervention sites, using DHS definition.

Table 3: A360 definition, Ogun State, Nigeria

	Comparison site			**Intervention site**			**Risk ratio**
	Baseline	Endline	Risk C	Baseline	Endline	Risk I	Risk I / Risk C
Shagamu (C) vs Ado-Odo/Ota (I)							
mCPR	49.8 (46.5-53.1)	51.0 (47.1-54.9)	1.0	44.7 (41.1-48.3)	48.8 (44.3-53.3)	1.1	1.1
Observations	485/974	413/810		346/774	360/738		

Table 4: DHS definition, Ogun State, Nigeria

	Comparison site			**Intervention site**			**Risk ratio**
	Baseline	Endline	Risk C	Baseline	Endline	Risk I	Risk I / Risk C
Shagamu (C) vs Ado-Odo/Ota (I)							

mCPR	53.8 (48.8-58.8)		48.7 (43.4-54.0)	0.9	45.4 (40.3-50.6)		53.3 (47.4-59.2)	1.2	1.3
Observations	267/496		222/456		179/394		233/437		

Note: In baseline report, all sexually active girls within last year were considered, therefore mCPR according to DHS was described as 47.9 (489/1,022) in Shagamu and 42.2 (347/822) in Ado-Odo/Ota