

# Pre-analysis Plan for Harming to Signal Follow-up (19 September 2019)

## 1 Sampling

Respondents: 411 village chiefs and 411 other villagers.<sup>1</sup>

Obtain information about 4,953 girls at risk (age 10-17 at baseline in July 2018) and their 3,674 households from village chiefs and other villagers.

## 2 Interventions and Experiments

### 2.1 Signaling Intervention

During initial household listings in 2018 we implemented a signaling intervention in survey villages where households could publicly donate for the needy in their village.

→ See initial pre-analysis plan, registered 2<sup>nd</sup> July 2018.

### 2.2 Willingness-to-pay for signaling intervention

We start with a practice round where respondents can decide between a snack and 0-200 Malawian kwachas in cash cards. We measure the respondents' willingness-to-pay through a series of three to four binary choices between receiving money or the snack, following a "staircase" procedure (Cornsweet 1962).

Consecutively, the respondents enter another lottery in which they can earn 0 or 10,000 Malawian kwachas. They are informed that they can chose between receiving that money in cash cards or to instead obtain the signaling intervention with donation box and bracelets, as described section 1.1 in the pre-analysis plan, registered on 2<sup>nd</sup> July 2018. We again measure the respondents' willingness-to-pay through a series of three to four binary choices between receiving money or the signaling intervention, following a "staircase" procedure (Cornsweet 1962).

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1 Two villages that were sampled at baseline turned out to be only one village with one chief, explaining that the number of villages is reduced by 1 compared to baseline.

### 3 Outcomes

We consider four types of outcomes: (i) Emergence of alternative signaling strategies, (ii) participation of girls in harmful traditional practices, (iii) social image of household heads, (iv) village chiefs'/other household's involvement in shaping traditions and their attitudes.

#### (i) Emergence of alternative signaling strategies

Two respondents ( $r$ ) per village are asked about their village ( $v$ ) and households ( $h$ ). In the case of *factual* village-level questions, answers of the two respondents are averaged. Opinion questions are treated as separate observations for both respondents. In the case of factual questions about households, answers are weighted and aggregated over both respondents with relative weights corresponding to the degree of familiarity with the particular household (scale 1-5). If a respondent does not know a household at all, the response of the other respondent provides the full answer weight. Opinion questions about households are treated as separate observations, but again weighted by the degree of familiarity of the respondent with the household.

Specific outcomes:

- Frequency of food collections for needy households (answer intervals of 3 month averaged over 2 respondents in village):  $FC_v$
- Share of households in village contributing to food collections in last year/ last month (answer intervals of 10% averaged over 2 respondents in village):  $ShareFC_v^M, ShareFC_v^Y$
- Contributions to food collections of households with girls at risk (contributed to food collections in last month/year? → binary):  $FC_{hv}^M, FC_{hv}^Y$
- Importance of traditions in village (scale 0-10):  $ImportanceTradition_{rv}$
- Publicity of traditions: scale 0-3 → create dummy for  $\geq 2$ :  $PubliclyTradition_{rv}$
- Change of importance of local traditions (more important, less important, equally important):  $ChangeTradition_{rv}$
- Willingness to pay for public donation intervention (0-10,000 MWK). We remove observations if the enumerator states that respondent did not understand WTP instructions, even after repeated explanations and a practice round:  $WP_{rv}$

### **(ii) participation in traditional practices**

Two respondents ( $r$ ) per village are asked about all girls ( $l$ ) at risk in their village. Answers are weighted and aggregated over both respondents with relative weights corresponding to the degree of familiarity with the particular girl (scale 1-5). If a respondent does not know a girl at all, the response of the other respondent provides the full answer weight. Same approach for questions about households ( $h$ ).

- Elicitation of intended and actual child marriage ( $CM_{ihv}^I, CM_{ihv}^{Act}$ ) and (sexual) initiation rituals ( $SI_{ihv}^I, SI_{ihv}^{Act}$ ), attitudes of households towards child marriage ( $CM_{hv}^A$ ) and (sexual) initiation rituals ( $SI_{hv}^A$ ), pregnancies  $P_{ihv}$ , and school attendance  $S_{ihv}$  for all girls in the village that were 10-17 at baseline in July 2018 and their households.

- Change of child marriage (<15, <18) /sexual initiation frequency, as perceived by respondent (more common, less common, equally common): ( $CM_{rv}^R, SI_{rv}^R$ )

### **(iii) social image of household heads**

Two respondents ( $r$ ) per village are asked about all heads. Answers are weighted over both respondents with relative weights corresponding to the degree of familiarity with the particular head (scale 1-5). If a respondent does not know a household at all, the response of the other respondent provides the full answer weight.

**Main measure of social image** (adapted versions from Falk et al's (2016) social preference module)

- Altruism (scale 0-10): "How willing is (**head**) to give to good causes without expecting anything in return?"

- Reciprocity (scale 0-10): "When someone does (**head**) a favour, (**head**) is willing to return it."

- Trust (scale 0-10): "(**head**) assumes that people have only the best intentions."

→ Here, we are interested on the joint measure of pro-sociality, containing altruism, reciprocity and trustworthiness:  $Image_{hrv}$

### **Other household characteristics**

- Support for child marriage (scale 0-10):  $Support_{hrv}^{CM}$

- Religious attendance (Never, weekly, monthly, yearly, less than yearly):  $Church_{hrv}$

- Support for sexual initiation rituals (scale 0-10):  $Support_{hrv}^{SI}$

- Perceived to follow local traditions even if they harm children (scale 0-10):  $SupportTradition_{hrv}$

- Likelihood to receive help by other villagers (scale 0-10):  $ReceiveHelp_{hrv}$

**(iv) village chiefs'/other household's involvement in shaping traditions and his attitudes**

- Frequency of communication about traditions (Daily, weekly, monthly, 3-monthly, bi-yearly, yearly, never):  $TalkTradition_{hrv}$

- Frequency of communication about marriage of daughters of other households (Daily, weekly, monthly, 3-monthly, bi-yearly, yearly, never):  $TalkChildmarriage_{hrv}$

- Favorable attitudes of chief/other household towards child marriage (binary for ideal age of marriage < 18) and sexual initiation rituals (binary):  $(CM_{rv}^{Att}, SI_{rv}^{Att})$

## 4 Analysis Plan

Clustering: unless noted otherwise, all analyses will be clustered at the village level.

### 4.1 Social signaling

At baseline, the chief assigned a more positive public image to households that support child marriage, in villages where child marriage is common, and vice-versa in villages without child marriage.

**Main specifications:**

- Does this relationship still hold in control villages (without the public donation intervention)?

$$Image_{hrv} = \alpha_v + \beta_1 Support_{hrv}^{CM} + \beta_2 Support_{hrv}^{CM} * Childmarriage_v + \epsilon_{hrv} \rightarrow \beta_2 > 0 ? \tag{1}$$

- Does this relationship still hold in treatment villages (with the public donation intervention)?

$$Image_{hrv} = \alpha_v + \gamma_1 Support_{hrv}^{CM} + \gamma_2 Support_{hrv}^{CM} * Childmarriage_v + \epsilon_{hrv} \rightarrow \gamma_2 > 0 ? \tag{2}$$

$\rightarrow \beta_2 > \gamma_2 ?$

**Alternative specifications:**

- Do (1) and (2) hold for other traditions  $(Support_{hrv}^{SI}, Church_{hrv}, SupportTradition_{hrv})$ ?

$$Image_{hrv} = \alpha_v + \beta_1 SupportOtherTradition_{hrv} + \beta_2 SupportOtherTradition_{hrv} * Tradition_v + \epsilon_{hrv} \rightarrow \beta_2 > 0 ? \tag{3}$$

- Alternative dependent variable:  $ReceiveHelp_{hrv}$

## 4.2 Substituteability of signaling strategies

### 4.2.1 Can an additional social signal reduce prevalence of child marriage and sexual initiation rituals?

#### Manipulation check: long-term compliance with the treatment

At baseline, our intervention led to public donations being significantly more common in treatment than in control villages. Do these differences persist?

$$FC_v = \beta_0 + \beta_1 \text{DonationTreatment}_v + \epsilon_v \rightarrow \beta_1 > 0? \quad (4)$$

$$\text{ShareFC}_v = \beta_0 + \beta_1 \text{DonationTreatment}_v + \epsilon_v \rightarrow \beta_1 > 0? \quad (5)$$

#### ITT analysis

Main:

$$CM_{ihv}^{Act} = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 < 0? \quad (6)$$

$$SI_{ihv}^{Act} = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 < 0? \quad (7)$$

Additional:

$$CM_{ihv}^I = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 < 0? \quad (8)$$

$$SI_{ihv}^I = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 < 0? \quad (9)$$

$$P_{ihv} = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 < 0? \quad (10)$$

$$S_{ihv} = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon_{ihv} \rightarrow \beta_1 \neq 0? \quad (11)$$

#### IV analysis

$$1^{\text{st}} \text{ stage: } FC_v = \alpha_0 + \alpha_1 \text{DonationTreatment}_v + \alpha_2 X_{ihv} + \alpha_3 Z_v + \epsilon_{ihv} \quad (12)$$

$$2^{\text{nd}} \text{ stage: } Y_{ihv} = \beta_0 + \beta_1 \widehat{FC}_{ihv} + \beta_2 X_{ihv} + \beta_3 Z_v + \epsilon'_{ihv} \text{ for } Y_{ihv} \in [CM_{ihv}^{Act}, SI_{ihv}^{Act}, CM_{ihv}^I, SI_{ihv}^I, P_{ihv}, S_{ihv}]$$

$$\rightarrow \beta_1 < 0? \quad (13)$$

Alternative endogenous variables if first stage is weak with  $FC_v$ :  $\text{ShareFC}_v^M, \text{ShareFC}_v^Y$

**Heterogeneity:** Low vs high prevalence villages at baseline (median split)

## 4.2.2 Are changes in attitudes towards child marriage and sexual initiation rituals as response to the signaling intervention long-lasting

### ITT analysis

$$CM_{hrv}^A = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 X_{hv} + \beta_3 Z_v + \beta_4 W_{rv} + \epsilon_{hrv} \rightarrow \beta_1 < 0? \quad (14)$$

$$SI_{hrv}^A = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 X_{hv} + \beta_3 Z_v + \beta_4 W_{rv} + \epsilon_{hrv} \rightarrow \beta_1 < 0? \quad (15)$$

### IV analysis

$$1^{st} \text{ stage: } FC_v = \alpha_0 + \alpha_1 DonationTreatment_v + \alpha_2 X_{hv} + \alpha_3 Z_v + \alpha_4 W_{rv} + \epsilon_{hrv} \quad (16)$$

$$2^{nd} \text{ stage: } Y_{hrv} = \beta_0 + \beta_1 \widehat{FC}_{hrv} + \beta_2 X_{hv} + \beta_3 Z_v + \alpha_4 W_{rv} + \epsilon'_{hrv} \text{ for } Y_{hrv} \in [CM_{hrv}^A, SI_{hrv}^A] \rightarrow \beta_1 < 0? \quad (17)$$

Alternative endogenous variables if first stage is weak with  $FC_v$ :  $ShareFC_v^M, ShareFC_v^Y$

### Heterogeneity:

Low vs high prevalence villages at baseline (median split)

## 4.2.3 Has the signaling intervention affected prevalence and perceived importance of traditions in general?

### Main:

$$ImportanceTradition_{rv} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 X_{rv} + \beta_3 Z_v + \epsilon_{rv} \rightarrow \beta_1 \neq 0? \quad (18)$$

$$ChangeTradition_{rv} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 X_{rv} + \beta_3 Z_v + \epsilon_{rv} \rightarrow \beta_1 \neq 0? \quad (19)$$

### Additional:

$$PubliclyTradition_{rv} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 X_{rv} + \beta_3 Z_v + \epsilon_{rv} \rightarrow \beta_1 \neq 0? \quad (20)$$

### Heterogeneity:

Low vs high prevalence villages at baseline (median split)

#### 4.2.4 Type of pooling equilibrium

At end line, we investigate whether those who previously supported child marriage and sexual initiation rituals were faced with lower or higher willingness to cooperate by other villagers in formerly high-prevalence villages, differentially across treatment and control villages.

$$\begin{aligned} \text{ReceiveHelp}_{hrv} &= \alpha_v + \beta_1 \text{DonationTreatment}_v * \text{BaselineSupport}_{hv} + \beta_2 \text{BaselineSupport}_{hv} + \beta_3 X_{hv} + \beta_4 W_{rv} + \epsilon_{hrv} \\ \rightarrow \beta_1 \neq 0? & \end{aligned} \quad (21)$$

### 4.3 Targeting elites for social norms change

#### 4.3.1 Willingness to pay for social norms change

##### Main analyses:

Does WTP depend on the DonationTreatment implemented at baseline?

$$\text{WP}_{rv} = \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 X_{rv} + \beta_3 Z_v + \epsilon_{rv} \rightarrow \beta_1 \neq 0? \quad (22)$$

Does WTP depend on who was in charge of implementing the DonationTreatment at baseline, the Chief or another household ( $\text{Chief}_v$ )?

$$\text{WP}_{rv} = \beta_0 + \beta_1 \text{Chief}_v + \beta_2 X_{rv} + \beta_3 Z_v + \epsilon_{rv} \rightarrow \beta_1 \neq 0? \quad (23)$$

Does WTP depend differentially on DonationTreatment, depending on who was in charge at baseline?

$$\begin{aligned} \text{WP}_{rv} &= \beta_0 + \beta_1 \text{DonationTreatment}_v + \beta_2 \text{Chief}_v + \beta_3 \text{DonationTreatment}_v * \text{Chief}_v + \beta_4 X_{rv} + \beta_5 Z_v + \epsilon_{rv} \\ \rightarrow \beta_3 \neq 0? & \end{aligned} \quad (24)$$

##### Additional analyses:

- Heterogeneous treatment effects, depending on rate of child marriage and sexual initiation rituals at baseline and at endline.
- Analyze chief and others separately. Do they differ?

### 4.3.2 Mechanism: Are chiefs more involved in shaping traditions if they were not in charge of the public donation intervention?

Are chiefs talking more frequently to households about traditions if they are in charge of the public donation intervention?

$$TalkTradition_{hrv} = \beta_0 + \beta_1 Chief_v + \beta_2 X_{rv} + \beta_3 Z_v + \beta_4 W_{hv} + \epsilon_{hrv} \rightarrow \beta_1 \neq 0? \quad | \quad r = chief \quad (25)$$

$$TalkChildmarriage_{hrv} = \beta_0 + \beta_1 Chief_v + \beta_2 X_{rv} + \beta_3 Z_v + \beta_4 W_{hv} + \epsilon_{hrv} \rightarrow \beta_1 \neq 0? \quad | \quad r = chief \quad (26)$$

### 4.3.3 Is the public donation intervention more/less effective in changing traditional practices if the chief is in charge of the intervention?

**Main:**

$$CM_{ihv}^{Act} = \alpha_0 + \alpha_1 DonationTreatment_v + \alpha_2 Chief_v + \alpha_3 DonationTreatment_v * Chief_v + \alpha_4 X_{ihv} + \alpha_5 Z_v + \epsilon_{ihv} \\ \rightarrow \alpha_3 \neq 0? \quad (27)$$

$$SI_{ihv}^{Act} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 Chief_v + \beta_3 DonationTreatment_v * Chief_v + \beta_4 X_{ihv} + \beta_5 Z_v + \epsilon_{ihv} \\ \rightarrow \beta_3 \neq 0? \quad (28)$$

Does the treatment effect only depend on who is in charge for initiation rituals, but not for child marriage?

$$\rightarrow \beta_3 \neq \alpha_3? \quad (29)$$

**Additional:**

$$CM_{ihv}^I = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 Chief_v + \beta_3 DonationTreatment_v * Chief_v + \beta_4 X_{ihv} + \beta_5 Z_v + \epsilon_{ihv} \\ \rightarrow \beta_3 \neq 0? \quad (30)$$

$$SI_{ihv}^I = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 Chief_v + \beta_3 DonationTreatment_v * Chief_v + \beta_4 X_{ihv} + \beta_5 Z_v + \epsilon_{ihv} \\ \rightarrow \beta_3 \neq 0? \quad (31)$$

$$P_{ihv} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 Chief_v + \beta_3 DonationTreatment_v * Chief_v + \beta_4 X_{ihv} + \beta_5 Z_v + \epsilon_{ihv} \\ \rightarrow \beta_3 \neq 0? \quad (32)$$

$$S_{ihv} = \beta_0 + \beta_1 DonationTreatment_v + \beta_2 Chief_v + \beta_3 DonationTreatment_v * Chief_v + \beta_4 X_{ihv} + \beta_5 Z_v + \epsilon_{ihv} \\ \rightarrow \beta_3 \neq 0? \quad (33)$$

4.3.4 Is the public donation intervention more/less effective in changing respondents attitudes towards child marriage and initiation rituals if the chief is in charge of the intervention?

$$CM_{rv}^{Att} = \alpha_0 + \alpha_1 DonationTreatment_v + \alpha_2 Chief_v + \alpha_3 DonationTreatment_v * Chief_v + \alpha_4 X_{rv} + \alpha_5 Z_v + \epsilon_{rv}$$

$$\rightarrow \alpha_1, \alpha_2, \alpha_3 \neq 0? \quad (34)$$

$$SI_{rv}^{Att} = \alpha_0 + \alpha_1 DonationTreatment_v + \alpha_2 Chief_v + \alpha_3 DonationTreatment_v * Chief_v + \alpha_4 X_{rv} + \alpha_5 Z_v + \epsilon_{rv}$$

$$\rightarrow \alpha_1, \alpha_2, \alpha_3 \neq 0? \quad (35)$$