Measuring impacts without footprints:

An evaluation of Ghana's African Youth Alliance Project

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How to evaluate impact when....

- Implementation of the intervention was through existing “branded” interventions
- There are multiple causal pathways
- A non-random sub-population was targeted
- Previous interventions may have already affected the desired outcomes
- The outcomes are culturally sensitive: adolescent sexual and reproductive behaviors
- Intervention exposures were as short as 12m
- Baseline sample not comparable to endline intervention or control group samples

African Youth Alliance/Ghana

- A comprehensive adolescent sexual and reproductive health (ASRH) intervention
- 2000-2005
- US$ 14m (Bill and Melinda Gates Foundation)
- Executing agencies:
  - UNFPA
  - Pathfinder
  - PATH
- Twelve Implementing Partners (IPs)
  - Government agencies
  - Non-government organizations
- 20/110 districts with unmet ASRH needs targeted

Original evaluation strategies (JSI 2007)

- Identify a subset of localities where all six AYA components were delivered
- Add a comparison group of localities matched on macro characteristics
- Collect self-reported data on a random sample of young adults
- Develop detailed exposure measures for both AYA and background ASRH interventions
- Estimate AYA treatment effects, controlling for background ASRH exposure

Exposure measures

- AYA-specific items
  - Schools
    - "*Life planning skills*" course
  - Peer educators
    - IPs identified by name
  - Youth-friendly clinics
    - IPs identified by name
  - Mass media
    - radio "*Curious minds*"
    - tv: "*Children's channel*"
  - Print
    - "*Junior graphic*"
  - Enter-education
    - "*Challenger Cup*" soccer meets

- Other ASRH items
  - Schools
    - any in-class ASRH exposure
  - Peer educators
    - any exposure
  - Clinics
    - any visits
  - Mass media
    - any radio, tv spots, billboard exposures
  - Print
    - any exposure
  - Enter-education
    - any poetry reading, concert, dance, drama troupe, sporting event exposures

Exposure measures

- Each exposure dimension weighted by content recall
  - Content areas: Pregnancy, condoms, STDs, HIV/AIDS, abstinence, being faithful, VCT
  - Coded 1 if 4-7 content areas recalled, 0 otherwise
- Both exposure indexes categorized
  - AYA
    - 0 dimensions -> unexposed (n=1624)
    - 1-2 dimensions -> some exposure (drop n=815)
    - 3-6 dimensions -> exposed (n=960)
  - Other ASRH
    - 0-4 dimensions -> unexposed (n=1460)
    - 5-6 dimensions -> exposed (n=1104)

Evaluation results (JSI 2007)

- Did exposure to AYA's comprehensive, integrated intervention result in improved ASRH behavioral outcomes among youth aged 17-22 in areas where AYA worked?
  - Yes, according to instrumental variable treatment effects models
  - Significant treatment effects attributable to AYA on all nine measured ASRH behaviors among females
    One counterintuitive negative effect among males
  - Full report available (JSI 2007)

Follow-up evaluation

Here we ask a second evaluation question:

- *Did AYA "add value" to (reinforce) existing ASRH interventions?*

Or

- "*Given their observed exposures to other ASRH interventions, what would have happened had everyone been exposed to AYA?*"

Follow-up evaluation

- Evaluation strategies
  - Use existing data randomly sampled within purposive sampling frame
  - Use existing measures
  - Model self-reported outcomes, AYA and other ASRH intervention exposures as simultaneous, endogenous choices
  - Estimate value added using simulations

Recursive trivariate probit

Y_{ki} =1 if $Y^*_{ki} - \beta_{k0} + \beta_{k1}X_i + \beta_{k2}AYA_{ki} + \beta_{k3}ASRH_{ki} - \eta_{1ki} > 0$ (1)
= 0 otherwise

AYA_{ki} =1 if $AYA^*_{ki} - \gamma_{k0} + \gamma_{k1}X_i + \gamma_{k2}Z_{AYAki} - \eta_{2ki} > 0$ (2)
= 0 otherwise.

$ASRH_{ki}$ =1 if $ASRH^*_{ki} - \delta_{k0} + \delta_{k1}X_i + \delta_{k2}Z_{ASRHki} - \eta_{3ki} > 0$ (3)
= 0 otherwise.

$$\text{cov}(\eta_2, \eta_1) = \rho_{21} \text{ cov}(\eta_3, \eta_1) = \rho_{31} \text{ cov}(\eta_3, \eta_2) = \rho_{32}$$

- Y^*_{ki} a latent dependent variable (ie, propensity to report behavior *k*)
- AYA^*_{ki} and $ASRH^*_{ki}$ latent variables representing propensities to report AYA and other (non-AYA) ASRH program exposures
- X_i a vector of exogenous individual and household characteristics
- $\beta_{k0} - \beta_{k2}$, $\gamma_{k0} - \gamma_{k2}$, $\delta_{k0} - \delta_{k2}$ parameters
- η_{1i}, η_{2i},η_{3i} normally distributed errors $Var[\eta_1] = Var[\eta_2] = Var[\eta_3] = 1$
- $\rho_{21}, \rho_{31}, \rho_{32}$ error covariance terms

Recursive trivariate probit

- Model estimation by simulation (Stata **mvprobit**)
- Post-estimation probabilities also simulated (Stata **mvppred**)
  - Joint, marginal probabilities for each outcome
- Run simulations, constraining AYA and other ASRH exposures to 0, then to 1, for everyone
  - Compute four conditional probabilities
    - Pr(Y|X,other ASRH)|AYA=0
    - Pr(Y|X,other ASRH)|AYA=1
    - Pr(Y|X,AYA)|other ASRH)=0
    - Pr(Y|X,AYA)|other ASRH)=1
- Plot simulated probabilities by age

Control variables

- Respondents' age
- Household SES (asset index)
- Nativity
- Years since last attended school
- Religion
- Household head's educational attainment
- Region

Model results: Endogeneity

- AYA, other ASRH exposures endogenous in all models
  - All exposure error covariances positive: the more likely respondent reported exposure to other ASRH the more likely s/he also reported exposure to AYA
  - Some ideas on why they are endogenous
    - Measurement errors
    - True program treatment effects confounded
    - Self-selection
    - Others?

Model results: Endogeneity

- All four female outcomes endogenous with AYA exposure
  - Error covariances in salutary direction
  - Possible latent variable explanation: females most likely to report AYA exposure had lower propensities to engage in risky sexual behaviors
- One female outcome (recent condom use) endogenous with other ASRH exposure
  - Error covariance positive
  - Possible explanation: females most likely to report other ASRH exposure had higher propensity to use condoms

Model results: Endogeneity

- One male outcome (abstinence) endogenous with AYA exposure
  - Error covariance negative: the more likely exposed to AYA the less likely was abstinent
  - Possible explanation: males most likely to report AYA exposure had higher propensities to be sexually active
- One male outcome (condom use) endogenous with other ASRH exposure
  - Error covariance positive
  - Males most likely to report other ASRH exposure had higher propensities to use condoms

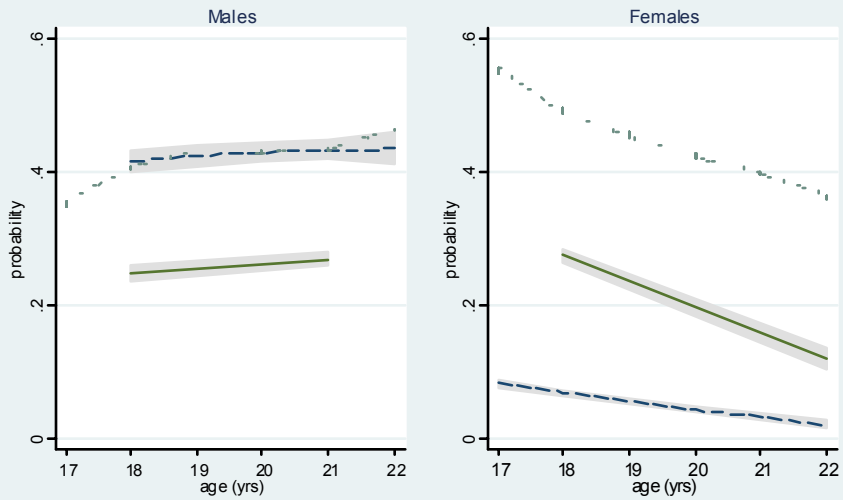
Model results: treatment effects

	Contraceptive use at first sex		Condom use w/ current partner		Two or more partners <12m		Abstinence	
	males	females	males	females	males	females	males	females
AYA				+ (p=.108)				- (p=.04)
Other ASRH		+ (p=.109)						
Note: Only coefficients significant at p<.05 are shown.								

- Standard errors are larger so significant treatment effects are less likely in trivariate than in probit or bivariate probit treatment effects models
  - more fixed parameters
  - larger variance-covariance matrix

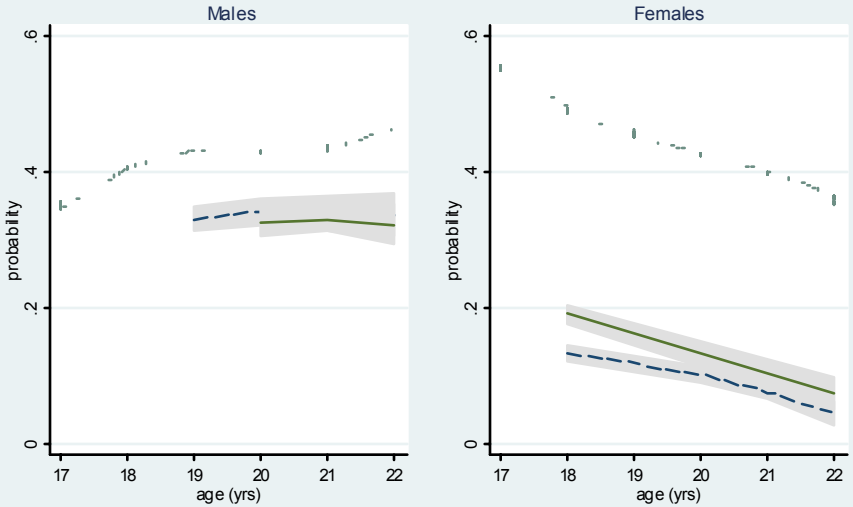
Model results: Simulations

Fig. 1. Contraceptive use 1st sex by age sex simulated AYA exposure
AYA Ghana evaluation 2006



dashed line: observed other ASRH|no AYA solid: observed other ASRH|all AYA dotted: sample mean

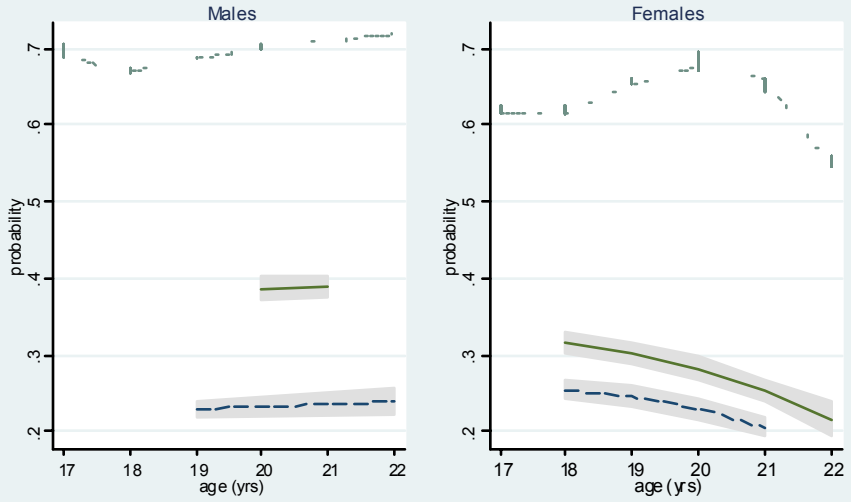
Fig. 1b. Contraceptive use 1st sex by age sex simulated ASRH exposure
AYA Ghana evaluation 2006



dashed line: observed AYA|no other ASRH solid: observed AYA|all other ASRH dotted: sample mean

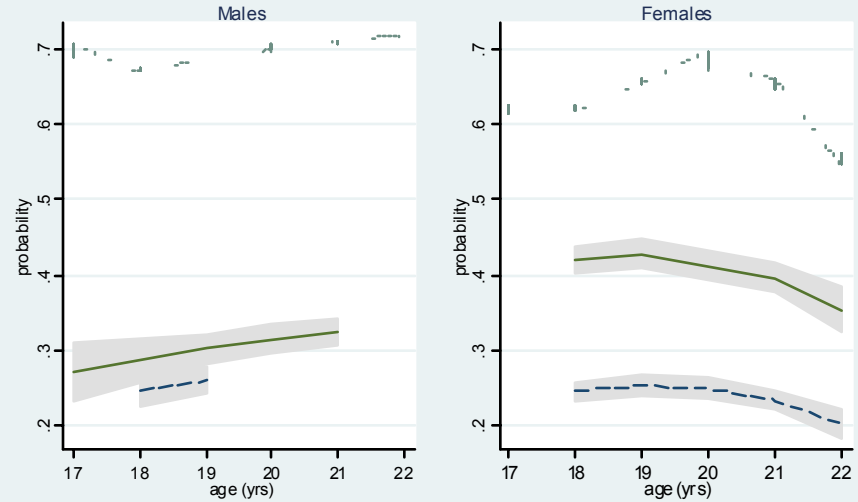
Model results: Simulations

Fig. 2. Ever used condom w/ current partner by age sex simulated AYA exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed other ASRH|no AYA solid: observed other ASRH|all AYA dotted: sample mean

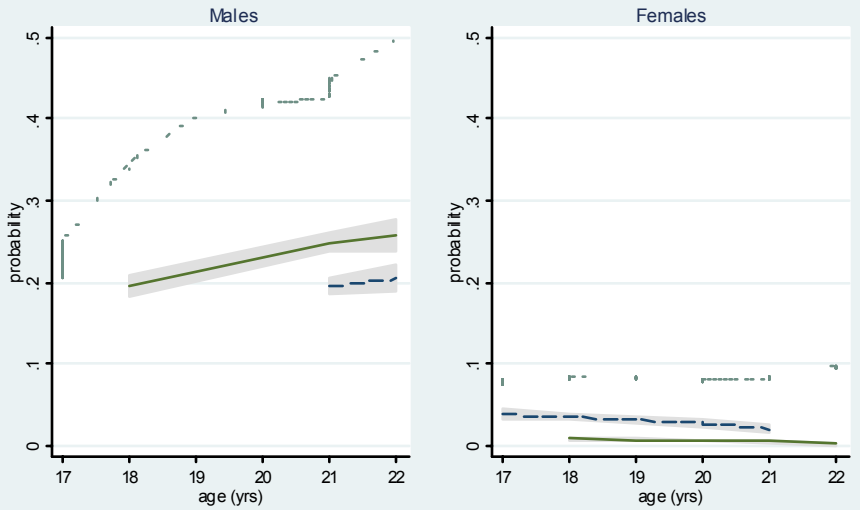
Fig. 2b. Ever used condom w/ current partner by age sex simulated ASRH exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed AYA|no other ASRH solid: observed other AYA|all other ASRH dotted: sample mean

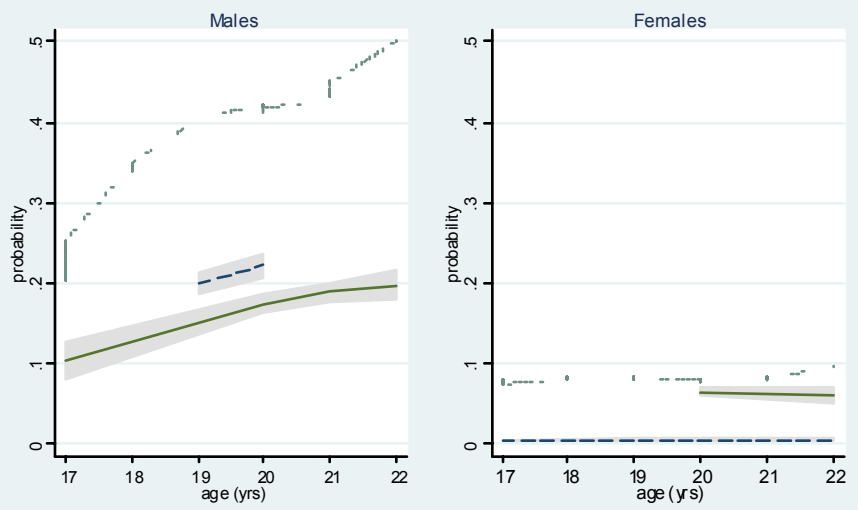
Model results: Simulations

Fig. 3. Two or more partners past 12 mos. by age sex simulated AYA exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed other ASRH|no AYA solid line: observed other ASRH|all AYA dotted: sample mean

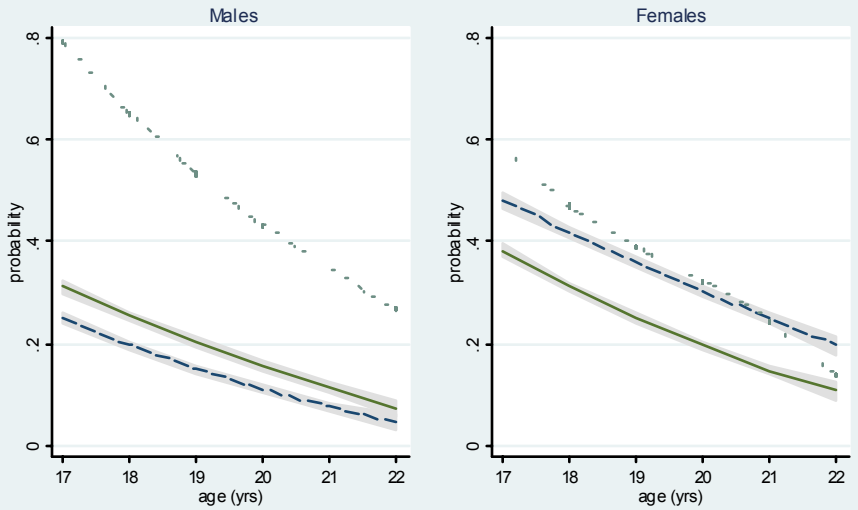
Fig. 3b. Two or more partners past 12 mos. by age sex simulated ASRH exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed AYA|no other ASRH solid line: observed AYA|all other ASRH dotted: sample mean

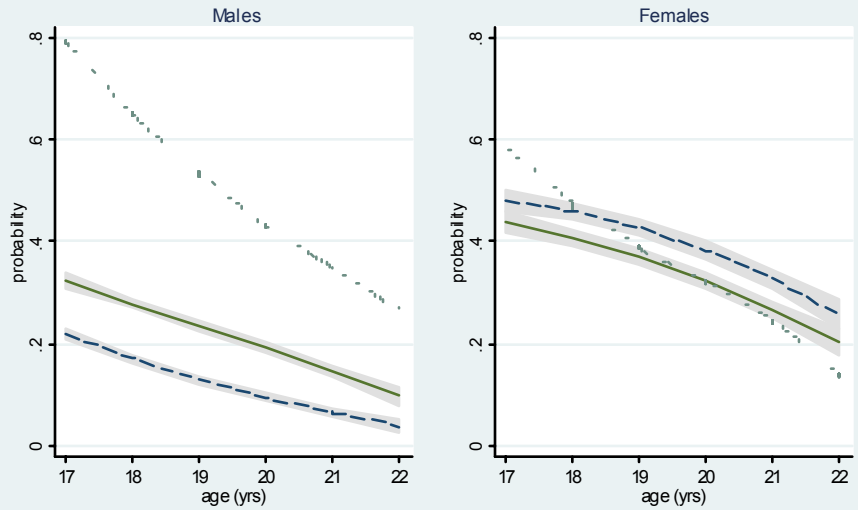
Model results: Simulations

Fig. 4. Primary or secondary abstinence by age sex simulated AYA exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed other ASRH|no AYA solid: observed other ASRH|all AYA dotted: sample mean

Fig. 4b. Primary or secondary abstinence by age sex simulated ASRH exposure
JSI/AYA Ghana evaluation 2006



dashed line: observed AYA|no other ASRH solid: observed AYA|all other ASRH dotted: sample mean

Summary of simulation results

	Value added by AYA		Value added by other ASRH	
	males	females	males	females
Contraceptive use at first sex	-	+	0 [t]	+
Condom use w/ current partner	+	+	+	+
2+ partners past 12 months	-	+	+	-
Abstinence	+	-	+	-

[t] No common support on fractile polynomials.

Summary and conclusions

- Contraception: Value would be added by both types of interventions
  - Full AYA exposure would increase:
    - contraceptive use at 1st sex, condom use among females
    - condom use among males
  - Full exposure to other ASRH interventions would increase:
    - contraceptive use at 1st sex, condom use among females
    - condom use among males
  - Neither type of intervention would add value for male contraceptive use at 1st sex
- Monogamy: Opposing effects
  - Full AYA exposure would:
    - increase monogamy among females
    - reduce monogamy among males
  - Full exposure to other ASRH interventions would:
    - reduce monogamy among females
    - increase monogamy among males
- Abstinence: Similar effects
  - Full exposure to either type of intervention would:
    - reduce female abstinence
    - increase male abstinence

Summary and conclusions

- Trivariate probits adequately fit the data
- Simulation results consistent with previously estimated AYA treatment effects for six of eight outcomes modeled here
- Exception: Abstinence
  - Probit treatment effects:
    - AYA increased female abstinence
    - AYA reduced male abstinence
  - Trivariate simulations:
    - full AYA exposure would reduce female abstinence
    - full AYA exposure would increase male abstinence
  - Possible reasons
    - disinhibition (females)
    - sample self-selection, other possible biases when other ASRH exposure is treated as a jointly endogenous choice

Summary and conclusions

- Simulations are a useful tool for probing treatment effects, particularly in cases where attribution is difficult, reporting bias is probable and true effects are weak or still emergent
- With their ability to simultaneously model multiple latent variables, multivariate probits reveal subtle effects not captured in probit or bivariate probit models