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Background

- The SEARCH trial (NCT01864603) assessed the impact of a universal HIV testing and antiretroviral therapy (ART) on community health in rural Kenya and Uganda
- Early identification of HIV infection and immediate ART access may influence the health of HIV-positive adults and children in their households as well as their socio-economic outcomes
- Improvements in community health due to multi-disease health services and universal ART may also improve socio-economic outcomes for HIV-negative adults, thereby informing cost benefit calculations for such investments in healthcare

Objective

- We examined impacts of the SEARCH intervention on socio-economic outcomes of HIV-positive and HIV-negative adults as well as children in their households

Methods

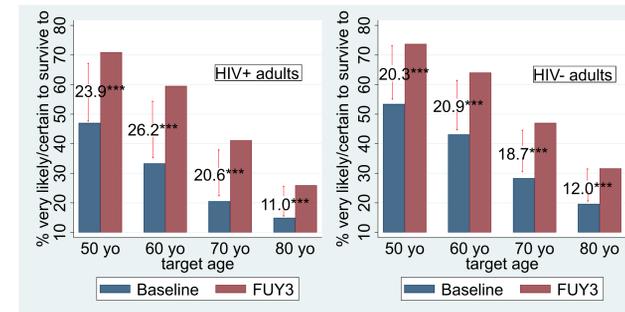
- In the SEARCH trial, control communities received baseline multi-disease testing and ART by national guidelines while intervention communities received annual testing and ART irrespective of CD4 count via patient-centered care
- We conducted longitudinal socio-economic surveys over a 3-year period in households of approximately 100 HIV-positive and 100 HIV-negative adults sampled after baseline HIV testing in 30 pair-matched communities in Kenya and Uganda
- Outcomes assessed in surveys included:
 - Working-age adults (ages 18-65 yrs.): Total work hours (**business**) and **non-market** work hours in the past week; **survival expectations** (whether participants felt very likely or almost certain to survive to target ages [Ref: almost impossible/not very likely/maybe])
 - Children (ages 6-17 yrs.): primary **school completion**; annual school **expenditures**; **time allocated** to household activities
 - Household (**HH**): food, non-food **expenditures**; **asset** holdings

Table 1: Baseline characteristics of working-age adults

	Control (N=5,184)	Intervention (N=5,313)	p-value
Age, mean (SD)	35 (13)	35 (13)	0.04
Male, N (%)	2,899 (56)	2,963 (56)	0.87
Education level			0.05
No education, N (%)	629 (12)	605 (11)	
Primary education, N (%)	3,328 (64)	3,346 (63)	
Secondary or more education, N (%)	1,227 (24)	1,362 (26)	
Married or cohabiting, N (%)	3,341 (64)	3,360 (63)	0.20
Region			<0.01
E Uganda, N (%)	1,829 (35)	1,831 (35)	
Kenya, N (%)	1,607 (31)	1,529 (29)	
SW Uganda, N (%)	1,748 (34)	1,953 (37)	
Work hrs. in past week, mean (SD)	30 (26)	30 (26)	0.61
On-farm work hours	19 (21)	19 (20)	0.57
Off-farm work hours	10 (18)	10 (18)	0.56
Non-market work hours	36 (48)	37 (53)	0.12

Non-market work includes time spent doing household chores and caregiving

Figure 1: Trends in survival expectations for HIV+ and HIV- adults



***p<0.001, **p<0.01, *p<0.05

Figure 2: Trends in per-capita HH expenditures (US\$)

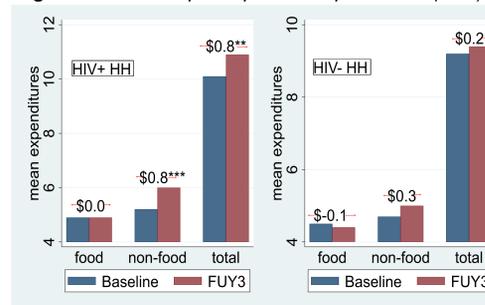


Figure 3: Trends in HH assets

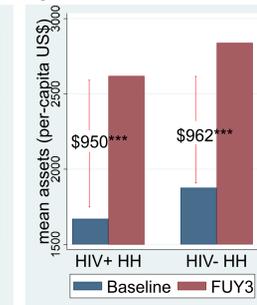


Table 2: Effects on SEARCH intervention on employment and survival expectations

	All adults Coef. (SE)	HIV- Coef. (SE)	HIV+ Coef. (SE)	HIV+, CD4<500 Coef. (SE)	HIV+, CD4≥500 Coef. (SE)
Total hours worked	1.1 (1.1)	0.3 (1.3)	6.1** (1.9)	2.0 (2.9)	9.9*** (2.6)
Non-market work hours	11.0*** (2.0)	12.0*** (2.2)	5.5* (2.6)	4.8 (3.7)	5.3 (3.7)
No. obs.	19,431	13,314	6,117	2,967	3,150
Non-market work hours of women	13.0*** (3.3)	14.4*** (3.9)	5.0 (3.8)	1.3 (6.0)	6.4 (4.8)
No. obs.	10,291	6,623	3,668	1,539	2,129
Non-market work hours of men	8.4*** (2.0)	9.6*** (2.3)	0.9 (1.3)	0.6 (2.0)	1.4 (1.2)
No. obs.	7,667	5,500	2,167	1,286	881
Survival expectations (very likely or almost certain to survive to)					
50 years old	-4.7 (5.0)	-5.7 (6.3)	1.5 (6.1)	5.4 (8.8)	0.8 (8.5)
No. obs.	7,494	4,045	3,449	1,619	1,830
60 years old	-4.2 (4.5)	-7.4 (5.6)	8.9 (5.2)	14.6* (7.0)	6.0 (7.7)
No. obs.	8,970	4,885	4,085	1,959	2,126
70 years old	-7.6 (4.3)	-10.1 (5.3)	3.4 (5.4)	8.1 (8.3)	0.3 (7.3)
No. obs.	9,327	5,196	4,131	2,001	2,130
80 years old	-0.6 (4.0)	-1.3 (4.9)	4.1 (4.8)	3.9 (7.1)	5.4 (6.2)
No. obs.	9,182	5,131	4,051	1,958	2,093

1) Table reports coefficients for the interaction term of FUY3 and intervention from regression models with individual fixed effects; Robust standard errors in parentheses; ***p<0.001, **p<0.01, *p<0.05

2) Each row examines an outcome; each column looks at specific population

3) For survival expectations, samples consist of participants younger than target ages at baseline

Statistical Analysis

- We analyzed socio-economic outcomes of adults and children who were observed at baseline and follow-up year 3 (FUY3)
- We used two-sample t-tests to assess baseline characteristics of adults in intervention and comparison communities
- Next, we used chi-squared tests to examine how subjective expectations, household expenditures and asset ownership changed over time among HIV-positive and HIV-negative adults
- Finally, we used difference-in-differences models to estimate impacts of the SEARCH intervention on outcomes.
 - Models included individual (or household) fixed effects, indicator for FUY3, interaction between indicator for intervention communities and FUY3, month of interview, region (SW Uganda, E Uganda, Kenya), and region-month interactions (to account for region-specific time trends)
 - Separate models were estimated for different subgroups based on HIV status and baseline CD4 count of adult

Results

- Longitudinal data were collected for 10,497 working-age adults from 5,283 households (Table 1)
- Participants' average age was 35 years and 56% were male
- Adults worked an average of 30 hours at baseline and the majority of participants engaged in subsistence farming

Trends in key socio-economic outcomes

- HIV-positive and HIV-negative adults were significantly more optimistic about surviving to target ages over time (Fig. 1)
- Expenditures increased between baseline and FUY3 in HIV-positive households (p<0.001) (Fig. 2)
- Asset ownership increased over time among HIV-positive and HIV-negative households (Fig. 3)

Impacts on employment outcomes and survival expectations (Table 2)

- Employment hours for HIV+ adults increased by 6.1 hours (p<0.01), representing a ~21% increase relative to baseline
- Impacts on employment were larger for HIV+ adults with baseline CD4≥500 (+9.9 hours, p<0.001)
- Impacts of intervention on non-market work hours were larger for women than for men
- The SEARCH intervention did not increase survival expectations even though these expectations increased significantly in control and intervention communities

Impacts on children's schooling outcomes (Table 3)

- The intervention did not affect primary school completion, or the annual school expenditures
- The intervention led to an increase in number of hours children spent on non-market work (i.e. household activities)

Impacts on expenditures and assets (Table 4)

- We found no significant difference in household expenditures over time between intervention and control communities
- We found a positive but not statistically significant increase in asset ownership among HIV-positive households
- Effect were smaller among HIV-negative households

Table 3: Adjusted regression results of children outcomes

	All children Coef. (SE)	HIV status of adults in household	
		HIV+ Coef. (SE)	HIV- Coef. (SE)
Primary school completion	5.0 (3.6)	4.0 (4.7)	2.7 (4.5)
No. obs	6,727	3,256	3,397
Annual school expenditure (US\$ per capita)	2.4 (2.3)	-1.0 (3.4)	3.1 (2.8)
No. obs	7,611	3,689	3,834
Non-market work hours	3.2* (1.6)	0.9 (1.5)	4.2* (1.8)
No. obs	7,611	3,689	3,834

Notes: Table reports coefficients for interaction term of FUY3 and intervention (percentage points for school completion); *p<0.05

Table 4: Adjusted regression results of household outcomes

	All households Coef. (SE)	HIV+ households Coef. (SE)	HIV- households Coef. (SE)
Expenditures			
Food	2.7 (3.6)	-0.5 (4.8)	3.5 (4.4)
Non-food	-4.2 (4.4)	-9.3 (6.1)	-3.0 (5.3)
Total	-1.3 (4.0)	-5.8 (5.5)	-0.3 (4.9)
No. obs	10,499	5,375	5,045
Asset ownership (current)			
Total assets	-22.5 (11.8)	18.8 (17.3)	-32.1* (14.3)
No. obs	10,544	5,398	5,076

Notes: All household outcomes were log transformed and USD per capita, *p<0.05

Conclusions

- Universal antiretroviral therapy provision led to significant employment benefits for HIV-positive adults, particularly those with high CD4 counts at baseline
- Improvements in socio-economic outcomes and survival expectations were observed in all communities following multi-disease testing at baseline

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