

Cash versus food assistance to improve adherence to antiretroviral therapy among HIV-infected adults in Tanzania: a randomized trial

Sandra McCoy, Prosper Njau, Carolyn Fahey, Nancy Czaicki, Ntuli Kapologwe, Suneetha Kadiyala, William Dow, Nicholas Jewell, and Nancy Padian

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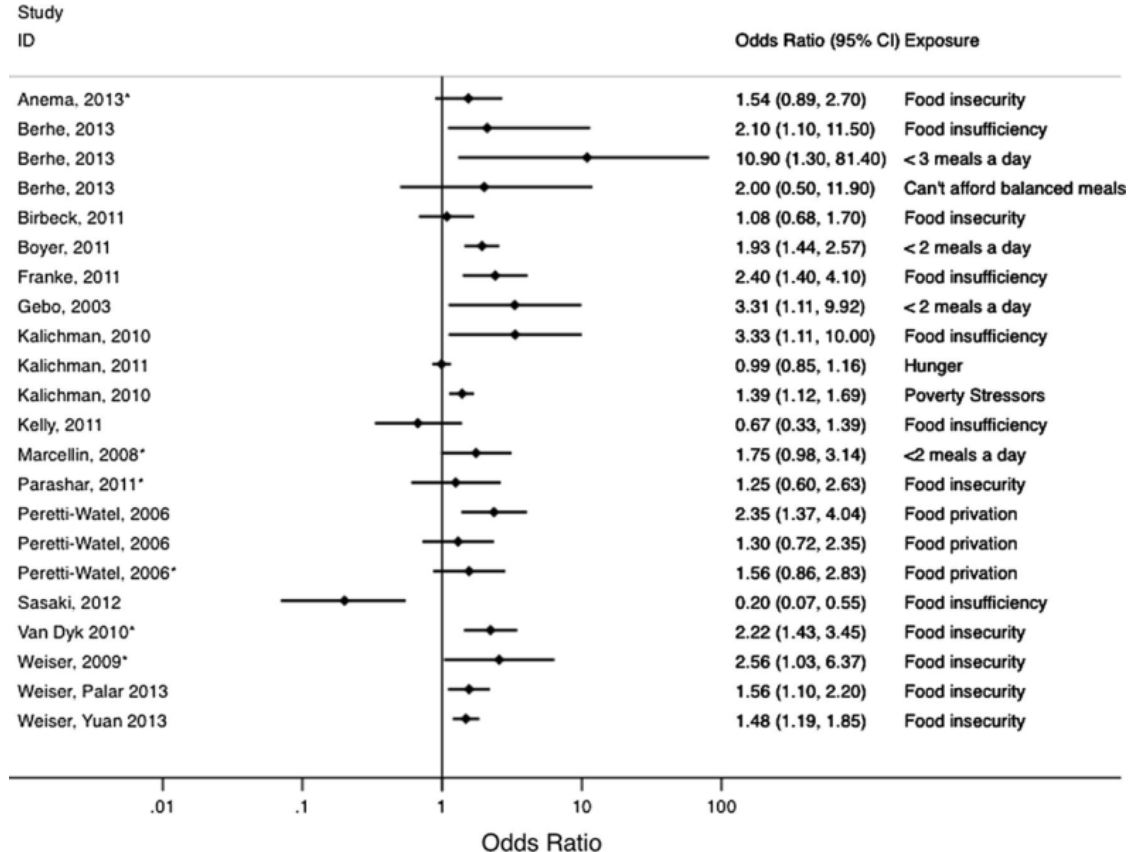
 School of
Public Health



Economic Barriers to ART Adherence

- Economic factors increasingly recognized as barriers to antiretroviral therapy (ART) adherence & retention in care
- Food insecurity (FI) is one dimension of economic wellbeing
 - FI is the lack of secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life
 - In sub-Saharan Africa, 220 million (23%) people are undernourished

FI Associated with Poor ART Adherence



Source: Singer AW, Weiser SD, McCoy SI. *AIDS Behav.* 2015 Aug;19(8):1510-26

Limited evidence that food aid programs improve ART adherence in LMIC

- Few intervention studies of food aid for people living with HIV infection (PLHIV) in low and middle-income countries
 - (*Cantrell et al., 2008; Serrano et al., 2010; Tirivayi et al., 2012; Posse et al., 2013; Martinez et al., 2014*)
- Some studies report improved ART adherence
 - For example, in Zambia, food supplementation increased the percent of clients with $\geq 95\%$ ART adherence after 1 year (70% vs. 48%, $RR_a=1.5$, 95% CI: 1.2, 1.8) (*Cantrell et al., 2008*)
- Lack of rigorous evaluations limits conclusions

Could cash be as effective or more effective than food aid for improving ART adherence?

- Long-standing debate about cash versus in-kind assistance
 - Cash is as good or better than many forms of aid for poverty alleviation (*Blattman & Niehaus, 2014*)
 - Cash gives freedom of choice, is cheaper to distribute, and in some settings cash may be preferred over food assistance (*Gentilini 2016*)
- Among PLHIV, cash transfers can improve ART adherence and retention in care (*Galárraga et al., 2013; El-Sadr et al., 2015, Yotebieng et al., 2016*)
 - Few studies conducted in sub-Saharan Africa

Study Objective

Evaluate the effectiveness of short-term cash and food assistance to mitigate food insecurity and improve adherence to antiretroviral therapy and retention in care among people living with HIV infection in Tanzania

- **Protocol:** *McCoy SI et al. BMC Infectious Diseases 2015;15:490.*
- **Trial Registration:** *Clinicaltrials.gov*, NCT01957917
- **Ethical Approvals:** National Institute for Medical Research and UC Berkeley

Study Setting & Population

- Three HIV primary care clinics in Shinyanga, Tanzania

Inclusion criteria:

1. ≥ 18 years
2. living with HIV infection
3. food insecure, ascertained by the Household Hunger Scale (*FANTA 2011*)
4. Initiated ART ≤ 90 days before enrollment

Exclusion criteria:

1. Severe malnourishment (BMI < 16 kg/m²)

Intervention Descriptions



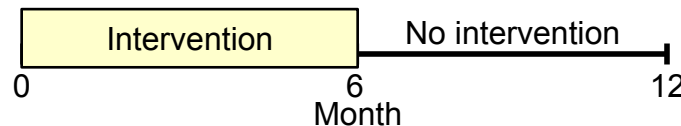
Nutrition Assessment and Counseling (NAC)

Comparison arm:

- Standard-of-care, including NAC

1. ≤ 6 consecutive months of support
2. Conditional on attending scheduled visits
3. Patients were counseled to “*use the cash/food as you wish to help you with your health.*”

Outcomes



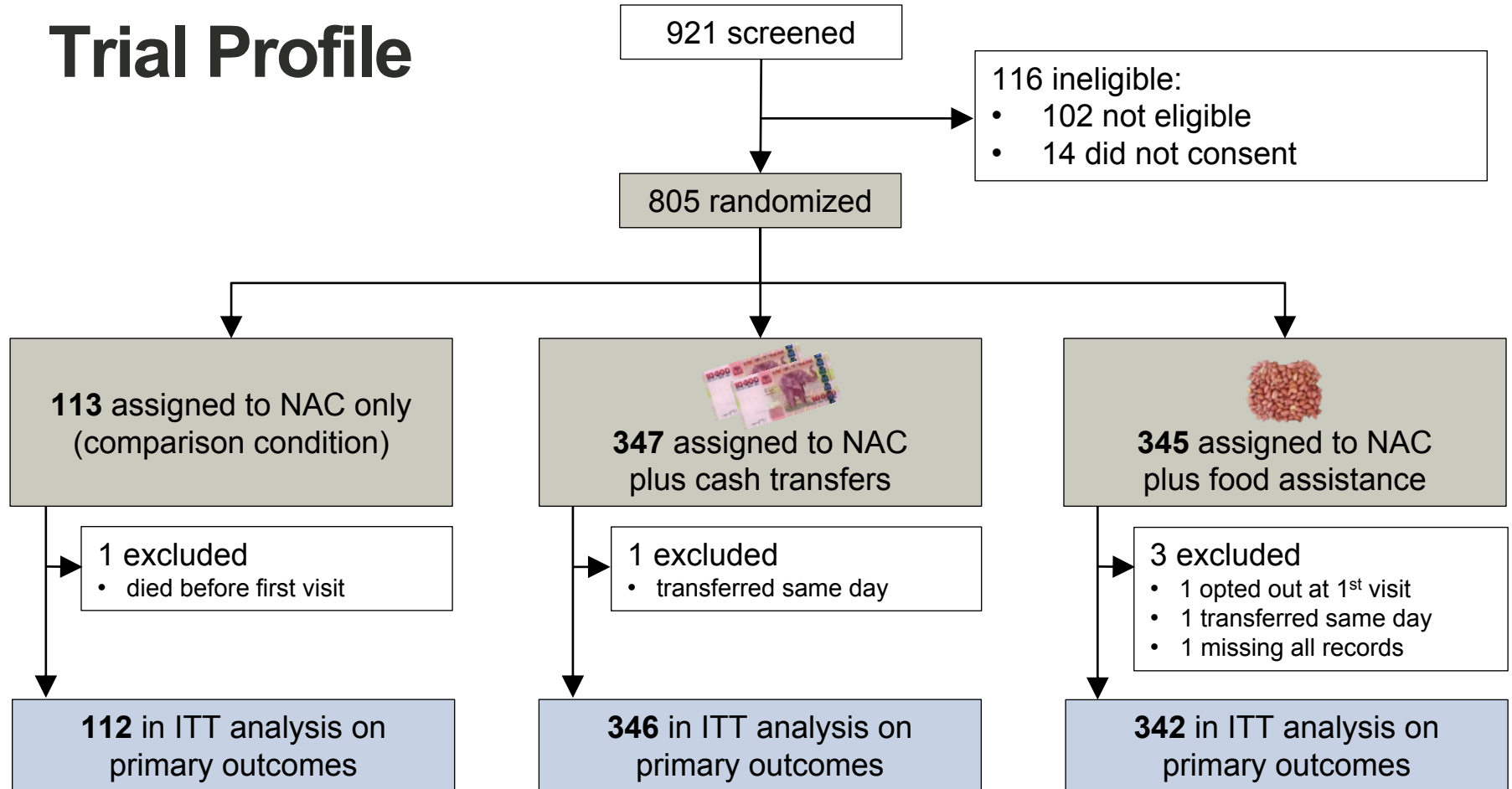
Primary Outcome:

- ART adherence at 6 months (*end of intervention period*)
 - Measured with the medication possession ratio (MPR), the proportion of days that an individual is in possession of ≥ 1 ART dose
 - MPR and MPR $\geq 95\%$

Secondary Outcomes:

- MPR $\geq 95\%$ at 12 months (*6 months after the intervention period*)
- Loss to follow-up (LTFU): ≥ 90 days since the last scheduled visit

Trial Profile



Participant Characteristics

Characteristic	Total (N=800)
	N (%)
<i>Sociodemographic Characteristics</i>	
Age (median, IQR)	35 (29–43)
Female	509 (64%)
No formal education	194 (24%)
Swahili is primary language	489 (61%)
Farmer (primary occupation)	405 (51%)
Severe household hunger ^b	328 (41%)
Minutes to clinic (median, IQR)	30 (20–60)
<i>Clinical Characteristics</i>	
BMI (median, IQR) ^c	21.0 (19.1–23.0)
CD4 (per mm ³ , median, IQR) ^d	200 (101–299)
WHO Clinical Stage 3-4	453 (57%)

NAC: nutrition assessment and counseling; BMI: Body mass index; ART: antiretroviral therapy; IQR: interquartile range

a. Chi-squared test for categorical variables and Kruskal-Wallis test of medians for continuous variables.

b. Household Hunger Scale

c. 772 participants had BMI available.

d. 637 participants had CD4 available.

ITT Results: ART Adherence (6 mo)

Outcome	Overall (n=800)	Study group			Between-group difference ^a (95% CI)		
		NAC only (n=112)	NAC + Cash (n=346)	NAC + Food (n=342)	NAC + Cash vs. NAC only	NAC + Food vs. NAC only	NAC + Cash vs. NAC + Food
Adherence to ART (6 months: end of intervention period)							
MPR \geq 95% ^b	79.5%	63.4%	85.0%	79.2%	21.6 (9.8, 33.4)**	15.8 (3.8, 27.9)**	5.7 (-1.2, 12.7)
MPR ^c	92.8%	85.4%	95.1%	92.9%	9.7 (5.6, 13.8)**	7.5 (3.4, 11.6)**	2.2 (-0.7, 5.1)

ART: antiretroviral therapy; MPR: medication possession ratio; CI: confidence interval

* P<0.05 **P<0.01

- Unadjusted intent-to-treat estimate using a Wald test and Bonferroni's correction for multiple comparisons.
- MPR is the proportion of time an individual is in possession of ≥ 1 ART dose. MPR \geq 95% is the proportion of patients with MPR \geq 95% during the 0-6 or 0-12 month interval.
- The proportion of time an individual is in possession of ≥ 1 ART dose

ITT Results: ART Adherence (12 mo)

Outcome	Overall (n=800)	Study group			Between-group difference ^a (95% CI)		
		NAC only (n=112)	NAC + Cash (n=346)	NAC + Food (n=342)	NAC + Cash vs. NAC only	NAC + Food vs. NAC only	NAC + Cash vs. NAC + Food

Adherence to ART (6 months: end of intervention period)

MPR \geq 95% ^b	79.5%	63.4%	85.0%	79.2%	21.6 (9.8, 33.4)**	15.8 (3.8, 27.9)**	5.7 (-1.2, 12.7)
MPR ^c	92.8%	85.4%	95.1%	92.9%	9.7 (5.6, 13.8)**	7.5 (3.4, 11.6)**	2.2 (-0.7, 5.1)

Adherence to ART (12 months: 6 months after intervention has ended)

MPR \geq 95% ^b	67.5%	55.4%	74.9%	64.0%	19.5 (6.9, 32.1)**	8.7 (-4.2, 21.5)	10.8 (2.5, 19.2)**
MPR ^c	90.1%	83.3%	93.0%	89.5%	9.7 (4.9, 14.5)**	6.2 (1.4, 11.0)**	3.5 (0.2, 6.8)*

ART: antiretroviral therapy; MPR: medication possession ratio; CI: confidence interval

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- Unadjusted intent-to-treat estimate using a Wald test and Bonferroni's correction for multiple comparisons.
- MPR is the proportion of time an individual is in possession of ≥ 1 ART dose. MPR \geq 95% is the proportion of patients with MPR \geq 95% during the 0-6 or 0-12 month interval.
- The proportion of time an individual is in possession of ≥ 1 ART dose

ITT Results: Loss to Follow-up

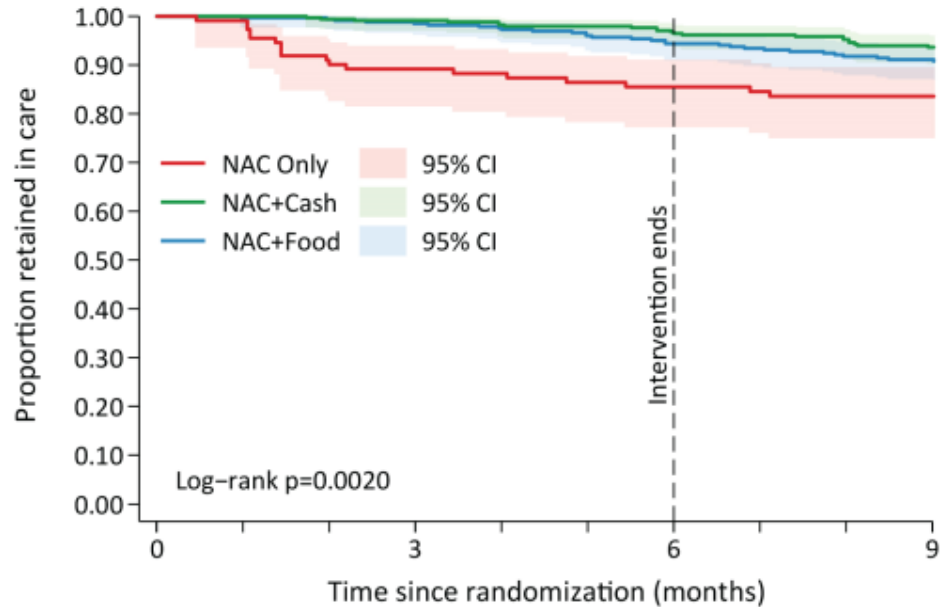
Outcome	Overall (n=800)	Study group			Between-group difference ^a (95% CI)		
		NAC only (n=112)	NAC + Cash (n=346)	NAC + Food (n=342)	NAC + Cash vs. NAC only	NAC + Food vs. NAC only	NAC + Cash vs. NAC + Food
LTFU							
Loss to follow-up, 6 mo ^b	2.6%	10.9%	0.9%	1.5%	-10.0 (-17.3, -2.8)**	-9.4 (-16.7, -2.1)**	-0.7 (-2.7, 1.4)
Loss to follow-up, 12 mo ^b	9.5%	17.3%	6.7%	9.7%	-10.6 (-20.1, -1.1)*	-7.6 (-17.4, 2.1)	-3.0 (-8.3, 2.3)

ART: antiretroviral therapy; MPR: medication possession ratio; CI: confidence interval

* P<0.05 **P<0.01

- Unadjusted intent-to-treat estimate using a Wald test and Bonferroni's correction for multiple comparisons.
- The proportion of patients with no evidence of HIV primary care at 6 months, defined not seen for at least 90 days since the last appointment scheduled prior to 6 months.

Kaplan-Meier curve of the proportion of participants in care over time, stratified by study arm (nutrition assessment and counseling (NAC) plus cash or food transfers)^a



Number at risk					
NAC Only	112	98	90	86	
NAC+Cash	346	340	323	294	
NAC+Food	342	320	292	272	

a. The proportion of participants retained in care was defined as one minus the probability of LTFU (≥ 3 months since the last scheduled visit). By definition, follow-up time between 9 and 12 months could not be classified as LTFU and is therefore not on the graph.

Pathways to Better Adherence

In-depth interviews revealed that the incentives acted through three primary pathways to increase adherence:

1. Incentives addressed competing needs and offset opportunity costs
2. They increased motivation via a price effect, and
3. They alleviated stress and anxiety, a mental health pathway supported by conceptual models and empirical data (Weiser SD, 2011; Nel A, 2011)

Limitations

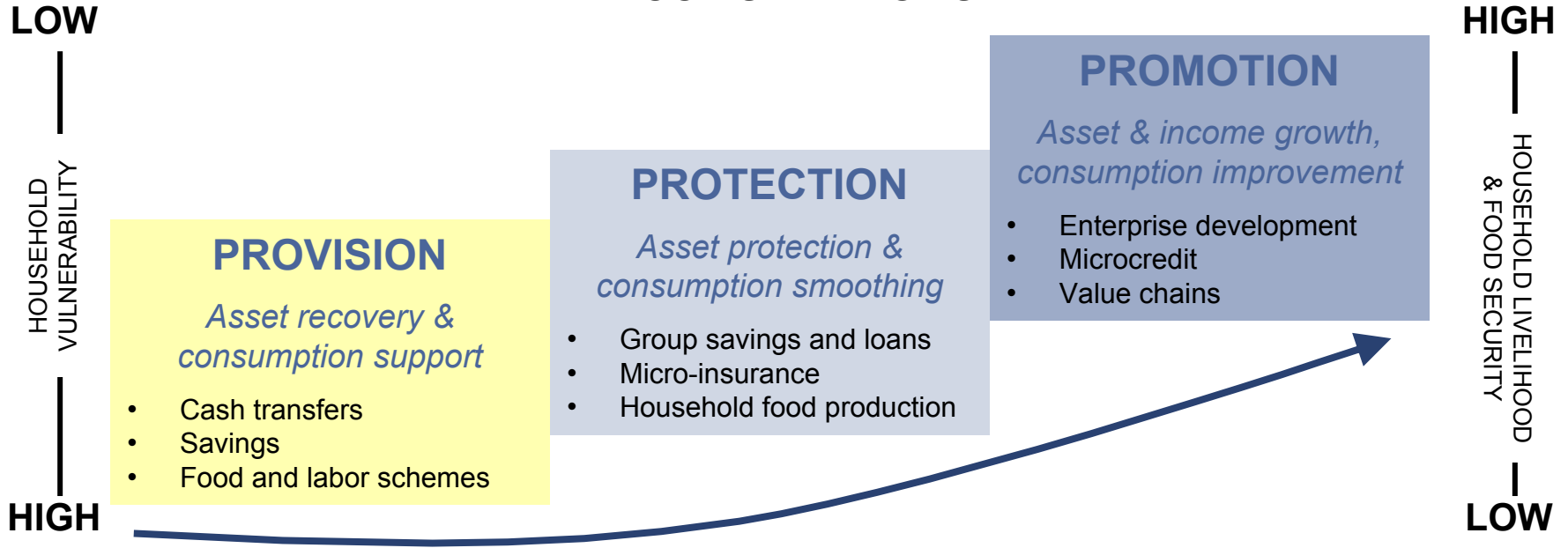
- Viral load not measured
 - MPR is highly correlated with short-term viral suppression
(*McMahon et al., 2011; Hong et al., 2013*)
- Potential for missing data from paper-based facility registers
 - Unlikely that missing data would be differential by study arm
 - Would likely result in *underestimates* of adherence and retention
- Study powered to determine whether cash assistance was non-inferior to food assistance; not to detect small differences between the two interventions

Discussion (1)

- Short-term cash and food transfers increase 6-month adherence and retention among food insecure treatment initiates vs. standard of care
 - The effects are most pronounced in the first 3 months
 - Many effects maintained at 12 months, 6 months after the incentive period
 - Demonstrates potential of short-term interventions at treatment initiation
- For some outcomes, cash was superior to food assistance. Cash was preferred by participants and was easier and cheaper to implement, warranting further evaluation.

Discussion (2)

LIVELIHOOD STRATEGIES



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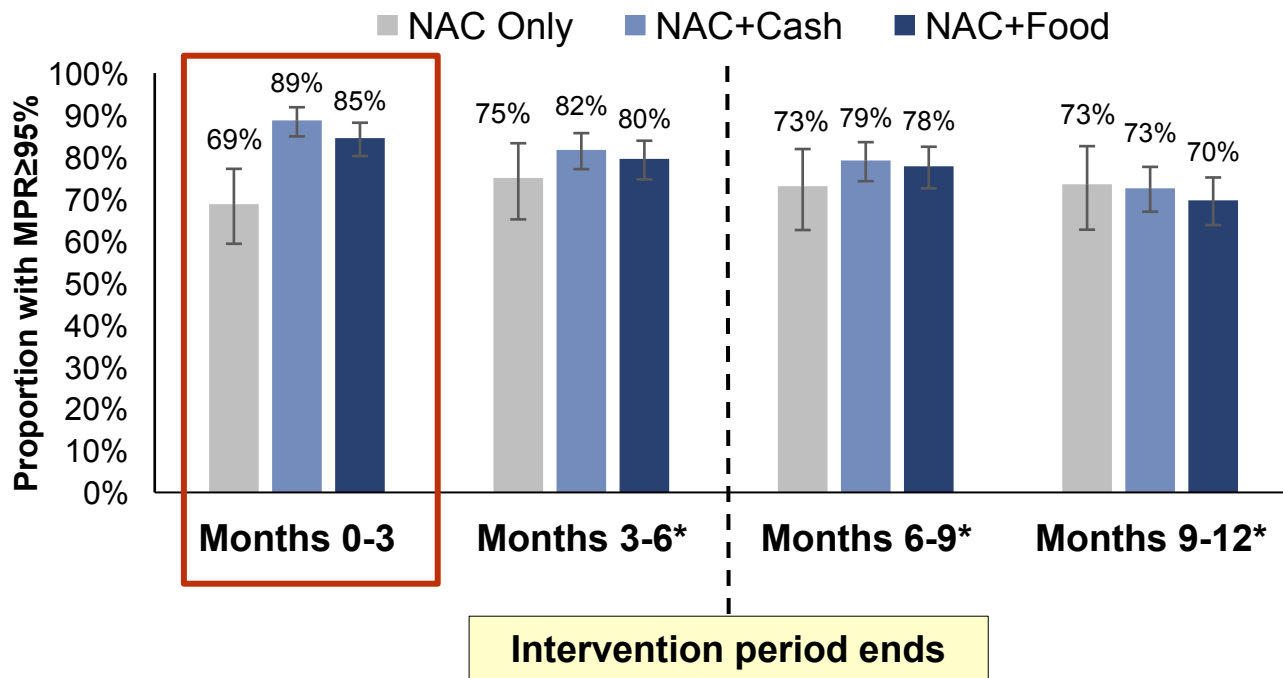
LSHTM

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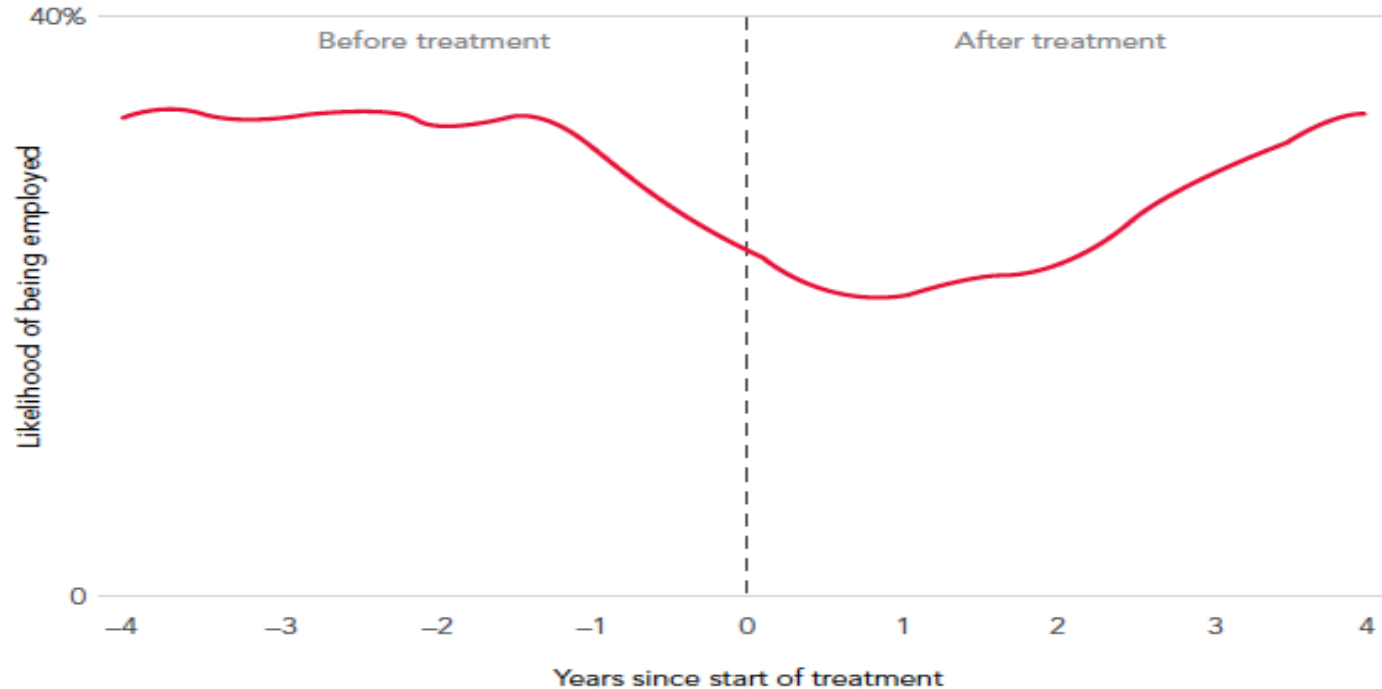


Effect on $\text{MPR} \geq 95\%$ is concentrated in the first 3 months of the intervention



* Restricted to individuals in possession of at least one dose during the interval

Likelihood of employment, before and after ART, Kwazulu-Natal, South Africa



Source: *Bärnighausen T, et al. The economic benefits of ART. 2nd International HIV Workshop on Treatment as Prevention, Vancouver, Canada, 22–25 April 2012.*

ITT Results: ART Adherence

Outcome	Overall (n=800)	Study group			Between-group difference ^a (95% CI)				
		NAC only (n=112)	NAC + Cash (n=346)	NAC + Food (n=342)	NAC + Cash vs. NAC only	NAC + Food NAC only	vs.	NAC + Cash NAC + Food	vs.
Adherence to ART (6 months: end of intervention period)									
MPR ^b	92.4%	85.4%	94.6%	92.6%	9.2 (5.0, 13.4)**	7.1 (2.9, 11.3)**		2.1 (-0.9, 5)	
MPR \geq 95% ^c	77.9%	63.4%	83.0%	77.5%	19.6 (7.6, 31.5)**	14.1 (1.9, 26.3)*		5.5 (-1.8, 12.7)	
MPR \geq 80% ^d	88.3%	79.5%	92.2%	87.1%	12.7 (3.0, 22.5)**	7.7 (-2.4, 17.8)		5.1 (-0.5, 10.6)	
Adherence to ART (12 months: 6 months after intervention has ended)									
MPR	87.9%	80.8%	90.9%	87.3%	10.0 (4.9, 15.1)**	6.5 (1.4, 11.6)*		3.6 (0, 7.2)	
MPR \geq 95%	58.8%	52.3%	63.3%	56.4%	11.0 (-2.1, 24.1)	4.1 (-9.1, 17.4)		6.9 (-2.2, 16)	
MPR \geq 80%	80.8%	74.3%	84.6%	79.1%	10.2 (-0.9, 21.3)	4.8 (-6.5, 28.7)		5.4 (-1.8, 12.6)	

ART: antiretroviral therapy; MPR: medication possession ratio; CI: confidence interval

* P<0.05 **P<0.01

- Unadjusted intent-to-treat estimate using Bonferroni's adjustment for multiple comparisons.
- The proportion of time an individual is in possession of >1 ART dose or prescription for ART.
- The proportion of patients with MPR \geq 95% during the 0-6 month interval.
- The proportion of patients with MPR \geq 80% during the 0-6 month interval.

ITT Results: Retention in Care

Outcome	Overall (n=800)	Study group			Between-group difference ^a (95% CI)		
		NAC only (n=112)	NAC + Cash (n=346)	NAC + Food (n=342)	NAC + Cash vs. NAC only	NAC + Food vs. NAC only	NAC + Cash vs. NAC + Food

LTFU (6 months: end of intervention period,)

Appointment attendance ^b	93.5%	82.6%	96.1%	94.5%	13.5 (9.1, 17.8)**	11.8 (7.5, 16.2)**	1.7 (-1.4, 4.7)
Loss to follow-up, 6 mo ^c	2.6%	10.9%	0.9%	1.5%	-10.0 (-17.3, -2.8)**	-9.4 (-16.7, -2.1)**	-0.7 (-2.7, 1.4)

LTFU (12 months: 6 months after intervention has ended)

Appointment attendance ^b	92.1%	83.4%	94.7%	92.3%	11.3 (7.2, 15.5)**	8.9 (4.7, 13.1)**	2.4 (-0.5, 5.3)
Loss to follow-up, 12 mo ^c	9.5%	17.3%	6.7%	9.7%	-10.6 (-20.1, -1.1)*	-7.6 (-17.4, 2.1)	-3.0 (-8.3, 2.3)

ART: antiretroviral therapy; MPR: medication possession ratio; CI: confidence interval

* P<0.05 **P<0.01

- Unadjusted intent-to-treat estimate using a Wald test and Bonferroni's correction for multiple comparisons.
- The proportion of scheduled visits completed during the 0-6 month or 0-12 month observation period.
- The proportion of patients with no evidence of HIV primary care at 6 months, defined not seen for at least 90 days since the last appointment scheduled prior to 6 months.