Improving Retention of Community-recruited Participants in HIV Prevention Research Through Saturday Household Visits; Findings from the HPTN 071 (PopART) Study in South Africa.

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Abstract

Background

Identifying successful strategies to improve participant retention in longitudinal studies remains a challenge. In this study we evaluated whether non-traditional fieldworker shifts (after hours during the week and weekends) enhanced participant retention when compared to retention during traditional weekday shifts in the HPTN 071 (PopART) population cohort (PC).

Methods

HPTN 071 (PopART) PC participants were recruited and followed up in their homes on an annual basis by research fieldworkers over a 3-4 year period. The average number of successful follow-up visits, where a PC participant was found and retained in the study, was calculated for each of 3 visit schedules (early weekday shift, late weekday shift, and Saturday shift), and standardized to account for variation in fieldwork shift duration. We used one-way univariate analysis of variance (ANOVA) to describe differences in mean-successful visits and 95% confidence intervals between the shift types.

Results

Data on 16651 successful visits were included. Successful visit rates were higher when conducting Saturday visits (14.0; 95% CI: 11.3-16.6) compared to both regular (4.5; 95% CI: 3.7-5.3) and late weekday shifts (5.3; 95% CI: 4.7-5.8) overall and in all subgroup analyses (P<0.001). The successful visit rate was higher amongst women than men were during all shift types (3.2 vs. 1.3, p<0.001). Successful visit rates by shift type did not differ significantly by age, over time, by PC round or by community triplet.

Conclusion

The number of people living with HIV continues to increase annually. High quality evidence from longitudinal studies remains critical for evaluating HIV prevention and treatment strategies. This study showed a significant benefit on participant retention through introduction of Saturday shifts for home visits and these data can make an important contribution to the emerging body of evidence for improving retention in longitudinal research.

Trial registration

PopART was approved by the Stellenbosch University Health Research Ethics Committees (N12/11/074), London School of Hygiene and Tropical Medicine (6326) ethics committee and the Division of AIDS (DAIDS) (Protocol ID 11865). PopART was registered with ClinicalTrials.gov (registration number NCT01900977).

Background

In 2018, 37.9 million people were living with HIV (PLHIV) globally, the majority of whom resided in Eastern and Southern Africa (20.6,54%), and an estimated 1.7 million new HIV infections. (1) In spite of advances in HIV prevention and treatment services, antiretroviral treatment (ART) coverage in South Africa in 2018 remained low, with global reports of 62% of PLHIV on ART, well below the WHO target of 80%. (2)

There remain extensive gaps in published evidence to guide strategies for implementation of HIV treatment and prevention services in high burden settings and successful completion of studies required to provide this evidence is challenging. (2) Longitudinal studies, defined as research designs that involve repeated observations of the same individuals over a period of time, (3) offer the opportunity for controlled and uniform analysis of the association between measured exposures and the outcome of interest, enabling more accurate attribution of causality and are a critical component of disease prevention and treatment research. (3, 4)

Overall, published literature from longitudinal studies show high rates of attrition. In a cohort study by Seed et al. that recruited mother and infant pairs and evaluated childhood development, attrition rates of 62%, were recorded in a four-year follow up period (5). In a further cohort study by Whiteman et al, which evaluated waste site exposure in Queensland Australia, high attrition rates of 53% were experienced over a 12 month follow up period (6).

Causes of attrition vary by study population and research design. Characteristics of individuals experiencing attrition are an important consideration with respect to study validity. (7) Some studies have found males and younger participants more likely to experience attrition (8–11). Other studies have found social factors such as lower educational and income level to be associated with higher attrition (11). Study designs that may not be ‘participant friendly’ are known to negatively affect study retention (10). Studies that included painful clinical procedures or medication regimens that were difficult for participants to tolerate or adhere to have shown higher attrition (10). Conversely, studies that included interventions that were attractive to participants, such as, access to a desirable study product or intervention, that was not routinely available, showed higher retention (10).

Identifying successful strategies to improve participant retention in longitudinal studies remains a challenge. HPTN 071 (PopART) was a three-arm cluster randomized controlled trial implemented in 21 urban and peri-urban study communities in Zambia (12 communities) and South Africa (9 communities) between 2013 and 2018. (12) In this study we evaluate whether non-traditional fieldworker shifts (after hours during the week and weekends) enhance retention when compared to retention during traditional weekday shifts.

Methodology

Study setting

A full description of the PopART trial design was previously published. (12) The overall goal of PopART was to assess whether an HIV prevention intervention package, including testing of all community

members and linkage to HIV care and treatment, could lead to decreased HIV incidence in communities. PopART communities were defined based on the catchment areas of health care facilities providing ART. The PopART intervention was delivered door-to-door to the total population by Community HIV-care providers (CHiPs). Communities were arranged in 3 triplets matched on geographical location and estimated HIV prevalence. The PopART trial in South Africa was implemented in 9 communities, 6 in the Cape Metro and 3 in the Cape Winelands districts. The populations of the 9 South African PopART communities ranged from 21,386 to 82,953 individuals, with an average of 45,780 individuals. The impact of the PopART intervention on HIV incidence was measured in a research cohort, the Population Cohort (PC). The PC included a randomly selected subset of each community enrolling approximately 2000 adults, aged 18 to 45 years, in each community who were followed up over 3 years.

PopART PC participant selection

The PopART PC was implemented from January 2014 to July2018. PC recruitment was undertaken at baseline (PC0) with baseline surveys completed at enrolment and participants followed-up after 12 months (PC12), 24 months (PC24) and 36 months (PC36). Additional participants were recruited at PC12 (PC12N) and PC24 (PC24N).

A household census was completed prior to PopART implementation which listed and enumerated households. A random selection of households identified in the census were selected for inclusion into the PC. Thereafter, individuals residing in each selected household were enumerated. From this list of enumerated individuals in each household, an eligible individual was randomly selected for inclusion in the PC, who, if accepting study participation, signed informed consent. If the randomly selected individual did not consent to participation, another eligible household member was randomly selected for inclusion.

PopART PC follow-up and retention

Follow-up household visits were completed by research field workers and consisted of completing a questionnaire, obtaining a blood specimen for HIV testing, and offering a HIV point of care test (POCT). The questionnaire covered socio-demographic, behavioural and HIV-related topics and was completed on an electronic data capture device (EDC), which was synced daily to a cloud-based database. Phlebotomy and POCT were completed after the interview by a trained research nurse and samples transported to laboratories for testing. The success of a household visit was defined as the successful completion of the electronic questionnaire during the household visit.

Retention of PC participants was critical for PopART. For enrolment, household visits were conducted by research enumerators (REs) who worked the traditional shift type i.e. weekdays ending at 4 pm. To increase the chance of finding participants at home, and thereby enhancing study retention, the household visit schedule was adjusted during PC12 adding additional shift types, namely a late weekday shift (ending after 4pm) and a Saturday shift (ending at 2pm).

The same research teams rotated through all shift types. With few exceptions, weekday shifts lasted eight hours, while the Saturday shift lasted five hours (see Table 1 for a list of exceptions). This remained unchanged during the remainder of the study. The allocation of participants to early weekday, late weekday and Saturday shifts was not random. Research teams communicated with participants to determine the most convenient time for survey completion in the household. This was done prior each household visit. Therefore, the time of day for completing research activities was based on participant availability. Research teams were systematically allocated to cover a combination of shifts which allowed research activities to be completed during early weekdays, late weekdays and Saturdays, to accommodate participant availability. During each shift type four research teams (two individuals per team) conducted follow-up household visits in each community.

Table 1
Duration of shift days by shift type stratified by PC round

	Early weekday shift (*n* days)	Late weekday shift (*n* days)	Saturday shift (*n* days)
PC12 (July 2015-June 2016)			
Duration field teams active (hours)			
4	0	0	0
5	1	0	24
6	1	0	0
7	0	16	0
8	53	125	0
Total days worked per shift type	***55***	***141***	***24***
Total hours worked per shift type	***435***	***1,112***	***120***
PC24 (July 2016-July 2017)			
Duration field teams active (hours)			
4	1	0	0
5	1	1	17
6	0	0	0
7	0	0	0
8	30	117	0
Total days worked per shift type	***32***	***118***	***17***
Total hours worked per shift type	***249***	***941***	***85***

Early weekday shift = research teams ending before 4pm

Late weekday shift = research teams ending after 4pm

Saturday shift = research teams ending at 2pm

PC= Population Cohort

Study design

For this study we conducted a cross sectional evaluation of the association between shift type and household visit success in the PC12 and PC24 in the 9 South African communities, for follow up study visits conducted between June 2015 and July 2017. A household visit was considered successful if the participant completed the electronic survey during the household visit.

Data sources

We used data extracted from the PopART PC survey data and from an electronic contact log. Survey data included questionnaire data on all household visits conducted, detailing sex, age, PC round, community of visit, time and date of visit and whether or not the visit was successfully completed. During the implementation of the PopART PC, household visits were monitored using an electronic contact log (ECL) to track the status of each household visit. ECL data included documentation of the number of household visit attempts prior to completion of a successful visit. Successful visits were excluded (dropped) from analysis if the sex of the research participant was not recorded, if the date of the household visit was missing, or if the visit was completed outside the three household visit shift types.

Data analysis

Only data from South Africa was included in the analyses. The study protocol used in both countries was the same, however there were differences in the management of operational activities. This lead to each country adopting a slightly different approach to reaching research participants.

We compared the rate of successful household visits by different shift type. (Table 1). This rate was calculated as the number of successful visits per day, divided by the number of hours that the research fieldworkers were active during that particular day. Every day during the study period research teams worked according to the same shift type similar in each community, thus by standardizing by hour per day, the outcome was also standardized by community and research team. We used one-way univariate analysis of variance (ANOVA) to describe differences in mean-successful visits and 95% confidence intervals between the shift types within each of the following subgroups: males, females, age 18-24 years, age 25-34 years, age >34 years, PC12, PC24, and separately for each community triplet. To investigate if patterns changed during the study period we also report outcomes per half year (from July 2015-July 2017).

Results

Of the 387 days that research fieldworkers completed follow-up visits, 220 (56.8%) and 167 (43.2%) were completed during PC12 and PC24 respectively (Table 1). In PC12, 55 (25.0%) days were traditional weekday shifts, 141 (64.1%) days were late weekday shifts and 24 (10.9%) days were Saturday shifts. In PC24, the majority of days was also a late weekday shift (118, 70.7%). There were a few exceptions to the standard duration of shift types (weekday shifts eight hours, Saturday shifts five hours), but most days were of standard duration: 53/55 (96.4%) of 8 hour early weekday and 125/141 (88.7%) of 8 hour late weekday shifts, and 100% of 5 hour Saturday shifts (Table 1). Overall, during PC12, the largest number of visit hours were completed during late weekday shift 1,112 (66.7%) compared to 435 (26.1%) during early weekday and 120 (7.2%) during Saturday shifts. Similarly, during PC24 the largest number of visit hours were completed during late weekday shift 941 (73.8%), compared to 249 (19.5%) during early weekday and 85 (6.7%) during Saturday shifts.

Data on 391/ 17042 (2.3%) of successful visits were excluded from analysis , as a result of missing data on sex (125 visits)(most likely as a result of data entry error or unsuccessful synching) and if the visit was completed outside of the visit shift schedule (266 visits). Overall data on 16,651 successful follow up visits completed during PC12 and PC24 was included in this analysis. Of visits included in the analysis: 3,069 (18.4%) were completed during a traditional early weekday shift, 10,713 (64.3%) during a late weekday shift and 2,869 (17.3%) during a Saturday shift (Table 2). The mean number of successful visits per hour was 4.5 (95%CI: 3.7-5.3) for traditional early weekday, 5.3 (95%CI: 4.7-5.8) for late weekday and 14.0 (95%CI: 11.3-16.6) for Saturday shifts ($P<0.001$) (Table 2).

Table 2
Successful follow-up visits standardized by duration and date of shift type: a comparison within subgroups

Subgroups	Early weekday shift	Late weekday shift	Saturday shift	*P* value*
Days (n)	87	259	41	
Duration 36 field teams active (hours)	684	2,053	205	
Total				
Successful visits *n*	3,069	10,713	2,869	
Mean successful visits per hour (95%CI)	4.5 (3.7-5.3)	5.3 (4.7-5.8)	14.0 (11.3-16.6)	<0.001
Sex: male				
Successful visits *n*	894	2,978	942	
Mean successful visits per hour (95%CI)	1.3 (1.1-1.5)	1.5 (1.3-1.6)	4.6 (3.7-5.5)	<0.001
Sex: female				
Successful visits *n*	2,175	7,735	1,927	
Mean successful visits per hour (95%CI)	3.2 (2.6-3.7)	3.8 (3.4-4.2)	9.4 (7.6-11.2)	<0.001
Age: 18-24 years				
Successful visits *n*	1,083	3,463	916	
Mean successful visits per hour (95%CI)	1.6 (1.3-1.9)	1.7 (1.5-1.9)	4.5 (3.6-5.3)	<0.001
Age: 25-34 years				
Successful visits *n*	1,184	4,274	1,154	
Mean successful visits per hour (95%CI)	1.7 (1.4-2.0)	2.1 (1.9-2.3)	5.6 (4.5-6.7)	<0.001
Age: >34 years$				
Successful visits *n*	802	2,975	799	
Mean successful visits per hour (95%CI)	1.2 (0.9-1.4)	1.5 (1.3-1.6)	3.9 (3.1-4.7)	<0.001
PC round: PC12				

Successful visits *n*	1,961	6,137	1,668	<0.001
Mean successful visits per hour (95%CI)	2.9 (2.1-3.6)	3.0 (2.5-3.6)	8.1 (5.3-10.9)	
PC round: PC24				
Successful visits *n*	1,108	4576	1,201	
Mean successful visits per hour (95%CI)	1.6 (0.9-2.3)	2.2 (1.8-2.7)	5.9 (2.9-8.8)	<0.001
Study period: July – December 2015				
Successful visits *n*	1,630	4,505	1,110	
Mean successful visits per hour (95%CI)	2.4 (1.6-3.1)	2.2 (1.7-2.8)	5.4 (2.4-8.4)	<0.001
Study period: January – June 2016				
Successful visits *n*	331	1,632	558	
Mean successful visits per hour (95%CI)	0.5 (0.2-0.7)	0.8 (0.6-1.0)	2.7 (1.3-4.1)	<0.001
Study period: July – December 2016				
Successful visits *n*	868	1,817	537	
Mean successful visits per hour (95%CI)	1.3 (0.6-1.9)	0.9 (0.5-1.2)	2.6 (0.3-4.9)	<0.001
Study period: January – July 2017				
Successful visits *n*	240	2,759	664	
Mean successful visits per hour (95%CI)	0.4 (0.1-0.6)	1.3 (1.0-1.7)	3.2 (0.9-5.5)	<0.001
Community: Triplet 1				
Successful visits *n*	897	3,631	906	
Mean successful visits per hour (95%CI)	1.3 (1.0-1.6)	1.8 (1.6-1.9)	4.4 (3.5-5.4)	<0.001
Community: Triplet 2				
Successful visits *n*	1,143	3,944	1,138	
Mean successful visits per hour (95%CI)	1.7 (1.3-1.9)	1.9 (1.7-2.2)	5.6 (4.5-6.6)	<0.001
Community: Triplet 3				
Successful visits *n*	1,069	3,138	825	
Mean successful visits per hour	1.5 (1.2-1.8)	1.5 (1.3-	4.0 (3.1-4.9)	<0.001

(95%CI)		1.7)

*ANOVA test was done to calculate if there was a statistically significant difference between the mean successful visits of each shift type within a subgroup. Successful visits were standardized by hour for each day during the study period.

$The eldest participant was 46 years, therefore the number of subgroups was restricted to three age groups. One individual had age missing.

Subgroup analyses comparing successful visits rates for different shift types was completed. When stratified by PC round, results were similar, with successful visit rates lowest during standard weekday shifts and highest on Saturdays, for both PC12 (P<0.001) and PC24 (P<0.001), the same trend was observed between both males (P<0.001) and females (P<0.001) with the successful visit rate lowest during weekday shifts and highest during Saturday shifts. Notably, the successful visit rate was higher for females compared to males for all shift types, early weekday shift (3.2 vs. 1.3, p<0.001), late weekday (3.8 vs. 1.5, p<0.001) and Saturday (9.4 vs. 4.6, p<0.001) shifts. When stratifying by age, successful visit rates were similar for early weekday and late weekday shift but consistent higher during Saturday shift (P<0.001) for all age groups.

When looking at 6 month periods from July 2015 through to July 2017 the successful visit rates were similar when comparing weekday and late weekday shifts and consistently higher on Saturday visits there was no clear trend in Saturday successful visit rates over time. Stratification by community triplet yielded similar results with similar successful visit rates when comparing weekday to late weekday shifts and consistently higher successful visit rates on Saturdays with no clear trend over time.

Discussion

This study showed higher successful visit rates when conducting Saturday visits compared to both regular and late weekday shifts overall and in all sub group analyses. Successful visits rates were higher during late compared to regular weekday shifts, but this difference was not statistically significant. The successful visit rate was higher amongst women than men were during all shift types. Successful visit rates by shift type did not differ significantly by age, over time, by PC round or by community triplet.

Wide ranges of strategies have been reported to improve retention in longitudinal studies (13, 14); however, we did not find any previous publications evaluating the impact of adjusted working hours. The finding that additional visits are required to successfully access men compared to women fits with previous published data on study retention (15–18). The results of this study are, however, in contrast to some previous studies that have reported difficulties accessing younger individuals for study retention (11, 15, 19, 20). Recruitment of suitable participants, which has been shown to improve retention, to this end, recruitment procedures should include interventions to systematically screen for individuals who are not likely to be retained throughout follow up. Targeted incentives have been identified as the most commonly documented approach to improving retention outcomes. A systematic review by Brueton et al

(13), assessed strategies to improve retention in 38 RCTs. The definition of retention varied between study trial including completion of response to a postal or electronic questionnaire and study visits. Monetary incentives were successful for increasing the rate of completion and or return of both postal and electronic questionnaires. Offer of a cash voucher was shown to increase return of postal questionnaires and biomedical test kits. (13). A further systematic review by Booker et al also found incentives to be an effective mechanism for improving retention with bigger incentives having a bigger positive impact (21).

In a more recent extensive systematic review, by Teague et al, including 141 articles from 28 different countries, reported 95 different retention strategies used in longitudinal cohort studies (14). Retention strategies were classified as i) barrier-reduction, ii) creating a project community and iii) follow-up/reminder strategies. Barrier reduction methods were shown overall to result in a 10% increase in participant retention (P = 0.01) and included measures to make the study environment more participant friendly e.g. consistency of staff collection, child care facilities and modification of data collection tools. ‘Creating a project community’ included study education and provision of appreciation gifts; however, none of these interventions was shown to have a significant impact on retention. Follow up/reminder strategies included tracing interventions (follow up phone calls, sms reminders, tracing via alternative contacts) and again none of these was shown to have a statistically significant impact on retention (14).

The triplet communities in the PC differ socioeconomically and in urban/rural environment. Our findings were similar across communities (triplets), which suggests that our findings are generalizable to other communities. Thus, these findings may help to inform retention strategies in future research studies and similar contexts. Study findings would be applicable in cohort studies undertaken in low resource settings similar to this. In similar settings, longitudinal HIV prevention research, is highly relevant to the high density resource limited urban sites and communities where Infectious diseases are a high risk such as HIV and TB.

This study has a number of keys strengths; including evaluating a novel and accessible intervention that has the potential to have a positive impact on research implementation. PopART communities in South Africa were large urban and peri-urban high density mostly informal settlements, context that are likely representative of many high burden settings. The study was also completed within a highly regulated CRT with extensive prospective definition of interventions and procedures, as well as data quality control. There are however some limitations for consideration. This was a post-hoc analysis and assignment of fieldworkers to visit specific households utilising different shift type they used for household visit completion was non-random based on logistical/operational factors. Although we stratified analysis for age, sex, PC round and study arm and operations were overall consistent across shift types, this non-random allocation of household visits may have introduced confounding not adjusted for in this analysis.

Conclusions

The number of people living with HIV continues to increase annually. High quality evidence from longitudinal studies remains critical for evaluating HIV prevention and treatment strategies. This study showed a significant benefit on participant retention through introduction of Saturday shifts for home visits and these data can make an important contribution to the emerging body of evidence for improving retention in longitudinal research.

List Of Abbreviations

HIV	human immunodeficiency virus
PLWHIV	People Living with HIV
PopART	Population Effects of Antiretroviral Therapy to Reduce HIV Transmission
EDC	Electronic Data Capture Device
PC	Population Cohort
PC12	Population Cohort month 12
PC24	Population Cohort month 24
ECL	Electronic Contact Log
CRT	Community-randomized trial

Declarations

Ethical Considerations

All participants included in the PopART PC provided written informed consent. PopART was approved by the Stellenbosch University Health Research Ethics Committees (N12/11/074), London School of Hygiene and Tropical Medicine (6326) ethics committee and the Division of AIDS (DAIDS) (Protocol ID 11865). PopART was registered with ClinicalTrials.gov (registration number NCT01900977).

Consent for publication

Not applicable

Availability of data and materials

All data used in this manuscript are under the oversight of HPTN071 (PopART), research data has been stored and managed as per Ethics requirements. The datasets generated and/or analysed during the current study are not publicly available due to funder access restrictions but can be accessed via request to SCHARP (deborah@scharp.org).

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Nomtha Bell-Mandla initiated the manuscript concept, drafted the initial drafts, developed the manuscript with input from co-authors and organised the references. Peter Bock has provide leadership throughout various versions of manuscripts, along with HPTN 071 (PopART) leadership Helen Ayles, Richard Hayes, Sarah Fidler who provided leadership and guidance. Roosa Sloot analysed the data and created the tables and figures. All authors provide input to various drafts and versions of the manuscript during its development.

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