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Amanda Deen Date

Evaluation of a Comprehensive Training Intervention for Couples'

Voluntary HIV Counseling and Testing Providers in Zambia

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Evaluation of a Comprehensive Training Intervention for Couples' Voluntary HIV Counseling and Testing Providers in Zambia

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B.A. Anthropology, French
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An abstract of
A thesis submitted to the Faculty of the
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Abstract

Evaluation of a Comprehensive Training Intervention for Couples'

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By
Amanda Deen

Background: Since 2007, couples' voluntary HIV counseling and testing (CVCT) has been expanded and implemented in government clinics in urban and rural Zambia. Recently, CVCT services have been integrated with couples' family planning counseling (CFPC) with a focus on providing long-acting reversible contraception (LARC) to couples who wish to delay fertility.

Methods: Data were analyzed from 305 trainees in government clinics in five districts between 2013 and 2014. Certifying nurses and laypersons to insert LARC methods involves passing both a didactic training consisting of multiple-choice and true/false questions regarding the benefits of family planning and HIV integration, knowledge of the intrauterine device (IUD), hormonal implants and a practical training. Covariates of interest were described by whether the trainee passed the didactic test and by whether the trainee passed the practicum using counts and percentages (means and SDs) for categorical (continuous) variables. Logistic regression identified covariates significantly associated with passing the didactic test.

Results: Ninety percent of trainees (n=275) passed the didactic test. In multivariate models, higher pretest scores and receiving training in 2014 versus 2013 were significant ($p<0.05$) predictors of passing. Of those that passed the didactic test, 60% (n=164) passed the practicum. In univariate analyses, having a higher education and receiving training in Lusaka versus the Copperbelt were significantly ($p<0.05$) associated with passing the practicum.

Conclusions: Understanding the factors associated with successful completion of CFPC didactic and practical trainings can help to target potential trainees (for example, those with more than a secondary education) and to evaluate the success of training programs (we saw changes in the training program implemented in 2014 lead to more training success). This training model could be used by others to facilitate the integration of family planning services and HIV prevention services to address unmet need for family planning and prevention of mother-to-child transmission of HIV.

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Chapter 1: INTRODUCTION

Context

The HIV/AIDS epidemic continues to disproportionately affect populations in sub-Saharan Africa, accounting for nearly 68% of people living with HIV (PLHIV) and 70% of new infections globally in 2010. [1] In Zambia, HIV prevalence has declined since 2001 yet continues to remain in the top ten countries in sub-Saharan Africa with the largest proportion of the population living with HIV/AIDS. [2] UNAIDS estimates HIV/AIDS prevalence in Zambia to be 12.7% and among young people aged 15 to 24 to be 4.6% among females and 3.5% among males. [3] In 2012, approximately 153 new infections and 82 deaths from HIV/AIDS occurred daily in Zambia.[3]

Couples' Voluntary Counseling and Testing (CVCT) is proven to be an effective prevention measure for HIV concordant and discordant couples in Zambia. Several studies examining the efficacy of CVCT have shown this intervention to be both cost effective and efficacious among cohabitating couples, substantially increasing the likelihood of both partners testing for HIV and becoming more knowledgeable about prevention and transmission. [4-12] Studies have also shown lower rates of seroconversion among HIV serodiscordant couples and an increase in condom usage. [10, 13, 14] Acceptability of voluntary testing and counseling (VCT) is generally high in Zambia, with a study showing 98% acceptability and 83% of women in antenatal care clinics preferring same-day testing as opposed to delayed VCT. [8]

Since 2007, CVCT has been expanded and implemented in government clinics in both urban and rural Zambia. Recently, CVCT services have been integrated with couples' family planning counseling (CFPC) with a focus on providing long-acting reversible contraception (LARC) to couples who wish to delay their fertility. Unmet need for contraception is high among

HIV infected women in Zambia. [15] Many women in Zambia are subject to misinformation and express fear of side-effects for reluctance to use contraceptive methods. [16] Modern contraceptives are thought to be utilized more by HIV-infected women if information about family planning methods and contraceptives are offered on site, preferably integrated with HIV testing.

Problem Statement

Although CVCT has proven effective for increasing condom use and reducing overall rates of seroconversion among cohabitating HIV serodiscordant couples in many sub-Saharan African settings, CVCT services, similar to HIV testing services, largely do not include a family planning component which is crucial for cohabitating couples for the prevention of unintended pregnancy and mother to child transmission (MTCT) of HIV. The integration of family planning into HIV prevention services could contribute to fewer unplanned pregnancies among women wishing to delay their fertility (Prong II of PMTCT for HIV positive women), a decrease in unsafe abortions, maternal mortality and potentially decrease perinatal transmission of HIV. [17] CVCT in Zambia has been integrated with couples' family planning and counseling (CFPC) with an emphasis on LARC methods. However, few nurses have had prior sufficient training to provide LARC methods and subsequently cannot provide adequate information to patients. [19]

Purpose

Since 2007, CVCT as been expanded and implemented in government clinics in both urban and rural Zambia. The expansion has created additional demand on health care professionals and facilitated the need for task-shifting among health workers. The Zambian Ministry of Health (MoH) fully endorsed the CVCT training curriculum put forth by ZEHRP,

National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) in 2008.[18] CVCT training in Zambia consists of three days of CVCT-focused training, one day of data management training and rapid HIV laboratory testing.

With the growing success of CVCT, the increased number of trainings need to be evaluated in order to ensure proper knowledge and quality of services provided are maintained among CVCT providers. This analysis evaluates the effect of the training based on pre- and post- test training scores and practicum completion. Predictors of pre- and post- test scores were also evaluated. The analysis of pre- and post-test training scores and potential predictors will contribute to identifying the effectiveness of LARC training and reveal any gaps for CVCT providers.

Definition of Terms

AIDS	Acquired immune deficiency syndrome
CDC	Centers for Disease Control and Prevention
CFCP	Couples' family planning and counseling
CVCT	Couples' voluntary counseling and testing
DOC	District Office Coordinator
HIV	Human immunodeficiency virus
IQR	Inter quartile range
IUD	Intrauterine device
LARC	Long acting reversible contraception
MOH	Ministry of Health
MTCT	Mother-to-child transmission
PLHIV	People living with HIV/AIDS
PMTCT	Prevention of mother-to-child transmission
RZHRG	Rwanda Zambia HIV Research Group
SD	Standard deviation
STI	Sexually transmitted infection
SUFP	Scaling Up Family Planning
UNAIDS	Joint United Nations Programme on HIV/Acquired Immune Deficiency Syndrome
VCT	Voluntary counseling and testing
ZEHRP	Zambia Emory HIV Research Group
ZCC	Zambia Counseling Council

Chapter 2: LITERATURE REVIEW

HIV/AIDS in Zambia

Prevalence of HIV in Zambia remains consistently higher among women than men aged 15-49 and young women often fail to complete school in order to provide for AIDS affected family members. [20, 21] HIV prevalence rates among pregnant women have been estimated as high as 21% in the densely populated city of Lusaka. [15] Transmission of HIV in Zambia is largely due to inconsistent condom use in heterosexual relationships, multiple and concurrent partners, labor migration and mother to child transmission (MTCT). HIV prevalence is highest in the provinces of Lusaka, Central and Copperbelt and ranges from 17% or more. [2, 21] Copperbelt province experiences a great deal of migration for its mining industry and inconsistent condom use and female sex work may be contributing to higher prevalence compared to other areas in Zambia. Prevalence of discordant couples in which one partner is HIV negative and one partner is HIV positive was 11% in Zambia in 2007 and nearly half of all couples in Lusaka are thought to consist of at least one HIV positive partner. [7, 21] In 2012, more than three quarters of positive partners were women. [21] Approximately 70% of new HIV infections in discordant couples occur among couples who are unaware of their individual HIV status and subsequently the HIV negative partner has a high risk of being infected by his or her partner(s). [22]

HIV infections in cohabitating couples account for the majority of new infections in sub-Saharan Africa. [4, 16] Dorak *et al*. (2004) report that nearly 20% of cohabitating couples in Zambia are serodiscordant. [23] Heterosexual transmission is one of the largest drivers of HIV infection in Zambia, with estimates as high as 71% of new infections caused by heterosexual

transmission and 10% of new infections is due to mother-to-child transmission. [20] Studies have shown transmission rates from an HIV-negative to an HIV-positive partner to range from 20% to 25% per year. [15, 24] An analysis of both Demographic Health Survey (DHS) and clinic data in Rwanda and Zambia in 2008 revealed that 55.1% to 92.7% of new HIV infections were transmitted heterosexually among married or cohabitating couples. [24] One reason contributing to high transmission rates among Zambian couples may be due to lack of testing among male partners as they assume an HIV status to be the same as their partners' or a lack of disclosure in discordant couples, especially among women. [25, 26] Further evidence suggests the presence of symptomatic sexually transmitted infections (STIs) that cause genital ulceration and inflammation also contribute to high rates of seroconversion among couples. [27, 28]

Couples' HIV Voluntary Counseling and Testing (CVCT)

Couples' Voluntary Counseling and Testing (CVCT) is proven to be an effective prevention measure for HIV concordant and discordant couples in Zambia. Several studies examining the efficacy of CVCT have shown this intervention to be both cost-effective and efficacious among cohabitating couples, substantially increasing the likelihood of both partners testing for HIV and becoming more knowledgeable about prevention and transmission. [4-12] Studies have also shown lower rates of seroconversion among HIV serodiscordant couples and an increase in condom usage. [10, 13, 14] Acceptability of voluntary testing and counseling (VCT) is generally high in Zambia, with a study showing 98% acceptability and 83% of women in antenatal care clinics preferring same-day testing as opposed to delayed VCT. [8]

Since 1994, the Zambia-Emory HIV Research Project (ZEHRP) has provided CVCT and have tested more than 20,000 cohabitating couples in Lusaka, the capital city of Zambia. [7, 18, 29] Since 2010, ZEHRP has expanded CVCT services to the high HIV prevalence region of the

Copperbelt. [18] Cohabitating couples are offered joint counseling at CVCT clinics followed by an educational video, a discussion and private and voluntary HIV testing. HIV tests and post-test counseling are carried out on the same day. [10, 16] Condom use is emphasized in order to prevent transmission of HIV. [29]

Integration of family planning and HIV services

Although CVCT has proven effective for increasing condom use and reducing overall rates of seroconversion among cohabitating HIV serodiscordant couples in many sub-Saharan African settings, CVCT services, similar to HIV testing services, largely do not include a family planning component which is crucial for cohabitating couples for the prevention of unintended pregnancy and mother to child transmission (MTCT) of HIV. The integration of family planning into HIV prevention services could contribute to fewer unplanned pregnancies among women wishing to delay their fertility (Prong II of PMTCT for HIV positive women), a decrease in unsafe abortions, maternal mortality and potentially decrease perinatal transmission of HIV. [17]

Contraceptive prevalence rates are among the lowest in the world in several sub-Saharan African countries. [30] In Zambia total fertility is high, with a total fertility rate (TFR) of 5.9 children per woman and modern contraceptive use is relatively low. [31] Of women aged 15-49 in Zambia, 17% report using a modern contraceptive method, which includes hormonal contraception, condoms, intrauterine devices (IUD), implants and lactational amenorrhea. [31] Chibwesha *et al.* (2011) found that 40% of HIV-infected women using antiretroviral therapy (ART) were not using any modern contraceptive method in a reproductive health counseling intervention in HIV clinics in Lusaka, Zambia. Additionally, among both concordant and discordant Zambian couples, only 20% to 40% reported using a modern contraceptive method in addition to condoms. [15] For HIV positive women of reproductive age who do not desire to

have children, unplanned pregnancy could result in transmission of the virus during pregnancy or labor. [16]

Unmet need for contraception among married women in Zambia is estimated to be 27% and has been estimated to be as high as 40% among HIV-infected women. [15, 31] Many women in Zambia are subject to misinformation and express fear of side effects for reluctance to use contraceptive methods. [16] The 2007 DHS in Zambia reports high levels of knowledge regarding contraceptive methods despite low usage. [31] Oral contraceptives (pills), male condoms and injectables are most commonly used methods. [31] Zambian women are most knowledgeable about the pill and least knowledgeable about emergency contraception. [16]

Modern contraceptives are thought to be utilized more by HIV-infected women if information about family planning methods and contraceptives are offered on site, preferably integrated with HIV testing. In a study by Newmann *et al.* (2013), HIV-infected women aged 18-25 were at greater odds of believing that they would initiate contraceptive use if family planning services were integrated with HIV services and if they made family planning decisions with their partners (adjusted odds ratio (aOR)=3.22; 95% confidence interval (CI)= 1.53–6.80). [17] Additionally promoting "dual method use" of condoms and long-acting contraception could help prevent unplanned pregnancy and both horizontal and vertical transmission of HIV. [16] In a randomized controlled trial among 251 couples at a VCT facility in Lusaka, Zambia, contraception initiation was three times higher among couples already using condoms who received education and contraceptives at the facility compared to couples who only received education and referrals for contraception. [29] Of those who initiated contraceptives, condom use remained consistent and contraception preference was for oral contraception (pills) and injectables but had high rates of failure after 1-2 years of follow up. [29].

The availability of contraceptives and family planning education at HIV testing facilities may lead to greater usage of modern methods and the subsequent reduction in unintended pregnancy. However, oral contraceptives and injectables are subject to user error and users are dependent on timely refills for proper use, which subsequently results in high failure rates. [32] Alternatively, long-acting reversible contraception (LARC), including the copper intrauterine device (IUD) and hormonal implants have proven more effective and less costly. [30, 33] Khu *et al.* (2013) found LARC users in Rwanda and Zambia to report less unprotected sex acts over a three-month period. [30] Reportedly only 0.4 % of women in Zambia use LARC methods. [33] Social or cultural norms, misconceptions and lack of knowledge regarding use and paucity of trained health professionals to provide LARC methods pose potential barriers in the uptake of these methods.[19]

However, several studies have presented successful uptake of modern contraceptive use including LARC among HIV discordant and concordant couples in Rwanda and Zambia. [30, 34] In a randomized control trial in Zambia, education and access to non-barrier contraceptives were provided to 251 concordant and discordant couples using condoms and resulted in a significant uptake in dual method use. [29] In Rwanda, King *et al.* (1995) found an increase in uptake among HIV-positive and HIV-negative women by providing information and hormonal contraceptives. [35] In a prospective cohort study, Dhont *et al.* (2009) found an increase in uptake of hormonal implants in HIV-positive pregnant women when provided at the clinic site as opposed to being referred to public family planning services. [36]

In high prevalence HIV areas such as Zambia, encouraging dual method protection such as condoms for HIV prevention in addition to a long-lasting effective contraceptive method such as LARC could have a lasting impact in order to prevent MTCT of HIV. [32, 37] In a

randomized trial of HIV positive couples receiving CVCT in Zambia, the most discontinued form of contraception was the IUD and injectables. [32] The authors recommend that LARC-focused family planning be integrated into HIV prevention services that could improve knowledge and utilization of these methods. [32]

CVTC provides an ideal opportunity to engage with couples regarding dual prevention efforts of both HIV and STI's. [15] The integration of family planning services at already existing HIV clinics may mitigate time barriers that Zambian women report as a result of attending several clinics for both HIV and family planning services. [15] Further, the integration of family planning services into HIV prevention services could greatly reduce heterosexual and perinatal transmission of HIV. [29] Ultimately the provision of LARC services could potentially impact uptake in dual services and a decrease in both heterosexual and perinatal HIV transmission.

Chapter 3: MANUSCRIPT

Title Page: (HDGH requirement; not meant for publication)

Evaluation of a Comprehensive Training Intervention for Couples' Voluntary HIV Counseling and Testing Providers in Zambia

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For publication in: JAIDS Journal of Acquired Immune Deficiency Syndromes

Contribution of student: (Hubert Department of Global Health requirement; not meant for publication)

As a student, I was involved in the secondary data analysis from the LARC trainings. RZHRG conducted all trainings and collected subsequent data and entered all data into a Microsoft Access database. I cleaned and analyzed the data. I was responsible for writing and preparing the manuscript for publication and creating all subsequent tables. Dr. Kristin Wall was significantly responsible for reviewing the analysis process, tables and reviewing the manuscript for intellectually substantial material.

Title Page (JAIDS Requirement)

Evaluation of a Comprehensive Training Intervention for Couples' Voluntary HIV Counseling and Testing Providers in Zambia

Running head: "LARC training evaluation"

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ABSTRACT (JAIDS Requirement)

Background: Since 2007, couples' voluntary HIV counseling and testing (CVCT) has been expanded and implemented in government clinics in urban and rural Zambia. Recently, CVCT services have been integrated with couples' family planning counseling (CFPC) with a focus on providing long-acting reversible contraception (LARC) to couples who wish to delay fertility.

Methods: Data were analyzed from 305 trainees in government clinics in five districts between 2013 and 2014. Certifying nurses and laypersons to insert LARC methods involves passing both a didactic and a practical training. Covariates of interest were described by whether the trainee passed a didactic test and by whether the trainee passed the practicum using counts and percentages (means and SDs) for categorical (continuous) variables. Logistic regression identified covariates significantly associated with passing the didactic test.

Results: Ninety percent of trainees (n=275) passed the didactic test. In multivariate models, higher pretest scores and receiving training in 2014 versus 2013 were significant ($p<0.05$) predictors of passing. Of those that passed the didactic test, 60% (n=164) passed the practicum. In univariate analyses, having a higher education and receiving training in Lusaka versus the Copperbelt were significantly ($p<0.05$) associated with passing the practicum.

Conclusions: Understanding the factors associated with successful completion of CFPC didactic and practical trainings can help to target potential trainees and to evaluate the success of training programs. This training model could be used by others to facilitate the integration of family planning services and HIV prevention services to address unmet need for family planning and PMTCT.

Keywords: CVCT, HIV/AIDS prevention, Zambia, training evaluation, LARC

BACKGROUND

The HIV/AIDS epidemic continues to disproportionately affect populations in sub-Saharan Africa, accounting for nearly 68% of people living with HIV (PLHIV) and 70% of new infections globally in 2010. [1] In Zambia, HIV prevalence has declined since 2001 yet continues to remain in the top ten countries in sub-Saharan Africa with the largest proportion of the population living with HIV/AIDS. [2] UNAIDS estimates HIV/AIDS prevalence in Zambia to be 12.7% and among young people aged 15 to 24 to be 4.6% among females and 3.5% among males. [3] In 2012, approximately 153 new infections and 82 deaths from HIV/AIDS occurred daily in Zambia.[3]

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occur among couples who are unaware of their individual HIV status and subsequently the HIV negative partner has a high risk of being infected by his or her partner(s). [22]

HIV infections in cohabitating couples account for the majority of new infections in sub-Saharan Africa. [4, 16] Dorak *et al*. (2004) report that nearly 20% of cohabitating couples in Zambia are serodiscordant. [23] Heterosexual transmission is one of the largest drivers of HIV infection in Zambia, with estimates as high as 71% of new infections caused by heterosexual transmission and 10% of new infections is due to mother-to-child transmission (MTCT). [20] Studies have shown transmission rates from an HIV-negative to an HIV-positive partner to range from 20% to 25% per year. [15, 24] An analysis of both Demographic Health Survey (DHS) and clinic data in Rwanda and Zambia in 2008 revealed that 55.1% to 92.7% of new HIV infections were transmitted heterosexually among married or cohabitating couples. [24] One reason contributing to high transmission rates among Zambian couples may be due to lack of testing among male partners as they assume an HIV status to be the same as their partners' or a lack of disclosure in discordant couples, especially among women. [25, 26] Further evidence suggests the presence of symptomatic sexually transmitted infections (STIs) that cause genital ulceration and inflammation also contribute to high rates of seroconversion among couples. [27, 28]

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Although CVCT has proven effective for increasing condom use and reducing overall rates of seroconversion among cohabitating HIV serodiscordant couples in many sub-Saharan African settings, CVCT services, similar to HIV testing services, largely do not include a family planning component which is crucial for cohabitating couples for the prevention of unintended pregnancy and MTCT. The integration of family planning into HIV prevention services could contribute to fewer unplanned pregnancies among women wishing to delay their fertility, a decrease in unsafe abortions, maternal mortality and potentially decrease perinatal transmission of HIV. [17]

Contraceptive prevalence rates are among the lowest in the world in several sub-Saharan African countries. [30] In Zambia total fertility is high, with a TFR of 5.9 children per woman, and modern contraceptive use is relatively low. [31] Of women aged 15-49 in Zambia, 17% report using a modern contraceptive method which include hormonal contraception, condoms, intrauterine devices (IUD), implants and lactational amenorrhea. [31] Chibwesha *et al.* (2011) found that 40% of HIV infected women using antiretroviral therapy (ART) were not using any

modern contraceptive method in a reproductive health counseling intervention in HIV clinics in Lusaka, Zambia. Additionally, among both concordant and discordant Zambian couples, only 20% to 40% reported using a modern contraceptive method in addition to condoms. [15] For HIV positive women of reproductive age who do not desire to have children, unplanned pregnancy could result in transmission of the virus during pregnancy or labor. [16]

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and injectables but had high rates of failure after one to two years of follow up. [29]

Oral contraceptives and injectables are subject to user error and users are dependent on timely refills for proper use, which subsequently results high failure rates. [32] Alternatively, long-acting reversible contraception (LARC), including the copper intrauterine device (IUD) and hormonal implants have proven more effective and less costly. [30, 33] Khu *et al.* (2013) found LARC users in Rwanda and Zambia to report less unprotected sex acts over a three-month period. [30] Reportedly only 0.4 % of women in Zambia use LARC methods. [33] Social or cultural norms, misconceptions and lack of knowledge regarding use and a paucity of trained health professionals to provide LARC methods pose potential barriers in the uptake of these methods.[19]

However, several studies have presented successful uptake of modern contraceptive use including LARC among HIV discordant and concordant couples in Rwanda and Zambia. [30, 34] In a randomized control trial in Zambia, education and access to non-barrier contraceptives were provided to 251 concordant and discordant couples using condoms and resulted in a significant uptake in dual method use. [29] In Rwanda, King *et al.* (1995) found an increase in uptake among HIV positive and HIV negative women by providing information and hormonal contraceptives [35]. In a prospective cohort study, Dhont *et al.* (2009) found an increase in uptake of hormonal implants in HIV-positive pregnant women when provided at the clinic site as opposed to being referred to public family planning services. [36]

In high prevalence HIV areas such as Zambia, encouraging dual method protection such as condoms for HIV prevention in addition to a long-lasting effective contraceptive method such as LARC could have a lasting impact in order to prevent MTCT of HIV. [32, 37] In a randomized trial of HIV positive couples receiving CVCT in Zambia, the most discontinued

form of contraception was the IUD and injectables. [32] The authors recommend that LARC-focused family planning be integrated into HIV prevention services that could improve utilization of these methods. [32]

CVTC provides an ideal opportunity to engage with couples regarding dual prevention efforts of both HIV and STI's. [15] The integration of family planning services at already existing HIV clinics may mitigate time barriers that Zambian women report as a result of attending several clinics for both HIV and family planning services. [15] Further, the integration of family planning services into HIV prevention services could greatly reduce heterosexual and perinatal transmission of HIV. [29] Ultimately the provision of LARC services could potentially impact uptake in dual services and a decrease in both heterosexual and perinatal HIV transmission.

Since 2007, CVCT as been expanded and implemented in government clinics in both urban and rural Zambia. The expansion has created additional demand on health care professionals and facilitated the need for task-shifting among health workers. The Zambian Ministry of Health (MoH) fully endorsed the CVCT training curriculum put forth by ZEHRP, National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) in 2008. [18, 38] CVCT training in Zambia consists of three days of CVCT-focused training, one day of data management training and rapid HIV laboratory testing.

CVCT in Zambia has been integrated with couples' family planning and counseling (CFPC) with an emphasis on LARC methods. However, few nurses have had prior sufficient training to provide LARC methods and subsequently cannot provide adequate information to patients. [19] With the growing success of CVCT, the increased number of trainings need to be evaluated in order to ensure proper knowledge and quality of services provided are maintained

among CVCT providers. This analysis evaluates the effect of the training based on pre- and post-test training scores and practicum completion. Predictors of pre- and post-test scores were also evaluated. The analysis of pre- and post-test training scores and potential predictors will contribute to identifying the effectiveness of LARC training and reveal any gaps for CVCT providers.

METHODS

Training

A didactic training of CFPC and LARC methods (the Copper T IUD and Jadelle implants) for medical professionals was conducted from May 2013 to January 2015 in 50 ZEHRP-affiliated government clinics in Lusaka, Monze, Ndola, Luanshya, Kitwe and Chingola in Copperbelt province. The selection of the trainees was a collaborative effort with the District Office coordinators (DOCs) and the Team Leader—Family Planning and Clinical Services of Scaling Up Family Planning (SUFP). Trainings consisted of CFCP provision and LARC insertion techniques. The didactic portion of the training lasted three days and the practicum portion eleven days.

Pre- and post-tests were given both before and immediately following the training sessions and respondents had 15 minutes to complete each test. Test questions were weighted equally and included multiple-choice and true/false questions regarding the benefits of family planning and HIV integration and knowledge of IUD and hormonal implants. Pre- and post-tests were identical to ensure that test scores could only be impacted by the training. Test scores were determined by the percentage of questions answered correctly.

Participants who answered correctly to at least 80% of the test questions were to fulfill a practicum in a government managed clinic that included at least five implant insertions, five

implant removals, five IUD insertions and two IUD removals. Participants from rural areas who did not receive a passing score for the didactic portion of the training reviewed questions that the participant answered incorrectly with the trainer and re-took the post-test. Post-test scores for rural participants reflect both trainees that received a passing score in their first attempt and those who were required to retake the post-test.

Analysis

After each training, data were entered into Microsoft Access. Data cleaning and analysis were conducted with SAS (version 9.3; SAS Institute, North Carolina, USA). Two analyses were performed to assess the overall impact of the training; the first assessing the didactic portion of the training and the second assessing the practicum portion of the training. A complete case analysis was performed for the didactic portion of the training in which two trainees were excluded due to failure to complete the post-test assessment and 16 were excluded due to missing data. Trainees were excluded in the practicum analysis if they had not passed the didactic portion of the training (n=30) and if they had not completed the practicum but were within two months of completing the didactic portion of the training (n=0). All trainees (n=305) were classified by education status achieved at the time of the training as secondary and "other" which included trainees who have indicated post-secondary and college degrees and those that have been certified in additional professional training but education status was not determined. Occupation was classified as nurse or "other"; consisting of nurse/midwives, clinical officers and senior clinical officers. Nurse/midwives included Enrolled Nurse/Midwives, Enrolled Midwives and Midwives. Nurses included Enrolled Nurses that are the equivalent of registered nurses by U.S. standards.

Descriptive statistics are provided in Table 1 for the didactic analysis and in Table 3 for the practicum analysis which include the participant's gender, age, educational attainment, district in which the training occurred, occupation, previous CVCT training, years of experience, location of the training (urban or rural) and year in which the training occurred. T-tests for continuous variables and Chi square tests of association for categorical variables between demographic factors and receiving a passing post-test score or for completing the practicum portion of the training are shown in Table 1 and Table 3 respectively.

Bivariate analysis determined significant variables ($p<0.05$) to be included in a logistic regression model in which the primary outcome measure was receiving a passing post-test score of 80% or higher for the didactic training. Logistic regression was used to predict receiving a passing post-test score dependent on trainee characteristics mentioned previously. Results of univariate and bivariate logistic regression are presented in Table 2. All model variables were assessed for multicollinearity.

Ethical considerations

This training was approved by the Institutional Review Board (IRB) at Emory University and at the University of Zambia. Additionally, the need for informed consent was waived by the Emory University IRB due the fact that all data collected from the training would be used only for the purpose of quality assurance and reporting to ZEHRP. The Zambian Ministry of Health pre-approved the training and data collection tools and all personal information was kept confidential.

RESULTS

Didactic Training

A description of trainee demographics is shown in Table 1. Of 305 trainees, 18.36% (n=56) are male and 81.64% are female (n=249). The median age for trainees was 41 years with the youngest trainee being 21 years and the eldest being 66 years of age (IQR=18.00). Only 30.16% of the trainees indicated only having completed secondary schooling whilst 69.84% indicated either post-secondary schooling or additional professional training. Copperbelt province (consisting of Ndola, Kitwe, Luanshya and Chingola) accounted for 55.08% (n=168) of the trainees and 44.92% (n=137) were trained in Lusaka (Luska and Monze). The majority of trainings occurred in urban areas (69.18%) compared to rural areas (30.82%).

Forty nine percent of the trainees identified as nurses and 50.82% identified as having other medical training. Approximately 35% of the trainees had previous CVCT training and 38.03% percent of the trainees had more than 10 years of professional experience prior to the training, 36.07% had between 5 and 10 and 25.90% had less than 5 years of experience. The majority of the trainings (53.77%) occurred in 2014 (accounting for 5 trainings that occurred in 2015) compared to trainings that occurred in 2013 (46.23%).

Practicum Training

A description of trainee demographics of those who passed the practicum portion of the training (n=275) is shown in Table 3. The average pretest score among the subset of trainees was 68.10 (SD=11.61) and average post-test score was well above passing at 91.65 (SD=7.11). Trainees had an average of 10.66 years of prior professional experience (SD=8.82) and a median age of 41 years (IQR=18.00). The majority of trainees were female (80.73%), had post-secondary education or additional professional training (70.18%), were trained in Copperbelt

(54.18%) and in urban areas (65.82%). Fifty percent indicated they were nurses and 49.82% indicated they had additional medical training. The majority of trainees (66.91%) had no previous CVCT training and 37.09% indicated having 10 or more years of prior professional experience. Approximately 58% were trained in 2014, which includes 5 trainees who trained in January of 2015, all of whom completed the practicum training entirely.

Impact of the training

Overall, 90.16% (n=275) of trainees received a passing score (of 80% or higher) on the post-test assessment. The average test score among 305 trainees who completed the training increased from 67.54% at baseline to 90.03%. Test scores increased significantly among all demographic groups. Paired T-tests (results not shown) suggest that overall, better performance was seen with men than with women, trainees 30 or younger compared to other age groups, trainees from rural areas rather than urban, participants who trained in Lusaka, trainees with no prior CVCT training, trainees with less than 5 years of experience and participants who were trained in 2014 compared to those trained in 2013. Trainees with post-secondary education or professional certification received higher post-test scores than trainees with only secondary education, however, those with secondary education improved the most from baseline.

Chi square tests of association with a passing test score were significant ($p<0.05$) for the covariates of pretest score, age, training site (urban or rural), previous CVCT training and training year. In a univariate analysis, higher pretest scores (cOR=1.04, 95% CI: 1.01—1.08), age (cOR=0.96, CI=0.93—1.00), not having previous CVCT training (cOR=2.64, 95% CI: 1.23—5.68) and training in 2014 (cOR=6.85, 95% CI: 2.55—18.44) were statistically significant ($p<0.05$) predictors of receiving a passing post-test score. Years of experience (per year increase and categorical), gender, education, training district and occupation were not predictive of

receiving a passing test score. Training site (urban or rural) was excluded from the analysis in which rural trainees were required to re-take the training and pass the test until they were permitted to move on to the practicum. Multivariate logistic regression suggests that a higher pretest score (aOR=1.04, 95% CI: 1.00—1.07) and training in 2014 versus 2013 (aOR=6.27, 95% CI: 2.04—19.28) are predictive of receiving a passing post-test score, controlling for all other covariates. The confidence interval for training year was impacted by the small number of trainees that failed the post-test in 2014, (n=5).

Of trainees who passed the didactic portion of the training (n=275), 59.64% (n=164) completed the practicum portion entirely. Both groups experienced similar average pretest scores but those who did not complete the practicum portion of the training received slightly better average post-test scores (92.51, SD=6.53) compared to those who completed the practicum (91.07, SD=7.45). Additionally, a greater proportion of trainees with slightly more years of experience, who were female, had greater educational attainment, trained in Lusaka, were from urban areas, those with additional professional training, no previous CVCT training, 5 to 10 years of experience and those trained in 2014 completed the practicum portion of the training. Chi square tests of association with completing the practicum were significant ($p<0.05$) for the covariates of education and training district.

Chapter 4: DISCUSSION

From the results of the post-test analyses, a didactic training in LARC methods for providers in Zambia proved to be effective. Although test scores were impacted by pretest scores and training year, test scores increased overall among all demographic groups. The overall average level of knowledge demonstrated by pretest scores was below passing at 67.54% and the average post-test scores were well above passing at 90.03% (results not shown). Additionally,

while those who had no previous CVCT training were more likely to pass the didactic portion than those who had prior CVCT training may be an indicator of professional fatigue ("burn out") for which training material was more effective for trainees who had no prior CVCT experience. A similar effect was seen in the practicum analysis in which a greater proportion having had no prior CVCT training completed the practicum entirely compared to those who had been trained previously in CVCT. In addition, having a higher education and receiving training in Lusaka versus the Copperbelt were significantly associated with passing the practicum. These findings could contribute to targeting future trainings for participants with no prior CVCT training but higher education and addressing any differences occurring between training site and year to ultimately improve upon the overall impact of the training.

These results suggest that it is necessary to assess the impact of trainings in order to realize their potential impact and area for improvement. A standard set of test questions for both pre- and post-tests ensured consistent measurement tools regarding the impact of the training. However, the short time frame in which participants were given pre-and post-tests may have jeopardized internal validity if participants were more familiar with the test questions. Any differences between training year could suggest that the quality of training or impact of training was different based on the year in which the training was received.

A major limitation to the didactic analysis was the inability to differentiate test scores from participants from rural localities who passed the post-test in their first attempt and those who failed on their first attempt and re-took the post-test. Although this covariate was ultimately excluded from the model, differences may exist between trainees from rural areas when compared to urban areas that were not captured in this analysis. For all analyses, a small sample size may have limited external validity as mentioned previously. Additionally, it was assumed

participants who were classified as having been professionally certified were required to complete post-secondary education based on Zambian standards. However there was no way to account for the level of education they had actually received since they were not asked and this may have resulted in more nuanced differences between groups with variable educational attainment.

In an attempt to successfully integrate family planning and CVCT services with an emphasis on LARC methods, an increasing number of trainings will need to take place. This analysis evaluates the effect of the training based on pre- and post- test training scores and the completion of the training practicum. Predictors of post-test scores and practicum completion were also evaluated. The analysis of pre- and post-test training scores, practicum completion and potential predictors will contribute to identifying the effectiveness of LARC training, target potential beneficiaries (such as those with no prior CVCT training but more education) and reveal any gaps for CVCT providers.

CVTC provides an ideal opportunity to engage with couples regarding dual prevention efforts of both HIV and STI's. [15] The integration of family planning services at already existing HIV clinics may mitigate time barriers that Zambian women report as a result of attending several clinics for both HIV and family planning services. [15] Further, the integration of family planning services into HIV prevention services could greatly reduce heterosexual and perinatal transmission of HIV. [29] Ultimately the provision of LARC services could potentially impact uptake in dual services and a decrease in both heterosexual and perinatal HIV transmission.

Conclusions

This analysis found that a didactic training of CFPC and LARC methods (the Copper T IUD and Jadelle implants) for CVCT clinic staff was highly effective in improving knowledge of family planning and LARC methods among trainees. Understanding the factors associated with successful completion of CFPC didactic and practical trainings can help to target potential trainees and to evaluate the success of training programs. This training model could be used by others to facilitate the integration of family planning services and HIV prevention services to address unmet need for family planning and prevention of mother-to-child HIV transmission.

Conflicts of Interest: The authors declare no conflicts of interest.

Authors' Contributions: AMD and KMW substantially contributed to the data analysis and interpretation and KMW revised the manuscript and provided approval for the final version.

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Chapter 6. TABLES

Table 1. Participant demographic characteristics stratified by receiving a passing post-test score

Trainee covariates of interest	Total trainees (N= 305)		Failed post-test (n = 30)		Passed post-test (n = 275)		Test statistic	Two-tailed P value
Pretest score, *mean* (SD)	67.53	(11.62)	62.37	(10.60)	68.10	(11.61)	-2.79[a]	**0.01**
Years of experience, *mean* (SD)	10.87	(8.86)	12.73	(9.16)	10.66	(8.81)	1.18 [a]	0.25
Age (years), *median* (IQR)	41	(18.00)	45.1	(9.66)	40.82	(10.79)	2.27 [a]	**0.03**
Gender, n (%)							1.55[b]	0.32
Male	56	18.36%	3	10.00%	53	19.27%		
Female	249	81.64%	27	90.00%	222	80.73%		
Education, *n (%)*							0.16[b]	0.69
Secondary	92	30.16%	10	3.33%	82	29.82%		
Other	213	69.84%	20	66.67%	193	70.18%		
Training District, *n (%)*							0.92 [b]	0.34
Lusaka	137	44.92%	11	36.67%	126	45.82%		
Copperbelt	168	55.08%	19	63.33%	149	54.18%		
Training Site, *n (%)*							14.82 [b]	**<.0001**
Urban	211	69.18%	30	100.00%	181	65.82%		
Rural	94	30.82%	0	0.00%	94	34.18%		
Occupation, *n (%)*							1.22 [b]	0.29
Nurse	150	49.18%	12	40.00%	138	50.18%		
Other	155	50.82%	18	60.00%	137	49.82%		
Previous CVCT training, *n (%)*							6.57 [b]	**0.01**
Yes	108	35.41%	17	56.67%	91	33.09%		
No	197	64.59%	13	43.33%	184	66.91%		
Years of experience, *n (%)*							2.82 [b]	0.24
Less than 5	79	25.90%	4	13.33%	75	27.27%		
5 to 10	98	36.07%	12	40.00%	98	35.63%		
More than 10	102	38.03%	14	46.67%	102	37.09%		
Training Year, *n (%)*							18.43 [b]	**<.0001**
2013	141	46.23%	25	83.33%	116	42.18%		
2014*	164	53.77%	5	16.67%	159	57.82%		

IQR: inter quartile range; SD: standard deviation

*Includes n=5 from 2015

[a] Two sample T test for equal means

[b] Fisher's exact test

Table 2. Univariate and multivariate logistic regression analysis of predictors of receiving a passing post-test score (80% questions answered correctly)

Parameter	cOR	(95% CI)		Two-tailed P value	aOR	(95% CI)		Two-tailed P value
Pretest score (per point increase)	1.04	1.01	1.08	**0.01**	1.04	1.00	1.07	**0.04**
Years of experience (per year increase)	0.98	0.94	1.02	0.23				
Age (per year increase)	0.96	0.93	1.00	**0.04**	1.01	0.96	1.06	0.69
Gender								
Male	*Ref*				*Ref*			
Female	0.47	0.14	1.60	0.12	1.16	0.28	4.5	0.88
Education								
Secondary	*Ref*							
Other	1.17	0.53	2.62	0.69				
Training District								
Copperbelt	*Ref*							
Lusaka	1.46	0.67	3.18	0.34				
Occupation								
Nurse	*Ref*							
Other	1.50	0.31	1.43	0.29				
Previous CVCT training								
Yes	*Ref*				*Ref*			
No	2.64	1.23	5.68	**0.01**	1.77	0.77	4.07	0.18
Years of experience								
Less than 5	*Ref*							
5 to 10	0.43	0.14	1.40	0.16				
More than 10	0.39	0.12	1.23	0.11				
Training Year								
2013	*Ref*				*Ref*			
2014*	6.85	2.55	18.44	**<0.01**	6.27	2.04	19.28	**<0.01**

*Includes n=5 from 2015

cOR: Crude Odds Ratio; aOR: Adjusted Odds Ratio; CI: Confidence Interval;

Table 3. Participant demographic characteristics stratified by completing all practicums (insertions/removals)

Trainee covariates of interest	Total trainees (N= 275)		Did not complete practicums (N=111)		Completed practicums (N =164)		Test Statistic	Two-tailed P value
Pretest score, *mean* (SD)	68.10	(11.61)	68.01	(11.68)	68.16	(11.59)	-0.10 [a]	0.92
Post-test score, *mean* (SD)	91.65	(7.11)	92.51	(6.53)	91.07	(7.45)	1.70 [a]	0.09
Years of experience, *mean* (SD)	10.66	(8.82)	11.58	(9.58)	10.04	(8.23)	1.38 [a]	0.17
Age, years, median (IQR)	41.00	(18.00)	40	(18.00)	41	(17.00)	-0.26 [a]	0.80
Gender, n (%)							0.25 [b]	0.62
Male	53	19.27%	23	20.72%	30	18.29%		
Female	222	80.73%	88	79.28%	134	81.71%		
Education, *n (%)*							8.89 [b]	**<0.01**
Secondary	82	29.82%	22	19.82%	60	36.59%		
Other	193	70.18%	89	80.19%	104	63.41%		
Training District, *n (%)*							61.76 [b]	**<0.01**
Lusaka	126	45.82%	19	17.12%	107	65.24%		
Copperbelt	149	54.18%	92	82.88%	57	34.76%		
Training Site							1.64 [b]	0.20
Urban	181	65.82%	78	70.27%	103	62.80%		
Rural	94	34.18%	33	29.73%	61	37.20%		
Occupation, *n (%)*							1.12 [b]	0.29
Nurse	138	50.18%	60	54.05%	78	47.56%		
Other	137	49.82%	51	45.95%	86	52.44%		
Previous CVCT training, *n (%)*							0.95 [b]	0.33
Yes	91	33.09%	33	29.73%	58	35.37%		
No	184	66.91%	78	70.27%	106	64.63%		
Years of experience *n (%)*							2.07 [b]	0.36
Less than 5	75	27.27%	32	28.83%	43	26.23%		
5 to 10	98	35.64%	34	30.63%	64	39.02%		
More than 10	102	37.09%	45	40.54%	57	34.76%		
Training Year, *n (%)*							1.44 [b]	0.23
2013	116	42.18%	42	37.84%	74	45.12%		
2014*	159	57.82%	69	62.16%	90	54.88%		

IQR: inter quartile range; SD: standard deviation

*Includes n=5 from 2015

[a] Two sample T test for equal means

[b] Fisher's exact test

Chapter 7: RECOMMENDATIONS

The results of this analysis provide support for the effectiveness of a standardized training for CVCT providers in Zambia. Integrating family planning and LARC messages into didactic trainings for providers could significantly contribute to increasing correct knowledge of family planning methods to be incorporated into HIV prevention messages. If providers are more knowledgeable and comfortable with family planning methods, they may be more willing to offer these services to their patients.

The training was evaluated in the Zambian context and due to the similar nature of the HIV epidemic in Rwanda, it is possible similar affects of this training would be seen. However, this limits the ability to transfer the success of this training to other countries in sub-Saharan Africa. This analysis does highlight the importance of assessing trainings for CVCT providers and similar models could be used to evaluate an increase in integrated trainings across the region. Analyzing qualitative data such as providers' perceptions regarding the integration of family planning and HIV services and the promotion of LARC methods could provide further evidence to assess pre- and post-training differences in knowledge and perceptions of LARC methods. Disaggregating data by those who took the post-test repeatedly and comparing their scores over time may provide a better assessment of the didactic portion of the training. Additionally, collecting more specific demographic data such as specific level of education achieved at time of training may contribute to a richer dataset to ultimately achieve greater internal validity.

The evaluation of a didactic training for CVCT providers in Zambia contributes to the assessment of integrated training models in sub-Saharan African countries. This analysis provided both evidence of the effectiveness of standardized didactic trainings with an emphasis on family planning counseling and LARC methods and revealed possible confounders such pretest scores and training year which need to be accounted for in conducting these trainings. With the success of CVCT, the additional integration of family planning services can provide essential information and knowledge for couples in order to address the unmet need for contraception among HIV serodiscordant and discordant couples. If CVCT providers are more knowledgeable about LARC methods, they will feel more comfortable to provide correct knowledge to women, providing more effective contraceptive options in order to simultaneously prevent unwanted pregnancy and prevent mother-to-child-transmission of HIV.