

**Social Support, Intimate Partner Violence and Quality of Life among
Women Living with HIV in Ruili, China**

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THESIS

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LIST OF ABBREVIATIONS

AIDS	Acquired immunodeficiency syndrome
ARV	Antiretroviral therapy
CDC	Centers for Disease Control and Prevention
RCDC	Ruili Center for Disease Control
CMOH	Ministry of Health of the People's Republic of China
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
HRQL	Health-related quality of life
IPV	Intimate partner violence
IQR	Interquartile range
MCHC	Maternal child and health care clinics
MFP	Multi-function (support) provider
NGO	Nongovernment organization
PLWHA	People living with HIV/AIDS
PSS	Perceived social support
QoL	Quality of life
SFP	Single-function (support) provider
UNAIDS	The joint United Nations programme on HIV/AIDS
USAID	The United States agency for international development
WLHA	Women living with HIV/AIDS

SUMMARY

Women are increasingly burdened with human immunodeficiency virus (HIV) globally at a time when the availability of antiretroviral therapy (ARV) has turned HIV and acquired immunodeficiency syndrome (AIDS) into a chronic condition. Despite a growing literature examining the life of women living with HIV/AIDS (WLHA) in Africa and the western world, much less is known about the experiences of WLHA in Asia. With quality of life (QoL) becoming one of the primary goals of long-term HIV management, data is urgently needed to understand the challenges facing WLHA in settings that differ from the existing body of research. Social support and intimate partner violence (IPV) also have emerged in the scientific literature as core factors influencing the well-being of WLHA, yet they largely remain unexplored within the context of a low resource environment.

Migrant women are of special concern because they are at high risk for HIV. Despite the plethora of evidence that cross-border migration elevates the risk of adverse health outcomes among women, little is known about how migration intersects with social support, IPV, and QoL of WLHA. Social support is known to be challenged during acculturation for migrants, poses critical impact on IPV and also has proved instrumental to a better quality of life. How these intersecting outcomes play out among WLHA under the influence of cross-border migration is the question driving this study. This study set out to address the prominent gap in knowledge among a population of WLHA with male partners in Ruili, China, a location where one of the nation's HIV epicenter meets a population flow that crosses the border from Myanmar into China.

The specific study aims are: (1) to assess perceived social support among the WLHA and to see if migration status differentiates the sizes of perceived support, (2) to investigate if and

SUMMARY (continued)

how migration, social support, and a set of partnership variables predict IPV risk among these women, and (3) to evaluate the quality of life among WLHA and how it is associated with migration, social support and IPV.

I. BACKGROUND

A. Women living with HIV

The availability of highly active antiretroviral therapy (HAART) has substantially decreased mortality for people living with HIV/AIDS (PLWHA) globally and turned HIV infection into a chronic condition (Murray et al., 2014). Consequently, improving long term health outcomes including quality of life has become prioritized in the care of PLWHA (Y. Zhao, Han, Ma, & Li, 2019).

While women are being increasingly affected by HIV worldwide, consistent evidence suggests that women living with HIV experience poorer outcomes and quality of life when compared to their male counterparts (Cederfjäll, Langius-Eklöf, Lidman, & Wredling, 2001; Degroote, Vogelaers, & Vandijck, 2014; Ickovics Jr & et al., 2001; Mrus, Williams, Tsevat, Cohn, & Wu, 2005; Wisniewski et al., 2005). Also once a woman is diagnosed with HIV infection, her perception of the social support available to her and also her relationship with an intimate partner, including partner-satisfaction, can either help or hinder her efforts to cope with the exigencies of HIV treatment and the challenges of living with the infection (Degroote et al., 2014; Preau et al., 2007; Sarna, van Servellen, Padilla, & Brecht, 1999). Both perception of social support and partner relationships are thought to differ by native-borne versus migrant status. Moreover, in terms of sexual partnering, evidence also suggests that the threat or occurrence of intimate partner violence (IPV) among HIV-positive women can affect her quality of life living with HIV.

This dissertation examines perceived social support, intimate partner relationships, including possible domestic violence, partner satisfaction, and quality of life among HIV-

positive women living in Ruili, China. The study focuses on women living in Ruili because of the city's early importance to the AIDS epidemic in China and also for its location along the Myanmar border that allows a rich cultural sampling of China-borne versus Myanmar migrant women living with HIV.

B. Social support, migration and living with HIV

Social support has been studied extensively as either a buffer against life stress or a direct contributor to mental health, including among people living with HIV (S. Cohen & Wills, 1985; Hostinar & Gunnar, 2015; Hupcey, 1998). Mixed findings suggest that the effectiveness of social support for improving health outcomes can vary largely by a myriad of factors, including recipient characteristics, socio-cultural context, type of support functions and stressors, and the source of support (Y. Zhao et al., 2019). Considerable research has tested social-support centered strategies for their potential benefits in enhancing case management, medication adherence, psychosocial wellbeing, responsible health behaviors, and overall quality of life (A.C. Gielen, McDonnell, Wu, O'Campo, & Faden, 2001; Khamarko & Myers, 2013; Y. Li et al., 2014). Existing evidence points to the need to differentiate the various structures and functions of support based on subgroup factors such as gender, partner and family situations, socioeconomic and cultural environments, and migration (W. T. Chen et al., 2011; House, Umberson, & Landis, 1988; Shumaker & Hill, 1991).

It is well documented that cross-border migrant populations are at increased risk for negative life stressors largely due to difficulties in developing social capital in the recipient country (Kuo, 2014; Ryan, Sales, Tilki, & Siara, 2008). Creating sources of social capital includes rebuilding social networks in the form of interpersonal relationships with people to call upon if needed to provide various types of functional social support at the destination location.

Nonetheless, in contrast to the abundance of separate research on social support in relation to either HIV/AIDS or to migration, little is known about the characteristics of social support networks available to PLWHA immigrants in a country outside their birth. A gap in current knowledge about the intersections of HIV and migration especially exists related to migrant women living with HIV, and even less is known about how migration and other related factors may shape such women's social support networks.

C. Women living with HIV and intimate partner violence

Intimate partner violence (IPV) has been defined as violence directed against a woman by a current or ex-husband or boyfriend (R. Jewkes, 2002). The term can refer to multiple forms of violence within an intimate relationship: physical aggression, sexual violence, and psychological abuse. Numerous studies have shown that IPV against women is prevalent globally, with lifetime reported rates ranging from 10% - 70%. Its occurrence may be especially endemic in under-developed world regions (Bachman & Saltzman, 1994; K. L. Hoffman, Demo, & Edwards, 1994; R. Jewkes, 2002; Krantz & Garcia-Moreno, 2005; Tjaden & Thoennes, 2000; Watts & Zimmerman, 2002).

Of an array of contributing factors, decades of research have identified IPV as one of the most influential predictors of adverse physical and mental health outcomes for women. Well known psychopathology among women as the consequence of IPV includes depression, anxiety, posttraumatic stress disorder, substance dependency, and suicidality (J. C. Campbell, 2002; Golding, 1999; Goodman, Koss, & Felipe Russo, 1993). Intimate partner violence is also implicated in the vulnerability of women to HIV acquisition, because women in a violent relationship often have little to no power in negotiating safe sex or adopting self-protection measures (J. C. Campbell et al., 2008; Rachel Jewkes, Dunkle, Nduna, & Shai, 2010). For

women who already have acquired the virus, IPV can act as a major barrier to testing, positive serostatus disclosure, care seeking, medication adherence, and retention in treatment. The acquisition of HIV renders women more vulnerable to relational abuse from male partners, as often becomes a huge concern over partner notification practices as well as disclosure (Rothenberg & Paskey, 1995). Fear of and victimization due to IPV can lead to delayed diagnosis/treatment, maladaptive behaviors, impaired quality of life, and poor adherence among women at risk for HIV or who have acquired the virus (A. Gielen et al., 2000; A.C. Gielen et al., 2001; Lopez, Jones, Villar-Loubet, Arheart, & Weiss, 2010).

Relatively little is known about the full range of IPV experienced by HIV seropositive women. Current findings largely are limited to HIV-positive women's IPV experience with status disclosure to a partner, and the results are inconsistent as to whether or not confiding being HIV-positive increases a woman's vulnerability to IPV (Burgos-Soto et al., 2014; M. Cohen et al., 2000; Andrea C Gielen, McDonnell, Burke, & O'campo, 2000; Andrea C. Gielen, McDonnell, & O'Campo, 2002; Koenig & Moore, 2000; Medley, Garcia-Moreno, McGill, & Maman, 2004). The small body of available studies that have assessed the health impact of IPV among seropositive women directly links its occurrence with poor coping, elevated psychopathology, reduced adherence to Antiretroviral therapy (ARV), hampered engagement in care, and impaired quality of life (A. C. Gielen, McDonnell, O'Campo, & Burke, 2005; Lopez et al., 2010; McDonnell, Gielen, Wu, O'Campo, & Faden, 2000; Schafer et al., 2012; Siemieniuk et al., 2013; Trimble, Nava, & McFarlane, 2013). Additionally, experiences of IPV among seropositive women were also predictive of unsafe sex with an HIV-uninfected or unknown-status partner (Peltzer, 2014).

D. Satisfaction with intimate relationship and quality of life

Research among the general population indicates that satisfaction with a spousal relationship is a critical component of an overall sense of life satisfaction that can directly impact health (Janice K Kiecolt-Glaser & Newton, 2001; Janice K. Kiecolt-Glaser & Wilson, 2017)) and, in turn, quality of life (Flanagan, 1978; Y. Lin, Luo, Li, Xu, & Li, 2020; Michalos, 2013). Conversely studies of married couples consistently have found that marital dissatisfaction frequently works as a stressor in worsening mental health and eroding quality of life, especially for wives (Berry & Williams, 1987; Carr, Cornman, & Freedman, 2016) . Nonetheless, the role of spousal relationship satisfaction in quality of life for patients with chronic diseases remains understudied and rarely has been examined for women within the context of living with HIV.

Despite spousal relationship research flourishing in western societies while also emerging in some African countries, research examining quality of life for women living with HIV in the context of an intimate partnership appears nascent to Asia. To address this omission, we sought to answer the question: Is relationship satisfaction with a current male intimate partner associated with quality of life among HIV-positive women living in Ruili, China?

In posing our query, we recognize that perceptions of health-related quality of life (HRQL) constitute an essential domain of the overall assessment of quality of life for HIV-positive women (McDonnell et al., 2000). Consequently, we conceptualize HIV-positive women's HRQL, as measured by their personal assessment of their mental and physical health, to be a core subcomponent of their self-rated overall quality of life that encompasses additional facets beyond health such as culture and environment (Ferrans, Zerwic, Wilbur, & Larson, 2005) . Our analyses also take into account that Ruili women are not homogeneous and that their

experiences living with HIV can differ by personal characteristics including local ethnicity and cultural background.

E. HIV and women in Ruili, China

With about 150,000 newly diagnosed cases in 2018, China's population living with HIV/AIDS has grown to nearly 850,000 today (Y. Zhao et al., 2019). Nearly one-fourth of the identified cases were found in Yunnan Province, a landlocked area in southwest China bordering Myanmar, Vietnam and Laos. With a borderline of over 4000 kilometers in length, Yunnan is home to more than 20 ethnic groups including mostly women immigrants from Myanmar. The HIV epidemic in Yunnan is largely representative of the national trends in that injection drug use fueled its early spread of the virus while recent decades have seen a shifted trend towards sexual transmission and a rapid increase in the number of women affected (Jia et al., 2010; Xiao, Kristensen, Sun, Lu, & Vermund, 2007).

Ruili holds a special place in the history of China's HIV epidemic as the location where the country's first outbreak of AIDS was discovered in 1989 among 146 people with a history of injecting drugs (E. Yu, Q. Xie, K. Zhang, P. Lu, & L. Chan, 1996). With a population over 160,000 today, Ruili rests on the west border of Yunnan with three sides adjoining the country of Myanmar that is the world's second largest producer of illicit opium. In the early era of HIV in China, needle sharing fueled the transmission along the routes of drug trafficking for which Ruili has historically been an active hub (Beyrer et al., 2000).

An epidemiologic survey in 2010 found a HIV prevalence of 1.2% among Ruili residents in border villages (Zheng, Li, Shu, Liu, & Duo, 2009). Most were living in the rural area that surrounds the city. By the end of 2012 when the study was conducted, over 3000 people had been identified in Ruili as having contracted HIV including more than 1700 women (Xie X.,

RCDC, personal communication, 2013). Epidemiological statistics indicate that over time, women in Ruili were increasingly affected by HIV just as also was true for China nationally. While the first outbreak of AIDS in 1989 was among men who inject drugs, by 2003 female sero-positivity already accounted for 35% of total cases. In the aforementioned 2010 survey, more cases were detected among women than men. Meanwhile, the overall male-to-female ratio declined from 40 at the start of the epidemic to 1.7 by the end of 2012, meaning over one-third of newly reported cases in Yunnan were among women (H. Li, 2012).

F. Population movement and HIV in Ruili, China

Ruili has historically been a hub for border trading and drug trafficking due to its unique geographical location. Adjacent to Myanmar on three sides, the borderline surrounding Ruili is mountainous, thickly forested, and highly permeable. Population flow driven by economic opportunities has long been in place. People move frequently across the border or from other parts of China to this region in seeking work, trade, or a new life. Great mobility of the population has played a central role in shaping the HIV epidemic into its complex landscape as seen today (Du Guerny, Hsu, & Hong, 2003).

People who travel across the border into Ruili are of great public health concern to China because of the high prevalence of HIV in the Great Mekong area (McMichael & Healy, 2017; USAID, 2006). With the fast economic development in China during the past decades, there has been an influx of Burmese migrants, largely “pushed” by the political struggle and the economic hardship in Myanmar and “pulled” by the prosperity and stability of China. Of these cross-border migrants, women who enter for trade, sex work and marriage account for a substantial proportion (Chantavanich, Beesey, & Paul, 2002; Jirattikorn et al., 2020). This mobile population goes largely undocumented since the borderline is minimally guarded and easily crossed.

Ethnographic studies have recorded the phenomena in which illegally entered Burmese women who were deported in the morning during police crackdowns sneak back into China on the same evening (Mo, 2010; S. Zhao, 2011).

Today's public policies promoting HIV prevention and intervention in China have rescinded many earlier restrictions on service to migrants. Health policies facilitate free access to HIV testing, counseling and care for those in needs regardless of region or city of origin (Peng & Ling, 2019). Among the early adopters of the changing policies, the Ruili Center for Disease Control (RCDC) implemented simplified processes to extend testing and monitoring of disease progress and administration of free ARVs that allowed any residents of Ruili, permanent or temporary, to be eligible for free HIV related services when needed. Owing to the resourcefulness in funding and capacity, Ruili quickly achieved a high coverage of HIV testing as well as antiretroviral treatment rarely seen in the other parts of China when this study was conducted.

Women who migrated from Myanmar into Ruili form a special group of HIV relevancy. These women are believed to be especially vulnerable to HIV due to high prevalence rates in both the sending and the receiving communities (Chantavanich et al., 2002; McMichael & Healy, 2017). Some of these migrant women go into the local commercial sex industry voluntarily or through human trafficking. Some marry Chinese men in hope for an improved life. Both migration pathways predispose these women to increased risk of acquiring HIV. A 2009 survey numerating more than 2000 households having foreign members in Ruili found that Burmese women were overwhelmingly represented among the non-China borne, and a HIV prevalence of 3.5% was detected among these women (Z. Li et al., 2009). Compared to those who migrated through marriage, women who entered for sex work were more mobile and their status far less

known due to high turnover rates in the commercial sex industry. Studies at a few other border regions of China found up to 10 times higher prevalence of HIV infection among cross-border female sex workers compared to their Chinese sex-working peers (Feng, 2011; Zhou et al., 2013).

Myanmar women who migrate to Ruili are not socio-culturally homogenous. There are more than 135 ethnic groups in Myanmar (Holliday, 2010) that the Burmese government categories into what it terms as 8 “major national ethnic races.” The Bamar, the majority group in Myanmar, are believed to make up the main Myanmar immigrants in China. Bamar people experience harsh living conditions and reside the lowest social tier in Myanmar, resulting in many Bamar women seeking a better life in China. Bamar women also constitute the main victims of cross-border human trafficking (Chantavanich et al., 2002). Meanwhile the Shan in Myanmar belong to the same ethnic group known as “Dai” on the Chinese side, and both speak the same language. Studies in China have identified a large number of “imported Dai wives” who typically marry Chinese Dai men and blend easily into the receiving communities (Mo, 2010). Nonetheless, some evidence suggests that more Shan women migrate to Thailand than China (Grundy-Warr, 2004). Other ethnic groups in Myanmar who share origin and cultural identity in China with Chinese ethnic minorities include the Kachin (known as the Jingpo in China) and the Wa people (Wa in China).

Migrant women’s marriages in China largely are undocumented, meaning not registered in the Chinese civil affairs system. The reasons include existing Chinese cultural sanctions that override government regulations in recognizing cross-border marriages and pragmatic difficulties in obtaining the required documents in the turbulent hometowns for many Burmese women (Fu et al., 2011). Nonetheless, local policies promoting HIV testing and care among

mobile population have helped the couples of cross-border de facto marriages to easily register at local CDC locations and gain access to the array of free HIV related services. Also, the emergence of the AIDS epidemic has resulted in law enforcement in Ruili increasingly collaborating with the public health sector and also becoming more tolerant towards the illegal presence of cross-border women with children borne locally (Li Z., RCDC, personal communication, 2013).

II. SIGNIFICANCE AND OBJECTIVES

The few qualitative studies conducted by Chinese scholars that HIV-positive women's lives in China suggest that they are subject to reduced social support, increased rates of domestic violence, insecurity towards the future, and impaired quality of life. The women studied tend to be mostly of very low literacy, from extreme poverty, and socially disadvantaged in many ways (Mo, 2010; J. Zhang & Bao, 2013; Zheng et al., 2009). However, none of these studies have ever tried to quantitatively evaluate these women's vulnerability towards poor health, intimate partner violence, and reduced quality of life outcomes. Similarly, the difference between China-born and Myanmar migrant HIV-positive women's social support within the context of their partner relationships appears never to have been examined.

A gender perspective and focus are largely absent from existing research on PLWH in China (K. Lin, McElmurry, & Christiansen, 2007). Numerous studies of women living with HIV in Western societies and Africa report increased mortality and comorbidity, impaired quality of life, adverse pregnancy outcomes, suboptimal treatment adherence and outcomes, and prevalent relational violence and mental disorders (Davidson et al., 1998; Ickovics Jr & et al., 2001; Lopez et al., 2010; Maman, Campbell, Sweat, & Gielen, 2000; Turner, Laine, Cosler, & Hauck, 2003). The possible occurrence of these same problems among Chinese women have been investigated by a much smaller collection of studies (W. T. Chen et al., 2011; X. Li, Hong, & Poston, 2011; Zunyou Wu & Wang, 2010; Yu, Li, Chen, et al., 2012), and examination of their scope and depth within China's many unique cultural contexts such as cross-border and migrant populations is largely lacking.

About 40% of PLWHA in Ruili are women of whom over 50% are Myanmar migrants. As both an epicenter of HIV and a hotspot of population movement, Ruili provides a unique

opportunity for understanding the intersection of HIV and migration on the life and health of women living with HIV (Du Guerny et al., 2003). Ruili residents are spread across five ethnic groups in addition to Han (the majority ethnic group in China), resulting in a highly diversified local cultures (X. Zhang, 2009). Shared ethnicity and culture across a national border are also a phenomenon common to Ruili as a border town. Myanmar citizens often cross the country border into China and blend in easily with the local residents without going through any official procedures. These cross-border travelers not only share a similar language and cultural background with the hosting community, but often share similar disease burdens including HIV. In contrast to the magnitude of cross-border population movement across China's many miles of shared borders with 14 other countries, little research has been done to understand what quality of life is like for migrant women who travel across these pathways to become permanent China residents. Not to mention that when HIV enters the picture, even less is known about their health risks including IPV, perceived access to social support, and quality of life for both migrant and local-borne women who contract the virus.

Due to the feminization of the HIV epidemic in China, cross-border women including those crossing the China-Myanmar border into Ruili have become the focus of local HIV intervention efforts (Guo & Li, 2012). The nation's policy makers, health workers and stake holders are in grave need of information on this unique subgroup in designing effective prevention and intervention policies and programming (Xiang et al., 2011). A study quantitatively examining social support, partner satisfaction including IPV, and quality of life for HIV-positive women in Ruili will provide critical evidence through which gender-sensitive interventions can be tailored to address this population's needs more efficaciously, and resources can be allocated to achieve optimal efficiency. At the same time, a quantitative study of women living with HIV in a border-

town setting will be the first of its kind in China, a focus promising to fill an important gap of knowledge in the field. This study is innovative in terms of being possibly the first to investigate and compare the status of social support, IPV, partner satisfaction, and quality of life among cross-border migrant versus non-migrant HIV-positive women living in China, the largest country in Asia.

III. RESEARCH METHODS

A. Study setting and population

Human immunodeficiency virus seropositive women living in Ruili, China with a male intimate partner for at least 6 months are the population of research interest for this study. As discussed earlier, women make up the major portion of HIV-positive cases in the city and its incorporated rural environment. Many of these women have immigrated to Ruili for marriage or other opportunities. Although their numbers are unknown, some of these women likely immigrated to Ruili after having contracted the virus in Myanmar while others likely became HIV-positive while living in China.

Local maternal and child health centers offer initial HIV testing for both women and men throughout China. In Ruili, maternal child and health care clinics (MCHC) administer the local antenatal screening program and conduct pre-marital health screening. Human immunodeficiency virus testing and counseling are available at MCHCs through trained physicians and nurses.

In China, all HIV sero-confirmatory tests following an initial sero-positive test are conducted and registered at a local CDC. Contact information for every known HIV seropositive person is entered into both the local and national CDC databases, and those tested positive are linked to care at a local clinic serving HIV-positive patients. After initiating ARV, the patient needs to visit the health care clinic once every three months for medication and regular check-ups. Although the convenience of opting to obtain medication at village clinics is available, most patients elect to come to a city hospital to avoid the risk of inadvertent disclosure to those whom they know but are unaware of their status. All follow-up, treatment, and lab testing is free under central and local government funding.

A few local NGOs have worked with people living with HIV in Ruili for many years, and these groups have established effective working relationships with the local CDC. The Home of Red Ribbon, chartered in 2005 as a national organization, specializes in peer-delivered HIV education and treatment counseling throughout China including in Ruili. The Ruili Women and Children Development Center was launched in 2000, and it has a well-established positive reputation in the Ruili's sub-communities through numerous local initiatives for the welfare and empowerment of HIV positive women and children. These two organizations were the predominant local partners in the study to help circulate recruitment information and reach potential subjects. The study collaboration was coordinated by the local CDC since both organizations report to and receive partial government funding from it.

B. Sample size calculation

As intimate partner violence (IPV) is a core component of the study's focus on partner relationships, it formed the variable used to calculate the study's needed sample size. The resulting sample-size estimation was based on data from a study investigating IPV among immigrant South Asian women in the U.S. (Raj & Silverman, 2003). The study found an odds ratio of current physical IPV as high as 3.5 for immigrant women versus U.S. born women of South Asian descent. G*Power (the Department of Psychology, Heinrich Heine University, Düsseldorf, Germany) was used to implement the power analysis. As calculated by G*Power, with the conservative scenario of building a logistic model on the dichotomous IPV outcome and the binomial "from Ruili or Myanmar" predictor, with background prevalence set at 25% as an approximate average as seen reported for general women in China (Parish, Wang, Laumann, Pan, & Luo, 2004; Xiao Xu et al., 2005), when presuming that the coefficient of determination (r^2) by other independent variables altogether is 0.3 in multivariate logistic regression, the

estimated sample size to assure 85% power at $\alpha=0.05$ to detect a conservative odds ratio of 2.5 was calculated. About 225 participants would be needed according to the set up (Figure 1). To give more room for multiple outcomes, 250 participants were targeted as the recruitment goal.

Figure 1. Output screenshot from G*Power sample size calculation

z tests – Logistic regression

Options: Large sample z-Test, Demidenko (2007) with var corr

Analysis: A priori: Compute required sample size

Input: Tail(s) =	One
Odds ratio	= 2.5
Pr(Y=1|X=1) H0	= 0.25
α err prob	= 0.05
Power (1- β err prob)	= 0.85
R ² other X	= 0.3
X distribution	= Binomial
X parm π	= 0.5
Output: Critical z	= 1.6448536
Total sample size	= 225
Actual power	= 0.8510149

C. Sample and sampling procedures

A convenience sample of 223 HIV seropositive women were recruited through the RCDC, four district clinics in Ruili and the two local NGOs. Overall, 223 women provided consent to participate and were determined eligible for the study. Of these participants, 219 were able to provide complete data on the social support, IPV and quality of life measurements. The remaining 4 subjects were either unable to answer all the main outcome questions or stopped the

interview prematurely. The analysis of data was based on the 219 subjects for whom outcome data were complete.

To be eligible to participate, a participant had to be female, between the age of 18 to 59 years, born in Ruili or Myanmar (as self-reported), having cohabitated with a husband or boyfriend (intimate male partner) during the past 12 months, able to give informed consent, and having been confirmed seropositive for HIV for more than six months. The six-month window since infection was selected in recognition that the mental distress of learning an HIV diagnosis can be overwhelming. Being interviewed for a lengthy time over personal life during this difficult period could exert additional and unnecessary stress on the women.

Potential participants were told about the study at physicians' offices, NGO activity sites, or regular home visits or phone calls made by CDC staff, community physicians, or peer educators. Those women who showed interest in participation were instructed to contact a research team member to hear more about the study and what participation would entail. Following screening to confirm eligibility, informed consent was obtained. The data were collected in private through face-to-face interviews conducted by trained interviewers. The interviews were anonymous. No identifiable information was collected at any part of the study and code numbers were used instead of names on all data collection instruments and analyses. Participants received cash compensation equivalent to \$9 USD for their time and transportation costs in participating. The monetary compensation is consistent with other research studies conducted in the area. The study was approved for the protection of research subjects by the University of Illinois at Chicago's Institutional Review Board and Kunming Medical University's Medical Ethics Committee.

Categorization of a woman's country of origin relied on self-identification. Even though they had become naturalized Chinese citizens, women who identified themselves as originally being from Myanmar were enrolled as a Myanmar migrant. Women migrants to Ruili from other parts of China were excluded from the study as they made up less than 5% of women living with HIV in Ruili and also their socio-cultural backgrounds tend to differ from Myanmar and local-born Ruili women. Women with the following characteristics also were considered ineligible: 1) not having co-resided with a male partner during the past 12 months (even if she was legally married but living apart); and 2) too ill or frail to be interviewed as judged by the interviewer and/or the supervising physician.

D. Measurements and variables

1. Socio-demographic characteristics

Participants were asked about their age, ethnicity, education, marital status, family size, number of young children (< 18 years), employment status, individual and family annual income, and household economic status.

Measuring household economic status was a challenge, for a large proportion of these women were rural residents. Self-reported monetary incomes common among urban dwellers can be largely irrelevant as valid indicators of wealth or poverty in rural settings. As a consequence, an Asset Index grid adopted from Demographic Health Survey was developed to optimize the measurement of household wealth without expenditure data (Filmer & Pritchett, 2001). Its successful applications in developing countries and impoverished regions have been widely documented (Filmer & Pritchett, 1999; Njau et al., 2006), and thus was adopted for this study. The instrument asks simple yes/no questions about a variety of household properties and

facilities through which a wealth index score using principal component technique is constructed (Appendix I).

2. Migrant experiences

Each woman was asked about her country of origin (Ruili or Myanmar). Migrant women were asked for a ballpark estimate of their number of months or years living in Ruili excluding any significant duration of time absent from Ruili since the first arrival in the case of circular migration. Reason for migration was collected using an open-end question permitting respondents to briefly narrate the reason for their migration. Frequency of home visits among migrant women was recorded as the self-reported number of visits they made in the past year to Myanmar to see family and/or friends.

3. Perceived social support and social network

Questions were developed based on Manuel Barrera's Arizona Social Support Interview Schedule (Appendix I) to capture the perceived availability of social support and support network composition (M. J. Barrera, 1981). As a classic tool, Barrera's instrument has been widely adopted and validated cross-settings and cross-culture (Bernazzani, Saucier, David, & Borgeat, 1997; des Rivières-Pigeon, Séguin, Goulet, & Descarries, 2001; Kaufman et al., 2004). From the originally proposed four indices of support dimensions, only "available network size" was adopted to measure the social support, since perception of support is believed to be the most critical dimension of social support for women in sustaining positive affection, feeling valued and loved, and being protected from stress-induced maladaptive outcome (Levendosky et al., 2004; McDowell & Serovich, 2007).

The original scale asks about seven types of social exchange. For the focus of this study, only three types of support functions were measured pertaining to women living with HIV: intimate interaction, social participation, and tangible support.

The first question in each category of support asks for nomination of people whom the respondent perceives available for that specific type of support, thus generating the perceived support network. Based on the nomination, actual support obtained in the past month is checked for every person nominated, thus generating a network of actual support nested within the perceived network. All the nominations in response to the three support types were combined to form a total support network.

Participants were asked for further information on every network tie nominated, including the gender, relationship to the ego, ethnicity, origin, current place of residency, ever experiencing IPV if the tie was a woman or ever perpetrating IPV if the tie was a man (except that the tie was the partner discussed previously in the survey). A grid of social network members, types of support provided, and tie attributes was compiled (Figure 2) based on the information collected. Network composition regarding attribute *i* can be calculated as a proportion:

$$p_i = \frac{\text{\# of network members sharing attribute } i}{\text{total \# of network members}}$$

The network in the fraction can refer to any specific network of interest, be it the perceived support network, the network of one type of support, or the total network. The first few columns in the grid will define the range of a specific network. The proportion of certain relation ties can be calculated similarly by replacing the “attribute *i*” with any relation categories.

Figure 2. Social network grid example

Name /Alias	Perceived Support			Relation	Gender	Ethnicity	Origin	Current residency	History of violence
	1	2	3						
A	x		x	Friend	F	Dai	Ruili	Ruili	No
B			x	Spouse	M	Han	China	Ruili	N/A
...

4. Relationship and partner characteristics

A screening question prior to study enrollment asked about the current relational status of the participant. Only respondents who confirmed living with a male intimate partner during the preceding year were subsequently enrolled in the study.

The participant was then asked to indicate whether she was satisfied with her partner relationship. Relationship satisfaction was measured by the item asking, “How are you feeling about the current relationship?” The answer options ranked the satisfaction in the order from low to high in five levels and were dichotomized for main analysis: “very bad”, “Just so-so,” and “not so good,” were coded as being dissatisfied, and “doing fine” and “very happy” were coded as being satisfied with the current intimate partner relationship.

Human immunodeficiency virus specific relational factors included male partner’s HIV status as reported by the women (positive, negative, and unknown), and women’s way of disclosing HIV status to partners (self-disclosed, disclosure through couple-testing, partner learned through others, and undisclosed).

5. Subject and partner substance use

The participants were asked about their own and male partner's substance use. Alcohol consumption over the past year of both the participant and her partner were gauged by questions as to the type, frequency, and quantity of beverages consumed. A participant and her partner then were each coded as either "frequent drinkers" who drank alcohol-containing beverages at least weekly versus infrequent drinkers or non-drinkers.

Illicit drug use was measured for both the women and their partners (based on the women's proxy reports) by asking about the use of the following illicit drugs over the past year: opium, heroin, non-prescribed methadone or any other opiates/narcotics, cocaine, amphetamine/stimulants/hallucinogens, marijuana, and tranquilizers/downers. Any mention of one or more drugs from the list was coded as "recent drug use" versus "none."

6. Intimate partner violence

One of the main outcome variables is recent IPV, which is defined by the World Health Organization as "any occurrence of one or more violent acts during the past 12 months." (García-Moreno, Jansen, Ellsberg, Heise, & Watts, 2005) The IPV instrument from the WHO Multi-Country Study on Women's Health and Domestic Violence (García-Moreno et al., 2005) was used to gauge levels and/or frequencies of physical and sexual violent acts perpetrated by an intimate partner over the past year and also during the women's lifetime. In measuring any recent occurrence of physical and/or sexual IPV, the women were asked to respond "yes" or "no" to 9 questions about specific violent acts (Appendix I). Physical IPV in the preceding 12 months was assessed by asking the women if "your current/ex-husband/boyfriend ever

- Slapped you or thrown something at you that could hurt you?
- Pushed you or shoved you or pulled your hair?

- Hit you with his fist or with something else that could hurt you?
- Kicked you, dragged you or beaten you up?
- Choked or burnt you on purpose?
- Threatened to use or actually used a gun, knife or other weapon against you?"

Recent sexual IPV was measured by asking the women if in the preceding 12 months “your current/ex-husband/boyfriend ever...

- Physically forced you to have sexual intercourse when you did not want to?
- Forced you to do something sexual that you found degrading or humiliating?
- Did you ever have sexual intercourse you did not want to because you were afraid of what your partner might do?"

Lifetime IPV was assessed by asking the women to respond “yes” or “no” to whether they had experienced any of the 9 forms of violence at any time in their life prior to the last 12 months.

As suggested by WHO, reported incidents of physical and/or sexual violence were coded into “any IPV” versus “none” for over-the-past-year and lifetime (Garcia-Moreno et al., 2006). Based on the same recommendation, the severity of physical violence was dichotomized by grouping the acts described in the first two items (“Slapped/thrown something at” and “push/shove/pull hair”) into non-severe physical IPV versus otherwise severe acts.

7. Gender role attitude

The extent to which a participant endorsed male dominance in relationship and family life was assessed using the *Attitudes towards Gender Norms in Family Life Scale* adopted from the WHO Multi-Country Study on Women’s Health and Life Experience. The scale constitutes 16 items regarding gender norms in relationship and uses “Yes/No” or “Agree/Disagree” response categories that are friendly to participants with low education or literacy (Appendix I). The score,

ranging from 0 to 100, was calculated as the percentage of total number of male-dominance statements a subject agreed with over the total number of questions for which she gave valid (non-missing) answers, given that the total number of missing answers did not exceed 8. A higher score suggests a more submissive attitude of woman towards male power in relationship. The Cronbach α for the scale in this study is 0.73, indicating acceptable reliability.

8. Quality of life

Overall quality of life was measured by a single-item visual analogue scale (de Boer et al., 2004). The question asked, “Overall, how would you rate your quality of life?” In answering, participants were provided a colored scale to help anchor their ratings at integers ranging from zero (representing the worst) to 10 (the best). The rating was multiplied by 10 to obtain a final score ranging from 0 to 100. The question has been widely used in health studies and was adopted for its simplicity and validity (Bowling, 2005; K A Cunny & Perri 3rd, 1991).

With a narrowed focus on the health aspect of quality of life, HRQL was self-rated, using a summary index constructed from a 21-item short version of the well-known RAND Medical Outcome Study scale (Bozzette, Hays, Berry, & Kanouse, 1994; Bozzette, Hays, Berry, Kanouse, & Wu, 1995). Bozzette’s validated method generates a weighted average index across the scores of six components of HRQL: role function, pain, physical function, social function, energy/fatigue and emotional wellbeing. The HRQL index score ranges from 0 to 100, with 100 being the highest quality of life. When used in this study, the internal reliability measured by Cronbach’s α for all items is 0.80. The scores of perceived physical health subscale (3 items, Cronbach α = 0.67) and emotional wellbeing subscale (3 items, Cronbach’s α = 0.61), two components of the HRQL tool, were additionally assessed as individual outcomes. Each score ranges from 0 to 100, with 100 indicating the greatest health. Both the shortened RAND tool and

the index derivation method have been used and validated in the Women's Interagency HIV Study (WIHS) Chicago study (Appendix A. Quality of Life Instrument) (Liu et al., 2006; Plankey et al., 2013; Smith, Avis, & Assmann, 1999).

E. Data analysis overview

Interview responses were double entered into EpiData 3.1 (Lauritsen & Bruus, 2008), and then analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis determined data distributions and was used to summarize key variables. The number of providers available to each woman under respective function category was summarized with medians and interquartile ranges (IQR). The proportion of support network members sharing a certain attribute out of the total number of the providers named by each woman also was calculated. The resulting descriptive statistics were compared between Myanmar versus Chinese women to test for differences. Student's *t* test for asymptotically normal values, Mann-Whitney U test for discrete counts, and Chi-square test for categorical variables were used to assess bivariate unadjusted associations between migration status and other variables. A significance level of $\alpha = 0.05$ was applied to all hypothesis testing and inferential statistics.

Multivariate Poisson regression was used to examine how migration status, adjusted for additional explanatory variables, was associated with three social support outcomes: 1) the size of total perceived support network, (2) the size of each type of perceived support, and 3) the total number of perceived multi-function support providers. Migration status as the primary independent variable, as well as a set of candidate covariates/factors, were included in the multivariate model using a hypothesis based backward selection approach. A variable would only be removed from a fuller model when it lacked variability across the whole sample, did not

confound the remaining coefficient estimates by more than 15%, or was not associated with the outcome by itself.

Bivariate crude associations between the a priori candidates and recent physical and sexual IPV were determined using t tests (for continuous variables), chi square statistics (for 2×2 tables) and bivariate logistic regression (for comparisons across more than 2 categories). Upon the discovery of differential univariate association patterns for the two types of IPV, multivariate logistic regression assessed the adjusted effects of the hypothesized risk factors on the two types of IPV outcomes, recent physical and sexual IPV, respectively.

After the evaluation of bivariate associations, all eligible independent variables were further tested for their joined effects on the QoL outcomes with the presence of the main factor of interest, relationship satisfaction, by a stepwise multivariate linear regression process that went backward from a paramount model to a reduced model comprising only the most influential factors/covariates (Draper & Smith, 1981). A liberal approach was applied to selecting factors to comprise the starting full model. Regardless of the bivariate assessments, migration origin (Myanmar versus local) and perceived support were examined in the multivariate model for their hypothesized modifier roles via the tests of interaction terms. The whole model selection process was applied to assess the determinants for the two main outcomes, overall QoL and HRQL index, respectively. The derived optimal multivariate set was further tested on the emotional wellbeing and perceived physical health subscale measures in order to illustrate how the determinants of higher level of QoL outcomes might influence the two distinct components of HRQL.

F. Organization of contents

Results of the study's analyses are reported in the following three chapters of this dissertation along with the specific scientific literature and methods for each. Chapter IV evaluates self-perceived social support among Myanmar migrant versus domestic-born women living with HIV in Ruili, China. Chapter V investigates partner and relationship characteristics determining physical and sexual IPV among these women. Chapter VI examines satisfaction with intimate partner relationship in association with quality of life for them.

IV. SELF-PERCEIVED SOCIAL SUPPORT AMONG MYANMAR MIGRANT VERSUS DOMESTIC-BORN WOMEN LIVING WITH HIV IN RUILI, CHINA

A. Introduction

1. Social support, migration and living with HIV

Social support has been studied extensively as either a buffer against life stress or a direct contributor to mental health (S. Cohen & Wills, 1985; Hostinar & Gunnar, 2015; Hupcey, 1998). Mixed findings suggest that the effectiveness of social support for improving health outcomes can vary largely by a myriad of factors, including recipient characteristics, socio-cultural context, type of support functions and stressors, and the source of support (Gurung, Sarason, & Sarason, 1997; Kaplan, Cassel, & Gore, 1977; Kawachi & Berkman, 2001). Understanding the structural features and determinants of social support among specific sub-population is prerequisite to devising effective social support programs that are tailored to the needs of the target population.

The availability of antiretroviral treatment has turned HIV infection into a manageable chronic condition and brought into focus the needs of improving long-term outcomes for people living with HIV and AIDS (PLWHA). Considerable research has tested social-support centered strategies for their potential benefits in enhancing case management, medication adherence, psychosocial wellbeing, responsible health behaviors, and overall quality of life (A.C. Gielen et al., 2001; Khamarko & Myers, 2013; Y. Li et al., 2014). Existing evidence points to the need to differentiate the various structures and functions of support based on subgroup factors such as gender, partner and family situations, socioeconomic and cultural environments, and migration (House et al., 1988; Shumaker & Hill, 1991).

It is well documented that cross-border migrant populations are at increased risk for negative life stressors largely due to difficulties in developing social capital in the recipient country (Kuo, 2014; Ryan et al., 2008). Creating sources of social capital includes rebuilding social networks in

the form of interpersonal relationships with people to call upon if needed to provide various types of functional social support at the destination community. Nonetheless, in contrast to the abundance of research on social support in relation to either HIV/AIDS or to migration separately, little is known about the characteristics of social support networks available to PLWHA in a country outside their birth. A gap in current knowledge about the intersections of HIV and migration especially exists related to migrant women living with HIV, and even less is known about how migration and other related factors may shape such women's social support networks.

2. Perceived social support: a network framework

Conceptualization of social support has been largely diversified in literature. To focus on the dimension of social support that meets the most essential needs of women living with HIV, the investigation focuses on “self-perceived social support” as “the cognitive appraisal of being reliably connected to others” through social relationships (M. Barrera, 1986). Also, self-perceptions of support rather than actual support have been found to be the more influential to health outcomes, especially for women, in sustaining positive affection, feeling valued and loved, and being protected from stress-induced maladaptive outcomes (Levendosky et al., 2004; McDowell & Serovich, 2007; Wethington & Kessler, 1986).

Measuring perceived support through an egocentric network constructed under certain key categories of social-support functions yields a reliable index of a person's subjective assessment of being supported that, in turn, influences a sense of wellbeing and quality of life (M. Barrera, Jr. & Ainlay, 1983; Tardy, 1985). Among many support functions, three types are highly relevant to women confronting the challenges of living with HIV: *intimate interaction* (with whom you could share your most private thoughts and emotions), *social participation*

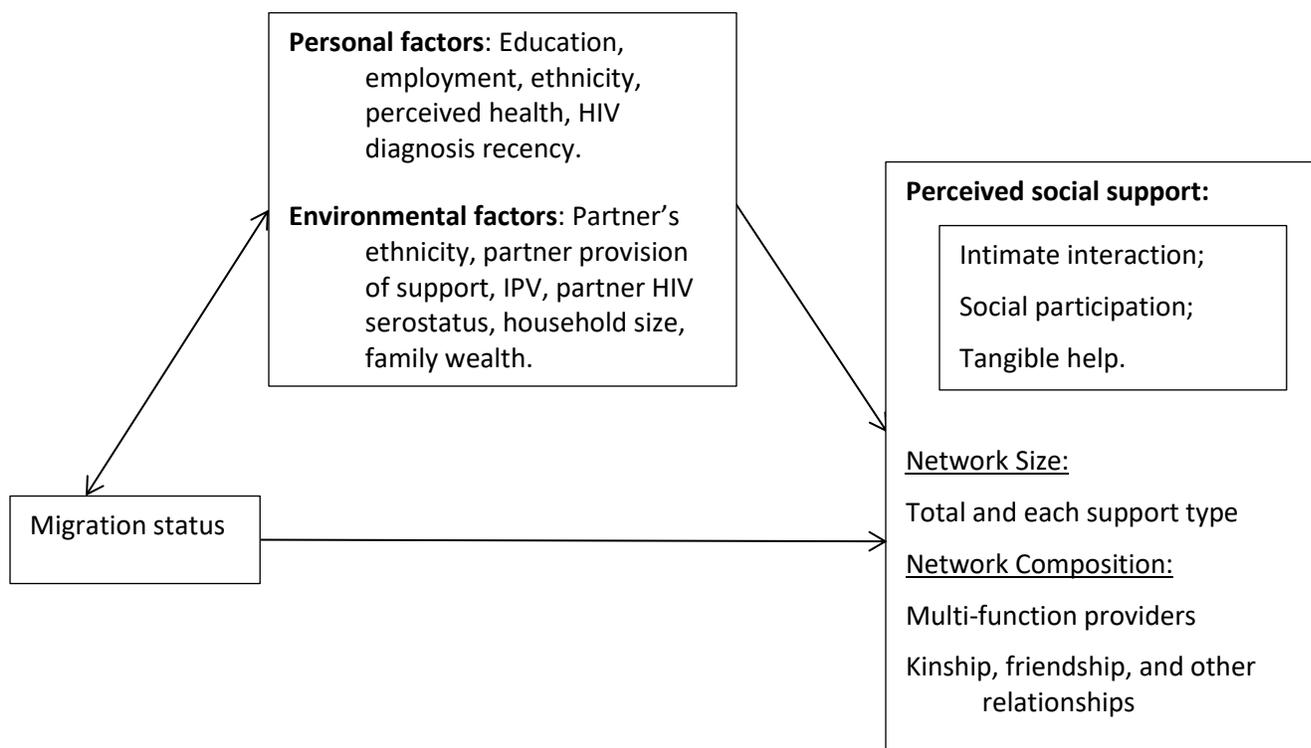
(with whom you could “hang out” and have a good time) and *tangible help* (to whom you could seek instrumental help in time of needs or hardship) (Khamarko & Myers, 2013; Langford, Bowsher, Maloney, & Lillis, 1997; Matsumoto et al., 2017). Intimate interactions and social participation confer emotional buttresses and stress buffers that are valuable in coping with a chronic condition. Tangible assistance offers the most instrumental type of social support that can facilitate seeking care, medication adherence, and simply getting through tough times (M. Barrera, 1986; M. Barrera, Jr. & Ainlay, 1983). These three dimensions of social support also correspond to the essential needs of a migrant in rebuilding social capital during acculturation and integration at the receiving society.

From the perspective of egocentric-driven network, the number of providers that a focal person perceives can be called upon if needed constitutes a quantified metric (network size) that can be correlated with health outcomes (Heaney & Israel, 2008). Equally important in understanding the impact of a social support network on health is the answer to the question: “Who serves what function in providing social support?” (Agnessens et al., 2006; McLeroy et al., 2001). The answers to “who” the support providers are (their relation to the focal person) and “what function” (the type of support provided) further describe the composition of a support network in terms of provider features, bringing in another dimension of social network that is relevant to health (House et al., 1988; Khamarko & Myers, 2013).

In the theory of social integration (Berkman, Glass, Brissette, & Seeman, 2000) the concept of efficient networks was proposed to explain the health benefit of having multi-function support providers – social network members who serve more than one type of social support need. Personal characteristics and environmental factors are posited to condition structural network attributes such as size and role-composition of a functional social support network that,

in turn, can impact health and wellbeing. Drawing upon this conceptual framework, the following model (Figure 3) guides this study's examination of the effects of migration on social support as measured by self-perceived network size and composition for 3 key social functions among male-partnered migrant Myanmar-born versus domestic-born women living with HIV in Ruili, China.

Figure 3. A conceptual model of how migration status determines perceived social support



3. Women living with HIV in Ruili, China

China and its Myanmar border offer an excellent opportunity to examine the effects of cross-border migration on social support among women living with HIV. China's population living with HIV/AIDS has grown over 850,000 today, with near 150,000 newly diagnosed in 2018 (Y. Zhao et al., 2019). About a quarter of the affected initially were found in Yunnan Province, a mountainous area in southwest China bordering Myanmar, Vietnam and Laos, and the home to more than 20 ethnic groups. A rapid increase in the number of women affected has been seen regionally as well as nationally in recent decades (Jia et al., 2010; Y. Zhang et al., 2020). National data shows that by 2010 the prevalence of HIV among women had grown to surpass that of men (Y. Zhang et al., 2020) and that by 2017 over one-third of the newly reported cases of HIV in Yunnan were women (Zhu et al., 2018).

This study focuses on a sample of women living with HIV in Ruili, China, the largest border city in Yunnan province. Ruili is home to the earliest localized HIV epidemic in China and also to an influx of active cross-border migrants including a large number of female marriage migrants from Myanmar (X. Zhang, 2009). As such, it offers a valuable opportunity to study if cross-border migration results in social support disadvantages for foreign-borne women living with HIV versus their counterparts endemic to the destination country through birth.

The research set out to address the following two research questions: 1) When compared to their local counterparts, do HIV-positive migrant women from Myanmar living with a male partner in Ruili, China perceive having the same number of social network members available to them for social support if needed for intimate interaction, social participation, and tangible help? 2) Are there differences between Myanmar migrant and local-borne women in: number of multi-

function supporters, level of partner provision of support, and the proportion of kinship support versus friendship or other sources of support.

B. Methods

1. Recruitment and sample

With the assistance of the RCDC, a convenience sample of HIV seropositive women was recruited in Ruili from four district clinics and two local nongovernment organizations (NGOs) that together serve more than half of the local PLWHA. Prospective participants were told about the study at the physicians' offices, the NGOs' activity sites, or during regular home visits or phone calls made by CDC staff, community physicians or peer educators. If interested, a potential subject could voluntarily contact a research designee to hear more about the study and to be screened for eligibility and consented for participation if she wished to enroll.

To be eligible to participate, prospective participants had to be female, between the age of 18 to 59 years of age, born in Ruili or Myanmar (as self-reported), have lived with a male partner at some time during the past 12 months, be able to give informed consent, and having been confirmed seropositive for HIV for more than six months. This time interval between enrollment and diagnosis was chosen to avoid added stress to participants in being interviewed about personal experiences while also handling a recent diagnosis. Six months also allowed recently diagnosed women time to adapt to the challenges of HIV management in considering the need for possible social support. The study was approved for the protection of research subjects by the University of Illinois at Chicago's Institutional Review Board and the Kunming Medical University's Medical Ethics Committee.

All participants were interviewed face-to-face and in private by trained interviewers using a structured questionnaire. In total, 223 women were enrolled and interviewed, of whom five were

unable or declined to answer questions that measured key variables of interest. The study's analysis is based on a final sample of 219 women for whom data are complete. Each participant received the equivalent of \$9 USD to compensate for her transportation costs and time spent being interviewed.

2. Measures

Perceived social support: the primary outcome of interest, was assessed through identifying an egocentric network of self-perceived supportive relationships for each participant. Three function categories were selected for examination from the Manuel Barrera's Arizona Social Support Interview Schedule (M. J. Barrera, 1981) that has been widely adopted and validated across multiple settings and cultures (Bernazzani et al., 1997; Knowlton & Latkin, 2007; Martínez García, García Ramírez, & Maya Jariego, 2002). Each participant was asked to name up to 5 people in her life whom she perceived available for three essential functions of social support: 1) *intimate interaction* (someone to talk to about things that are very personal and private), 2) *social interaction* (someone with whom to get together to have fun or to relax) and 3) *tangible assistance* (someone to call upon for help if sick, provide transportation, or needing to borrow money). The size of a woman's self-perceived social support network for each of the 3 functions was measured by the number of supporters (0-5) nominated. Without double-counting supporters named under more than one function type, the *total size of a woman's perceived social support* was calculated as the total number of supporters ever named across all three function networks with a resulting range from zero to 15. Individuals who were named only once across all three support functions were coded as a *single-function supporter*, otherwise a *multi-function supporter*. The total number of multi-function supporters named by a woman represents the size of her *perceived multi-function support network*.

The composition of a support network was derived from asking the woman to specify her relation to each support provider named and also the person's characteristics including gender, ethnicity, and residency. Relationship to the focal person was categorized as *kinship* (husband or male intimate partner, parents, siblings, other relatives by birth or marriage) versus non-kin: friends, neighbors, peer educators, health care providers, and other community members. For the support network analysis, the information pertaining to each supporter was individually coded in addition to the type(s) of social support function perceived available from this person. The *proportion of family support* was subsequently calculated as the percentage of the total number of perceived providers who were related to the woman as kin. The *level of partner support* was measured as the total number of support function types perceived available from the male partner: ranging from zero (male partner never named as a provider for any of the 3 support types) up to three (named across all 3 support types).

Migration status was determined by a participant self-identifying as either from Myanmar or from the local region. Chinese nationals who moved to the area from outside Ruili were excluded to limit confounding. Women who identified themselves as being from Myanmar were categorized as a Myanmar migrant even if they had been naturalized as a Chinese citizen.

Personal and environmental factors believed to influence social support were captured by asking the participants about their demographic background, household situation, male partner characteristics and health status. To gauge family livelihood within the context of a rural setting, a household wealth chart was used to report family ownership of such assets as modern electronics, vehicles, livestock, environmental sanitary condition and facilities, and housing conditions. A "wealth index" was calculated as a numerical score using the principle component method proposed by the tool's designers with a lower score indicating poorer household (Filmer

& Pritchett, 2001) . The participants were also asked to report on their male partners' ethnicity, education level, employment, and HIV status. Any occurrences of intimate partner violence (IPV) towards the participant during the preceding year was determined using the physical and sexual IPV tool developed in the WHO Multi-Country Study on Women's Health and Domestic Violence (García-Moreno et al., 2005).

3. Data analysis

Questionnaire responses were entered into and managed in EpiData (Lauritsen & Bruus, 2008). Exported data were analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis determined data distributions and was used to summarize key variables. The number of providers available to each woman under respective function category was summarized with medians and interquartile ranges (IQR). The proportion of support network members sharing a certain attribute out of the total number of the providers named by each woman also was calculated. The resulting descriptive statistics were compared between Myanmar versus Chinese women to test for differences. Student's *t* test for asymptotically normal values, Mann-Whitney U test for discrete counts, and Chi-square test for categorical variables were used to assess bivariate unadjusted associations between migration status and other variables.

Multivariate Poisson regression was used to examine how migration status, adjusted for additional explanatory variables, was associated with three social support outcomes: 1) the size of total perceived support network, (2) the size of each type of perceived support, and 3) the total number of perceived multi-function support providers. Migration status as the primary independent variable, as well as a set of candidate covariates/factors, were included in the multivariate model using a hypothesis based backward selection approach. A variable would

only be removed from a fuller model when it lacked variability across the whole sample, did not confound the remaining coefficient estimates by more than 15%, or was not associated with the outcome in itself. A significance level of $\alpha = 0.05$ was applied to all hypothesis testing and inferential statistics.

C. Results

1. Sample characteristics by migration status

Fifty-one (23%) out of 219 participants reported being originally from Myanmar. Table I shows the women's characteristics and how the Myanmar migrants compared to their local counterparts. Overall, most of the women were of Dai ethnicity (63%), followed by Jingpo and Han (16% each). More than half were between 31 and 40 years of age, with a median age of 37. Most (90.4%) were married to the current male partner, and over 75% have at least one co-residing child under 18 years old. The women were largely of low educational attainment with about 34% having never been schooled and only a few (n=6) having gone beyond the state-subsidized "Nine-year Compulsory Education" (through 9th grade). Of all the reported 70% individual incomes fell short of the national poverty line (World Bank, 2013). About 40% of participants had worked outside the home over the preceding year.

About two thirds of the women had been diagnosed with HIV for five years or more at the point of interview. Although more than 97% were already linked to care and started on antiretroviral therapy, 59 (35%) of the local women perceived their current health to be fair or poor while less Myanmar (10, 20%, $p=0.04$) women felt so. About 21% reported experiencing IPV during the past year, similarly for Myanmar and Chinese women.

TABLE I. PARTICIPANT CHARACTERISTICS ACROSS SAMPLE AND BY MIGRATION STATUS

Participant Characteristics ^a		<u>Total</u> N = 219	<u>From Myanmar</u> N = 51	<u>Local Born</u> N = 168	<i>P</i> ^b
Age		37.1 ± 7.8	36.1 ± 7.2	37.4 ± 7.9	0.31
Married		198 (90.4)	46 (90.2)	152 (90.5)	1.0
Ethnicity (women)	Dai	138 (63)	34 (66.7)	104 (61.9)	0.22
	Jingpo	35 (16)	10 (19.6)	25 (14.9)	
	Han	36 (16.4)	4 (7.8)	32 (19.0)	
	Others	10 (4.6)	3 (5.9)	7 (4.2)	
Ethnicity match with partner	Different ethnicity	71 (32.4)	13 (25.5)	58 (36)	0.16
	Same ethnicity	141 (64.4)	38 (74.5)	103 (64)	
Education level	Never schooled	74 (33.8)	29 (56.9)	45 (26.8)	<0.001
	In school ≤ 9 years	139 (63.5)	20 (39.2)	119 (70.8)	
	> 9 years	6 (2.7)	2 (3.9)	4 (2.4)	
Worked outside home last year		88 (40.2)	22 (43.1)	66 (39.3)	0.6
Income last year (in \$ equivalent)	Family	1,538 (923 – 3,846)	1,538 (769 – 3,077)	1,846 (923 – 4,615)	0.06
	Individual	500 (154 – 1,231)	462 (154 – 1,192)	615 (154 – 1,462)	0.8
Family Wealth Index		-0.1 (-0.78 – 0.86)	-0.29 (-1.15 – 0.51)	-0.03 (-0.69 – 0.95)	0.04
Number of young children	none	53 (24.2)	11 (21.6)	42 (25)	0.85
	1	122 (55.7)	30 (58.8)	92 (54.8)	
	≥ 2	44 (20.1)	10 (19.6)	34 (20.2)	
Years since HIV diagnosis	≥ 5	146 (66.7)	31 (60.8)	115 (69.7)	0.5
	2-4	57 (26)	16 (31.4)	41 (24.8)	
	< 2	13 (5.9)	4 (7.8)	9 (5.5)	
Any recent IPV		46 (21)	12 (23.5)	34 (20.2)	0.6
Self-perceived fair/poor health (vs. good)		69 (31.5)	10 (19.6)	59 (35.1)	0.04

^a Data presented as mean ± standard deviation, median (first quartile – third quartile), or counts (%).

^b Bolded and italic where $p < 0.05$.

Of the 51 Myanmar migrants, 43 (84%) moved to Ruili through marrying a Chinese man, and 49 (96%) had lived in Ruili for more than 5 years. More than half of the women from Myanmar were never schooled and their education levels were lower overall than the local women ($p<0.001$). Myanmar migrants also measured poorer on the household wealth index than the local women ($p=0.04$). No other demographic or environmental characteristic seem to differ between the migrants and native-born women. When asked about the frequency of visiting their family or friends back home in Myanmar, 38 (75%) reported they traveled across the border at least once a year.

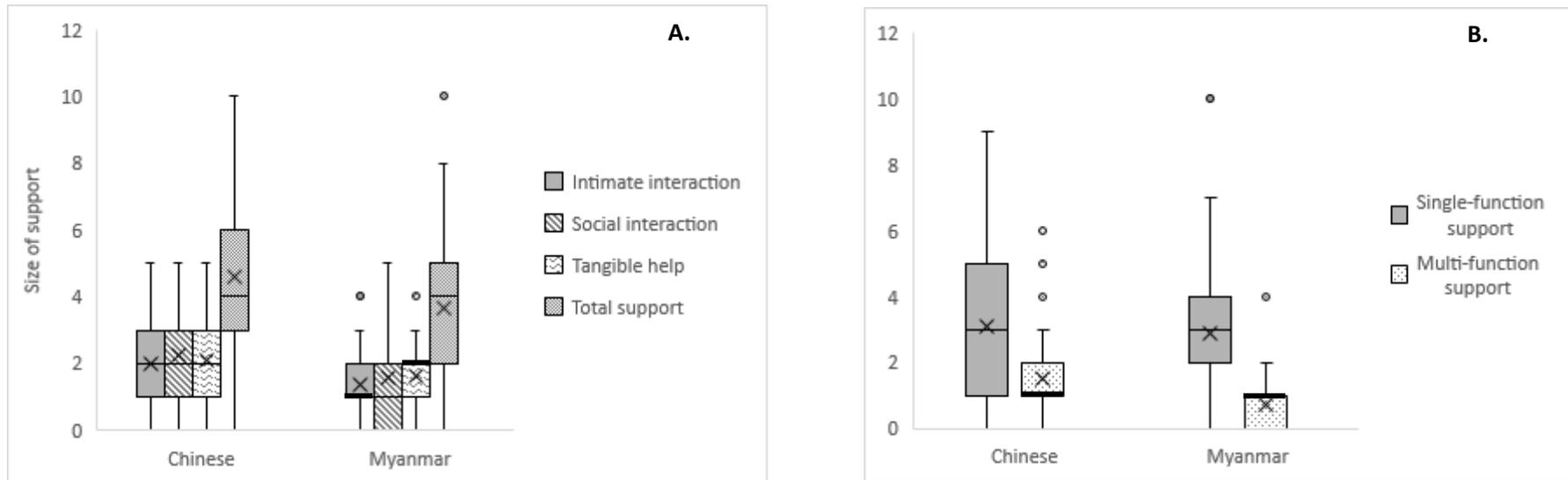
2. Bivariate analysis of perceived support networks for migrant versus local women

Compared to their local-born counterparts, Myanmar migrant women reported smaller support networks in total and within each function category (Figure 4A). By Mann-Whitney U tests, differences in the network size were significant for intimate interaction (for Myanmar women median 1, IQR 1-2; Chinese 2, 1-3, $p=0.002$), social participation (Myanmar 1, 0-2; Chinese 2, 1-3, $p=0.003$), tangible help (Myanmar 2, 1-2; Chinese 2, 1-3, $p=0.04$), and total support across all three categories (Myanmar 4, 2-5; Chinese 4, 3-6, $p=0.01$). More migrant than Chinese-borne women perceived having no support at all for intimate interaction (Myanmar 21.6% vs. Chinese 6.5%, $p=0.002$) and social participation (28% vs. 15.5%, $p=0.045$), but the two groups were similar in regard to no available tangible help (9.8% vs. 11.3%, $p=0.7$).

To examine the possible overlap of support functions within a woman's support network, the nominated supporters for all women were pooled over the groups of Myanmar versus Chinese-born, and were categorized by the support function(s) perceived available through them. As illustrated with the Venn Diagrams (Figure 5), difference in the total size of perceived

Figure 4. Comparing perceived social support between Myanmar migrant and Local-born women: number of support providers in each defined category of support in comparison

The box-and-whisker plots demonstrating the inter-quartile ranges (bounded box), medians (dividing line) and the total ranges (extending whiskers) of the values of network size. Means were indicated by “x”.



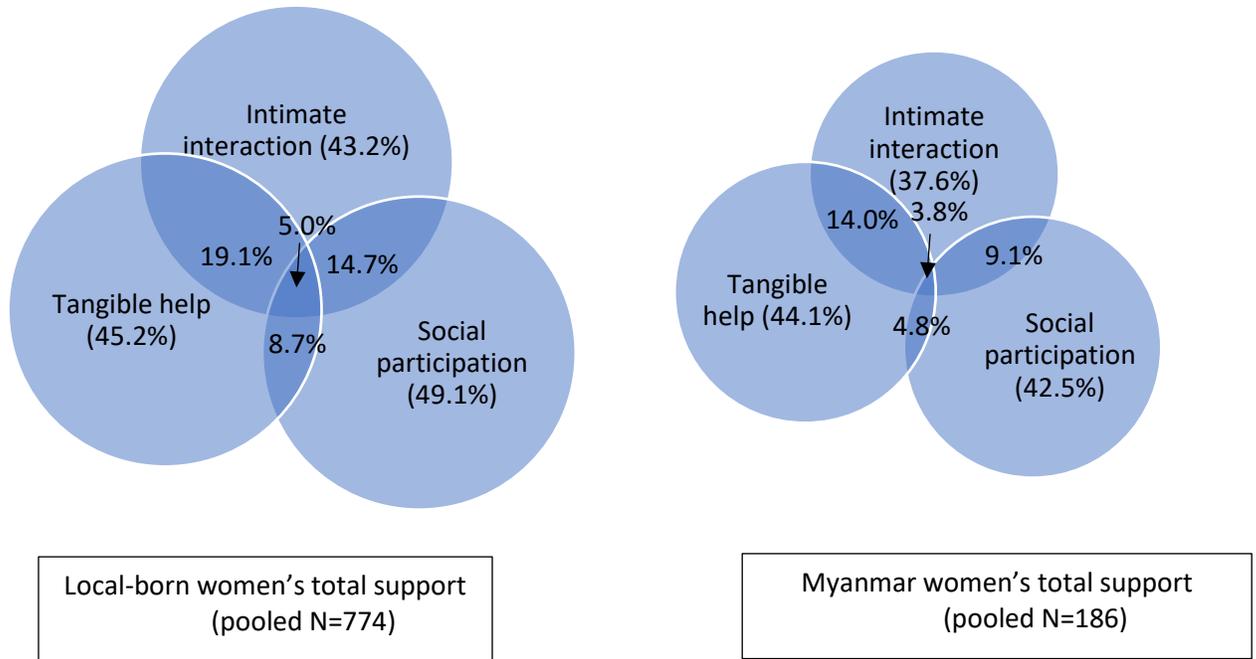


Figure 5. Multi-function support: Myanmar women's pooled support networks comprise of less proportion of multi-function support providers (shaded overlaps of the Venn Diagram) than the local-born women's networks

Note that the diagram is not drawn to the numerical scale.

support network by migration status was largely accounted for by the number of the multi-function supporters (shaded intersections in the Venn Diagrams).

Compared to their Chinese-born counterparts, Myanmar migrants perceived having fewer multi-function supporters (Figure 4B. Myanmar median 1, IQR 0-1; Chinese 1, 1-2, $p < 0.001$) but they did not differ in the number of single-function supporters ($p = 0.8$). The proportion of multi-function supporters over the total network of Myanmar women also is smaller than that of Chinese-born women (20% vs. 33%, $p = 0.002$, Figure. 6).

In answering the question "Who serves what function in providing social support", the composition and functional role of perceived support providers were examined. Overall, across

all three types of function support networks, the proportions of kin (medians of Myanmar and Chinese women: 50%; $p=0.95$) and friend supporters (median of Myanmar: 33%, Chinese: 50%; $p=0.23$) were similar between migrant versus non-migrant women. Among all categories of kinship, the proportion of by-birth family/relative supporters was found to be greater among the Chinese-born subjects (median: 33%, vs. Myanmar: 17%; $p=0.007$), while that of kin from the male spouse/partner side appeared to be greater among the Myanmar migrants (median: 20%, vs. Chinese: 0%; $p=0.001$, Figure 6.). Within the birth family/relative category, siblings accounted for a similar share of perceived support overall for both Myanmar (IQR 0 – 25%) and Chinese-born women (0 – 24%; $p=0.39$).

Among all three types of functional support networks, the presence of kin supporters did not differ by subjects' migration status. Whereas less Myanmar migrants than the local-born women perceived their parents as being available for tangible assistance, and Myanmar women's parents were perceived completely unavailable for intimate interaction (Table II). In contrast, perceived availability of siblings for any type of support did not appear to differ as much between migrants and non-migrants, except that siblings were less named for tangible help by Myanmar women than by the Chinese with a borderline significance (Myanmar 26% vs. Chinese 39%, $p= 0.07$, Table II).

Meanwhile, male partners seemed to be considered available by similar proportion of Myanmar versus Chinese-born women across all three function support types. Considering the level of partner availability for support, no difference by the women's migration status was observed regarding the man's perceived role as a single-function supporter, multi-function supporter, or non-supporter (Table II).

Figure 6. Comparing the composition of provider relationship categories within the total perceived support networks of Myanmar versus Chinese-born women

Asterisks label statistically significant differences in proportion of supporter type between Chinese and Myanmar subjects.

The box-and-whisker plots demonstrate the inter-quartile ranges (bounded box), medians (dividing line) and the total ranges (extending whiskers) of the values of network size. Means were indicated by “x”.

SFP: single-function (support) provider; MFP: multi-function provider.

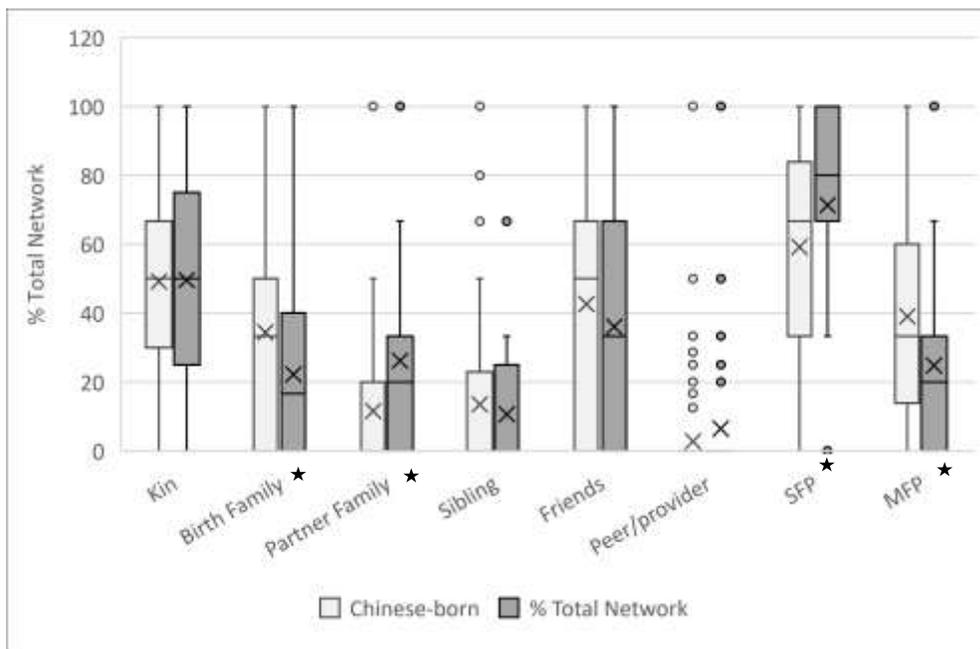


TABLE II. COMPARING THE PERCEIVED AVAILABILITY OF KIN VERSUS NON-KIN SUPPORT PROVIDER FOR RESPECTIVE TYPE OF SUPPORTER BETWEEN MYANMAR AND DOMESTIC-BORN WOMEN IN RUILI, CHINA

Perceiving available for support	Migration status		Total N (%)	<i>p</i>
	Local-born N (column %)	Myanmar-born N (column %)		
<i>Total</i>	168	51		
<i>Intimate interaction:</i>				
Kin	109 (64.9)	28 (54.9)	137 (64.0)	0.20
Male partner	51 (30.4)	18 (35.3)	69 (31.5)	0.51
Parent	44 (26.2)	0 (0.0)	44 (20.1)	< 0.0005
Sibling	41 (24.4)	10 (19.6)	51 (23.3)	0.48
Friend	62 (36.9)	12 (23.5)	74 (33.8)	0.08
Peer educator	10 (6.0)	5 (9.8)	15 (6.8)	0.35
<i>Social participation:</i>				
Kin	31 (18.5)	6 (11.8)	37 (16.9)	0.26
Male partner	3 (1.8)	2 (3.9)	5 (2.3)	0.33
Parent	3 (1.8)	0 (0.0)	3 (1.4)	1.00
Sibling	13 (7.7)	1 (2.0)	14 (6.4)	0.20
Friend	112 (66.7)	29 (56.9)	141 (64.4)	0.20
Peer educator	3 (1.8)	1 (2.0)	4 (1.8)	1.00
<i>Tangible help:</i>				
Kin	132 (78.6)	40 (78.4)	172 (78.5)	0.98
Male partner	44 (26.2)	10 (19.6)	54 (24.7)	0.34
Parent	64 (38.1)	6 (11.8)	70 (32.0)	< 0.0005
Sibling	66 (39.3)	13 (25.5)	79 (36.1)	0.07
Friend	29 (17.3)	8 (15.7)	37 (16.9)	0.79
Peer educator	3 (1.8)	1 (2.0)	4 (1.8)	1.00
<i>Level of partner support (number of support types available through male partner):</i>				
0	97 (57.7)	30 (58.8)	127 (58.0)	0.80
1	45 (26.8)	13 (25.5)	58 (26.5)	
2-3	26 (15.5)	8 (15.7)	34 (15.5)	

Friends comprise a frequently called-upon source of non-kin support for migrants and non-migrants alike. In every type of function support network, less Myanmar women than their local-born peers named at least one friend, but the differences are not statistically significant and only reaches marginal significance for intimate interaction ($p= 0.08$, Table II). Although the majority of subjects did not name any peer/provider (including peer educators, outreach workers or care providers, Figure 6) as part of their perceived support network, for the small fraction of women who did so, peer educators seemed to constitute a notable part of the subject's perceived support network (Figure 6), especially for the provision of intimate interaction (Table II).

3. Multivariate analysis of factors associated with perceived social support

Multiple adjusted Poisson regression (Table III) confirmed that the migrant women had smaller perceived support networks overall ($p < 0.01$) and for each type of function ($p < 0.05$) than their local-born counterparts. This effect was independent of demographics, family wealth, recent IPV, male partner or household characteristics. The effect of migration on perceived support becomes even more evident when noting that Myanmar women perceived having fewer multi-functioning supporters available than their local counterparts after adjusting for additional factors ($p < 0.001$).

The women's own ethnicity does not appear to influence the social support, but their male partners' ethnicity predicts the sizes of perceived total and social participation function support networks. Regardless of migration status, women with a partner of Han ethnicity perceived having fewer supporters overall and a smaller social-participation network (both $p < 0.01$) than those women with a Dai partner. The subjects from Myanmar and also having a Han partner reported the smallest support networks compared to other women as shown in the data (Table IV).

TABLE III. ASSOCIATIONS BETWEEN MIGRATION STATUS IN LIEU WITH OTHER FACTORS AND THE SIZES OF PERCEIVED SOCIAL SUPPORT NETWORKS AMONG HIV POSITIVE WOMEN IN RUILI, CONFIRMED VIA MULTIVARIATE ADJUSTED POISSON REGRESSION^a

Determinants of PSS	Subgroup N (%) / Mean (SD) ^b	Size of network/ Number of supporters				
		Total Support β (SE) ^c	Intimate interaction β (SE)	Social participation β (SE)	Tangible help β (SE)	Multi-function support β (SE)
From Myanmar (Reference: from local)	47 (22.7)	-0.27 (0.09)**	-0.30 (0.14)*	-0.47 (0.13)**	-0.3 (0.13)*	-0.7 (0.19)**
Partner ethnicity:						
Han (and others)	85 (41.1)	-0.25 (0.08)**	NS	-0.4 (0.12)**	NS	NS
Jingpo (Reference: Dai)	31 (15.0)	NS	NS	NS	NS	NS
Household wealth index	-0.0045 (0.998)	0.07 (0.04)*	NS	0.11 (0.05)*	NS	NS
Recent IPV (Reference: no occurrence)	46 (21)	NS	-0.34 (0.14)*	NS	NS	-0.39 (0.17)*

^a The regression has been adjusted for age, education, whether or not worked outside home during the past year, household size and self-perceived health in addition to the listed variables. These covariates in themselves do not significantly impact the perceived level of support but were controlled for since their removal would substantially affect the rest of the regression coefficients.

^b SD: standard deviation;

^c β : regression coefficient; SE: standard error.

*: $0.01 < p \leq 0.05$; **: $p \leq 0.01$; NS: not significant.

TABLE IV. THE ADDITIVE EFFECT OF MIGRATION STATUS AND PARTNER ETHNICITY ON THE TOTAL SIZE OF PERCEIVED SUPPORT NETWORK (NUMBER OF SUPPORTERS)

Male partner's ethnicity	Women's migration status	
	Median (25 th percentile – 75 th percentile)	
	<u>Myanmar</u>	<u>Chinese</u>
Han and others	3 (2-4)	4 (2-6)
Jingpo	4 (2.5-4)	4 (3-6)
Dai	4 (2-6)	5 (3-7)

Household wealth was associated with both larger-sized social participation and overall total networks perceived by the subjects (both $p < 0.05$) but did not impact the sizes of their intimate and tangible support networks. Recent victimization through intimate partner violence appears associated with the women's perception of fewer intimate interactions supporters and also fewer multi-function supporters (both $p = 0.02$). Nonetheless, IPV was not associated with the women's perception of the number of providers available for tangible help, social participation, or the 3 types of support function combined.

D. Discussion and conclusions

This study examined the self-perceptions of available social support among a sample of HIV-positive domestic-born versus migrant women from Myanmar living with a male partner in Ruili, China. The migrant women, most of whom moved to China through marriage, were similar to the local women demographically and in their partner/family environment except for being somewhat less educated, having lower family wealth, but also being in better self-

perceived health – a possible advantage on the cross-border marriage market. Also, most cross-border marriage along China's western perimeter occur largely due to the economic pull on the China side so that even the least wealthy households in China hold the advantage of attracting Myanmar brides from extremely impoverished rural regions over the border (Hackney, 2015).

Comparisons of the sizes of self-perceived social support networks for migrant versus local women show less sources of available social support as measured by the number of support providers for each of 3 core functions. This association also held true for the total number of perceived support providers across all three function categories as a measure of total support. Among migrant women, of the 3 social support networks and their functions, those for intimate interaction appear the smallest but less so for tangible help. From the standpoint of the women's wellbeing, this finding is troubling. As defines a "strong tie" in social relationships. Their absence can be detrimental to a person's psychological wellbeing and overall health. That migrant women are more likely than their domestic-born counterparts to perceive having fewer or no support persons available to call upon for intimate interactions is concerning and warrants attention by health providers and/or HIV management programs.

Interestingly we found that the differences in the size of support for the migrant versus local women can be explained by the difference in the number of multi-function support providers, but not the number of single-function providers. The importance of a multi-function support provider lies in their influence on the "intensity" of a relationship. Substantial evidence points to the protective effects of support that is denser (more frequent interactions per dyad) and intensive (more functional utility per tie) on mental health (House et al., 1988). Thus, when compared to local women, migrant women's comparative lack of multi-function support seems possibly to constitute a migration-related social support disadvantage. This finding, however,

also suggests a promising direction for expanding social support to migrant women. Instead of intervention and educational programs aimed solely at assisting women to increase the number of people in their social support networks, a more effective approach also might be to encourage and possibly facilitate transforming their existing single-function supporters into multiple function support providers. Social programs and their staffing also might take on this role. For example, a considerable portion of the women, migrant or not, named peer educators as confidants if seeking intimate interaction. Based on Thoits' (Thoits, 1995) findings as to the importance of "empathic understanding" in social support relations, peers sharing similar life stressors may be capable of providing not only emotional support, but also instrumental assistance based on having also confronted the same needs and hurdles that the focal person is facing. This shared experience, in turn, may make them excellent candidates to take on additional functions for HIV positive women beyond solely interactive support. In this regard, training peer educators to fulfill more than one support function may be the most efficient way of provisioning stronger and more effective support to those women.

The negative association between migration and self-perceived social support was found to be independent of other factors. Migrant women's disadvantage, as measured through individual and total network size for three key support functions, remains significant after being adjusted for individual and partner demographics, employment status, household size, family wealth and self-evaluated health. This finding is not completely unexpected. Successfully meeting the challenges of rebuilding supportive social relationships as a migrant in a destination country may lie largely outside the reach of individual factors or actions (Ryan et al., 2008). Structural limitation and sociocultural influences also appear to come into play (Boyd, 1989). Consequently, intervening solely at the individual-level may not be sufficient in helping migrant

women to strengthen and expand their social support networks. Network-level interventions for HIV-positive women that build bridges of access to support from partners, family, friends and others hold the potential to increase social support for migrant women.

The study also finds that women in a wealthier household seem to have larger social participation networks irrespective of migration status and as a result a larger total network. Yet wealth does not seem to affect the size of women's intimate or tangible support networks. This finding appears consistent with previous research showing that economic standing impacts networks of less intensive ties but not necessarily closer relationships (Granovetter, 1983). In addition, both migrant and non-migrant women reported having experienced IPV in the last 12 months, and its occurrence was associated with smaller networks of intimate interaction and also with fewer available multi-function providers. It is not possible to tell from the data if women who have fewer available confidants to talk with about problems or fewer "core supporters" are more vulnerable to IPV than those with more support providers. The opposite also might be true in that a woman experiencing IPV might less likely engage socially with others, possibly as the result of feeling shameful of being a victim and/or having an intimate partner who discourages her pursuit of social relationship outside marriage. In either case, effective interventions for both cross-border and domestic-born women living with HIV should identify and address possible IPV.

The finding that partner ethnicity differentiates the women's perceived support was unexpected. About a quarter of the Myanmar women and more than a third of the local women in this study have an inter-ethnic male partner. Rather than her own ethnicity, her partner's ethnicity was found to strongly correlate with the size of the women's support networks. Having a Dai partner appeared to predict the largest total support network for the woman, while having a

Han partner was associated with the smallest. This finding, however, may be specific to the local ethno-cultural setting or socio-geographic locations like it. This region of China tends to be patrilocal and also made up of communities clustered by ethnicity. Normatively, a married woman is expected to live with the man's family inside the man's community. People of Dai ethnicity tend to reside in close physical proximity within tightly knitted communities of shared values and traditions that promote structural and communal assistance to those in needs (Guo & Li, 2012). Thus, it may not be surprising to see that a woman, even if she is a migrant, who marries a Dai man receives the benefits of an expanded support network. Meanwhile, Han is the main ethnic group in China. With vast population size spread across multiple locations and greater socio-economic dominance ethnically at the national and local community levels, Han ethnicity may place less emphasis or value in building or drawing upon community based social support. Possibly this difference explains why women with a Han partner tended to report smaller social support networks irrespective of their own socio-cultural origins. Whatever the reason, however, that partner's ethnicity can affect women's perception and possibly their actual sources of social support suggests that intervention researchers need to be sensitive to the specific community and culture in which a woman's available social support is embedded.

The research design of this study limited findings' generalizability. First, study sampling only reached a group of migrant women who reported voluntary migration, had mostly settled down in Ruili over 5 years and were able to visit their home state across the border frequently. Admittedly our sample can only represent the cross-border migrant women in the region who have overcome the vulnerable stage of early integration, and are not members of less fortunate groups of female migrants known to exist in the region, like those trafficked either as "mail-order brides" or sex workers (Qiu, Zhang, & Liu, 2019). Next, the study measured women's perception

of to whom they can draw upon for support. It is possible that the actual support that they might receive differs from what they perceive that they can expect. Yet their perceptions may outrank actual support when it comes to functions related to health (Wethington & Kessler, 1986), especially in the case of affective support functions within which intimate interaction is a prominent component (Spiegel & Diamond, 2001; Wang, Mittleman, & Orth-Gomer, 2005).

The findings from this study document the sizes and compositions of three types of perceived social support networks serving key functions in the lives of married or partnered migrant women from Myanmar living with HIV in Ruili and their domestic-born counterparts. Both groups of women need to access more social support, and the most promising channels for them to expand access may be through identifying more support providers, existing or new, that potentially would be able to support more than a single function need. In the meantime to be fully effective, intervention programs need to identify the lack of certain kinship and/or friendship support providers in these women's networks, and partner with health care, social workers, and peer outreach to supplement perceived and actual social support networks for these women. Also, regardless of migration origin, attention needs to be paid to comorbid issues in IPV and family poverty for women living with HIV so that they perceive having help available to call on when needed.

V. PARTNER AND RELATIONSHIP CHARACTERISTICS DETERMINING PHYSICAL AND SEXUAL INTIMATE PARTNER VIOLENCE AMONG WOMEN LIVING WITH HIV IN RUILI, CHINA

A. Introduction

Intimate partner violence (IPV) is a prominent gender-related health risk that can lead to physical and mental afflictions and poor social well-being (Bachman & Saltzman, 1994; L. Heise & Garcia-Moreno, 2002; R. Jewkes, 2002). Male-on-female IPV is defined as violence perpetrated by a current or ex-husband or boyfriend, and the term covers multiple forms of violence within an intimate relationship: physical aggression, sexual coercion, psychological abuse and controlling behaviors (L. Heise & Garcia-Moreno, 2002; R. Jewkes, 2002). Numerous studies show that IPV against women is pervasive globally, with lifetime occurrences reported among about one third of women ever in an intimate relationship worldwide, rates ranging from 10% - 70% in various regions, and may be particularly endemic in the unindustrialized world (Hindin, Kishor, & Ansara, 2008; K. L. Hoffman et al., 1994; Krantz & Garcia-Moreno, 2005; Watts & Zimmerman, 2002; WHO, 2013). IPV is well known to predict numerous adverse health outcomes for partnered women, including physical injuries and sequelae, reproductive health pathologies, adverse pregnancy outcomes, psychological and emotional trauma, mental illnesses, and acquisition of HIV and other sexually transmitted infections due to diminished power in safe-sex decisions (Bonomi, Anderson, Rivara, & Thompson, 2007; J. C. Campbell, 2002; Coker, Sanderson, & Dong, 2004; Rachel Jewkes et al., 2010; Spiwak, Afifi, Halli, Garcia-Moreno, & Sareen, 2013).

This study focuses on the male-on-female IPV experienced by a group of women living with HIV infection in a highly endemic region of China. Relatively much less is understood about the IPV among HIV seropositive women. The data to date are largely limited to HIV positive women's experiences of IPV victimization surrounding HIV disclosure, and findings are

inconsistent as to whether or not positive HIV serostatus increases a woman's vulnerability (Burgos-Soto et al., 2014; M. Cohen et al., 2000; A. C. Gielen et al., 2000; Andrea C. Gielen et al., 2002; Medley et al., 2004). In a small body of available studies that indeed assessed the health impact of IPV among seropositive women, poor coping, elevated psychopathology, reduced adherence to ARV, hampered engagement in care and impaired quality of life were found to be directly linked to IPV (Lopez et al., 2010; McDonnell et al., 2000; Schafer et al., 2012; Siemieniuk et al., 2013; Trimble et al., 2013). Additionally, experiences of IPV among seropositive women were also predictive of unsafe sex with an HIV-uninfected or unknown-status partner (Peltzer, 2014).

In China, the issue of domestic violence has been studied to some extent in the general population and among internally migrating women and female sex workers (Gao, Wang, & An, 2011; D. Lin, Li, Fang, & Lin, 2011; Parish et al., 2004; Xiao Xu et al., 2005; C. Zhang et al., 2012). However, no studies in China have ever examined the experience of IPV among women with HIV infection. In fact, studies evaluating the health outcomes of HIV positive women in China are lacking overall, and the few available ones are mostly qualitative (W. T. Chen et al., 2011; Sabin et al., 2008; Yu, Li, Chen, et al., 2012). As women become increasingly affected by HIV in China, as seen in the other parts of the world, understanding their life and needs including experiences with IPV is pivotal in developing well-tailored health services and effective interventions programs. Our study set out to explore to what extent the HIV positive women with a male partner are affected by and what factors predict the risk of IPV.

Women's perception and recognition of in-relation aggression, as well as social norms regarding gender roles and domestic conflict tactics largely vary by culture (Hershow, Bhadra, et al., 2020; Raj & Silverman, 2002). Most violence and HIV literature pertain to western societies

and the African countries; research conducted in Asia is minimal (Fulu, Jewkes, Roselli, & Garcia-Moreno, 2013). This study set out in Ruili, a Southwest China border town where heroin trafficking from Mekong Delta fueled the earliest HIV outbreak in China. As an ethnically diversified area, Ruili is well suited to study the interplay of culture, IPV and HIV.

The existing body of research has produced a constellation of theoretical models attempting to explain the etiology of male-on-female IPV, among the most influential ones being the feminist theory, the power theory, the situational model, and the ecological framework (Dobash, 1992; Goode, 1971; L. L. Heise, 1998; Riggs & O'LEARY, 1996; Straus, 1976; Yllo & Bograd, 1988). In an attempt to bridge across various conceptualizations and re-focus on the relationship itself, Abramsky *et al* (Abramsky et al., 2011) proposed a “relationship approach” to build a framework encompassing determinants of IPV at both individual and couple levels that shape the relationship dyad. Our study adopted this focus to explore a set of factors, either rooted in the individual experience and background of the woman or the male partner, or situated around the current relationship, that may influence the risk of IPV victimization among the women living with HIV. Drawing upon the empirical findings from previous IPV research, the factors were chosen to be examined in this study based on their evidenced potential in predicting women’s vulnerability towards IPV within an intimate relationship.

Individual sociodemographic and household characteristics, such as younger age, lower education, poorer health, lower family income, and greater number of young children (Abramsky et al., 2011; Fulu et al., 2013; R. Jewkes, 2002), seem to condition a relationship for increased risk of violence, though not consistently so. Additionally, ethnicity brings in cultural ramifications on the gender role norms and beliefs within a relationship and hence impacts the risk of IPV (Sorenson, 1996). Being a migrant is a well-recognized risk factor for in-relationship

violence towards women, especially when a woman is crossing the border to marry the man in the destination country (C. Campbell & Mannell, 2016; Chiu et al., 2016). A woman's childhood history of witnessing IPV between caregivers and her attitudes towards male-dominance in relationship/family life are among the most consistently found predictors of IPV victimization, possibly through shaping one's beliefs in gender roles and relationship norms (Abramsky et al., 2011; Fehringer & Hindin, 2009; Flood & Pease, 2009; L. L. Heise, 1998). The length of time since a subject first knew of her HIV diagnosis is also considered an explanatory factor, as per literature duration of HIV diagnosis conditions better cope with HIV over time (Tsevat et al., 2009).

At the couple level, relative levels of education and statuses of employment of the couple were found to differentiate the risk of IPV for women when relative situations challenge the existing norms and threaten the men's power (Anderson, 1997; Macmillan & Gartner, 1999). We expected that higher education or better employment relative to the male partner for women would pose greater risk of IPV. Couple behaviors in alcohol consumption and drug abuse were also frequently found associated with IPV (R. Jewkes, 2002; R. Jewkes, Levin, & Penn-Kekana, 2002). Frequent drinking or using illicit drugs by both women and men have been implicated in the process of poor decision making that often precedes violent acts. Two HIV specific relational factors were of interest in the study: couple HIV seroconcordance, and the mode of disclosure of HIV status to current partner. Living with HIV presents a spectrum of physical and mental stressors on both parties in a relationship, which can lead to escalated conflicts. For HIV positive women, we hypothesized that longer time knowing her diagnosis will decrease a woman's risk of IPV victimization, an HIV negative partner predicts greater risk of IPV, and

HIV status disclosure to the partner by means other than the woman's choice would end with higher rates of IPV.

Perception of social support has proved to be critical for women in sustaining positive affection, feeling valued and loved, and in being protected from maladaptive outcomes (Levendosky et al., 2004; McDowell & Serovich, 2007). The availability of support from the intimate partner is especially critical in assessing the risk of IPV, and different types of support have different ramifications on relationship dynamics (Cutrona, 1996). Perceiving spouse as a confidant is known to mark effective communication within a relationship, which is henceforth less prone to aggressive tactics when conflicts arise (E. Hoffman, Nishimura, Isaacs, & Kaneshiro, 2013; Lee, 1988). However, reliance on partner for instrumental support could limit a woman in having a say in things and render her more vulnerable to violence (Ferraro & Johnson, 1983; Levendosky et al., 2004). Our study cross-sectionally examined how the risk of IPV among these women was associated with perceived availability of three types of social support (confidant, social participation, and tangible help), as well as with varying sources (from partner or not) of respective support. We expected that the availability of each type of support would be associated with lower risk of IPV, but spousal provision of support will only be protective when the partner was perceived to be a confidant.

We chose to study IPV for HIV positive women in Ruili, China's southwest border area. Ruili holds a special place in the history of China's HIV epidemic as the location where the first outbreak of AIDS in China was unveiled among 146 injection drug users in 1989 (E. Yu et al., 1996). A mountainous and permeable border is shared between Ruili and Myanmar, the country housing the world's second largest producer of illicit opium. When HIV infection was first introduced to this area, needle sharing fueled the transmission of HIV along the routes of drug

trafficking for which Ruili has been an active hub (Beyrer et al., 2000). Intravenous drug use mediated transmission has been surpassed in recent decades by heterosexual transmission as the main modality of new HIV acquisition (Z. Li et al., 2010; Lu et al., 2008). At the time of study, over 3,000 people were living with HIV in Ruili, more than half of whom are women. Aside from the subgroup of female sex workers, local HIV positive women mostly live in the rural ethnic communities surrounding the township, and these women are the focus of this study.

Sharing a highly permeable border with Myanmar on three sides, Ruili historically has seen a constant flow of cross-border population movements driven by trading and heroin-dealing. An unknown but substantial number of local women diagnosed with HIV were immigrants from Myanmar, either having moved to Ruili for work or by marrying a Chinese man. The Myanmar migrant women started drawing public health attention because a higher prevalence of HIV was discovered among them than for the Chinese-borne females (Zheng et al., 2009). When existing body of research largely pointed to added vulnerability to partner violence among cross-border migrant women, especially when the reason of migration is through marriage, very little was known about how the risk of IPV intersects with living with HIV and also being a cross-border migrant. This study population provides a valuable opportunity to explore the answers.

At the time of the study, Ruili had a population over 180,000 with more than 3000 people living with HIV/AIDS, and over half of them were women, many of whom acquired the infection from a drug-using sexual partner (Z. Li et al., 2010). This concentrated epidemic lays out a unique platform for studying the HIV positive women's experience with IPV within a multi-cultural setting. We believe that examining women's IPV experience while living with HIV and identifying the risk factors in such a population will be able to fill a significant gap in

knowledge, inform programs serving women living with HIV about where to look for increased risk of IPV and what can be targeted in intervention.

B. Methods

1. Study setting

The study was conducted in Ruili, a land-locked city surrounded by mountainous rural villages adjacent to Myanmar on the southwestern border of China. As China's epicenters for HIV/AIDS, Ruili had near 1,800 women living with HIV by the end of 2012. Ruili Center for Disease Control and Prevention constitutes the city's sole local deputy for HIV/AIDS testing, care management, service provision, and multi-sector coordination. Two main local non-government organizations (NGO) also work with RCDC to carry out their outreach and peer education programs for people living with HIV/AIDS: 1) the Home of Red Ribbon, chartered in 2005, specializes in antiretroviral treatment related counseling and peer education; 2) The Ruili Women and Children Development Center, launched in 2000, hosts a number of local initiatives for the welfare and empowerment of HIV positive women and children.

Ruili is exceptionally multi-ethnic and one third of the residents are Dai. In addition, nearly 10% are Jingpo, many of whom still reside within their own ethnic rural communities. The rest of Ruili's population is largely Han, the major ethnic group in mainland China, and they are more geographically scattered across Ruili (Ruili Municipal People's Government, 2012).

2. Participants and procedures

A convenience sample of HIV seropositive women were recruited through the RCDC, four district clinics and the two local NGOs. Eligible participants needed to be female between the age of 18 to 59 years, born in Ruili or Myanmar (as self-reported), having cohabitated with a husband or boyfriend (non-casual sexual or romantic male partner) during the past 12 months,

cognitively capable to give informed consent, and having been confirmed seropositive for HIV for more than six months. The six months window since infection was selected because the mental distress of learning an HIV diagnosis can be initially overwhelming. Being asked about IPV during this difficult period could exert additional and unnecessary stress on the women. In addition, the immediate post-diagnosis period is an emotionally tumultuous time when normal social patterns, relationships, and behaviors may be temporarily disrupted.

Potential participants were told about the study at the physicians' offices or the NGOs' activity sites, or through regular home visits or phone calls made by CDC staff, community physicians or peer educators. Those women who showed interest in participation were instructed to contact a research team member for more information and voluntary participation. Following screening to confirm eligibility, informed consent was obtained. The data were collected in private through face-to-face interviews conducted by trained interviewers. The interviews were anonymous and no identifiable information was collected at any part of the study.

Overall, 223 women provided consent for the study. Of these participants, 219 were able to provide complete data on the IPV measurement for recent physical/sexual IPV outcomes. The remaining four subjects were either not able to answer all the recent IPV questions or stopped prematurely before the IPV section could be started. The analysis of data was based on the 219 subjects whose outcome data were complete.

Participants received cash compensation for their time spent on and transportation to participation, in the amount equivalent to \$9. The study was approved for the protection of research subjects by the University of Illinois at Chicago's Institutional Review Board and Kunming Medical University's Medical Ethics Committee.

3. Measures

The main outcome, intimate partner violence (IPV), is defined by the World Health Organization (WHO) as “any occurrence of one or more violent acts during the past 12 months.” (García-Moreno et al., 2005). The IPV instrument from the WHO Multi-Country Study on Women’s Health and Domestic Violence, which was used in Asian countries including Japan and Thailand, but not in China or Myanmar (Garcia-Moreno et al., 2006), was used to gauge levels and frequencies of physical and sexual violent acts perpetrated by an intimate partner over the past year and also during the women’s lifetime. In measuring any recent occurrence of physical and/or sexual IPV, the women were asked to respond “yes” or “no” to 9 questions about specific violent acts. Physical IPV in the preceding 12 months was assessed by asking the women if “your current/ex-husband/boyfriend ever...

- Slapped you or thrown something at you that could hurt you?
- Pushed you or shoved you or pulled your hair?
- Hit you with his fist or with something else that could hurt you?
- Kicked you, dragged you or beaten you up?
- Choked or burnt you on purpose?
- Threatened to use or actually used a gun, knife or other weapon against you?”

Recent sexual IPV was measured by asking the women if in the preceding 12 months “your current/ex-husband/boyfriend ever...

- Physically forced you to have sexual intercourse when you did not want to?
- Forced you to do something sexual that you found degrading or humiliating?
- Did you ever have sexual intercourse you did not want to because you were afraid of what your partner might do?”

Lifetime IPV was assessed by asking the women to respond “yes” or “no” to whether or not they had experienced any of the 9 forms of violence at any time in their life prior to the last 12 months.

As suggested by WHO, reported incidents of physical and/or sexual violence were coded into “any IPV” versus “none” for over-the-past-year and lifetime (Garcia-Moreno et al., 2006). Based on the same recommendation, the severity of physical violence was dichotomized by grouping the acts described in the first two items (“Slapped/thrown something at” and “push/shove/pull hair”) into non-severe physical IPV versus otherwise severe acts.

Socio-demographic characteristics were collected on age, ethnicity, education, migration status, marital status, family size, number of children, household assets, employment status, individual and family annual income. Corresponding partner characteristics were reported by the women. To measure family economic status within the context of a low-income rural community to which most of the participants belonged, we used a household asset chart (Filmer & Pritchett, 2001) to gauge family livelihood and enumerate ownership of assets like modern electronics, vehicles, and livestock. A “wealth index score” was subsequently calculated using the principal component method as recommended by the designers of the measurement.

Relationship factors include relative educational and employment statuses between a couple. To measure the possible effects of educational matching/mismatching on IPV, we categorized each couple’s relative educational attainment into three discrete levels: both partners having the same level of education, the man having a higher education, or the woman having a higher education. As a second proxy of relationship power distribution, a couple’s relative employment status was categorized into one of four groups: both working outside the home

(having paid jobs or businesses), only the male working outside the home, only the female working outside home, and neither working outside home.

Serostatus specific relational factors included male partner's HIV status as reported by the women (positive, negative and unknown), and women's way of disclosing HIV status to partners (self-disclosed, disclosure through couple-testing, partner learned through others, and undisclosed).

The extent to which a participant endorsed male dominance in relationship and family life was assessed using the *Attitudes towards Gender Norms in Family Life Scale* adopted from the WHO Multi-country Study on Women's Health and Life Experience. The scale constitutes 16 items regarding gender norms in relationship and uses "Yes/No" or "Agree/Disagree" response categories that are friendly to participants with low education or literacy. The score, ranging from 0 to 100, was calculated as the percentage of total number of male-dominance statements a subject agreed with over the total number of questions for which she gave valid (non-missing) answers, given that the total number of missing answers did not exceed 8. A higher score suggests a more submissive attitude of woman towards male power in relationship. The Cronbach α for the scale in this study is 0.73, indicating acceptable reliability.

Perceived social support items were drawn from Barrera's Arizona Social Support Interview Schedule (M. Barrera, Jr. & Ainlay, 1983), which has been widely adopted and validated across settings and cultures (Bernazzani et al., 1997; des Rivières-Pigeon et al., 2001; Kaufman et al., 2004), and were used to measure "available network size" represented by the number of perceived support providers. Three types of social support function were selected from Barrera's instrument for their relevancy to IPV: intimate interaction /confidant support ("Who would you talk to about the things that are very personal and private?"), social

participation /companionship support (“Who are the people who you could get together with to have fun or to relax?”), and tangible help /instrumental support (“Who do you feel close to such that you could call on them for help if you were sick or needed a personal loan?”).

The women were asked to nominate up to five people to whom she could go for each type of social support if needed, and to describe her relationship to each person named. The number of names provided under each type of support formed a measure of the size of perceived support, which was subsequently dichotomized into “any perceived support (at least one named)” versus “none”. To examine the effect of both the size of and the male partner’s availability in confidant support, the category of “any perceived (confidant) support” were further divided into four subgroups: partner as the sole confidant, partner and at least one other supporter, only one non-partner confidant, or more than one supporter but none being partner.

To probe for participants’ childhood history of witnessing IPV, participants were asked to recall any incidents of male-on-female violence that she witnessed as a child towards her mother or any other female household members. The answers were categorized into “any history of IPV witness” versus “none” to tap into personal history known to influence IPV.

Health status was self-evaluated by answering a single item drawn from the RAND Medical Outcome Study (Ware, 1992) asking participants to rate their current health as being “poor,” “fair,” “good,” “very good,” or “excellent.

Both participants’ and their partners’ patterns of alcohol consumption over the past year were gauged through questions as to the type, frequency, and quantity of beverages consumed. A participant and her partner then were each coded as either “frequent drinkers” who drank alcohol-containing beverages at least weekly versus infrequent drinkers or non-drinkers. Drug use was measured for both the women and their partners (based on the women’s proxy reports)

by asking about the use of the following illicit drugs over the past year: opium, heroin, non-prescribed methadone or any other opiates/narcotics, cocaine, amphetamine/stimulants/hallucinogens, marijuana, and tranquilizers/downers. Any mention of one or more drugs from the list was coded as “recent drug use” versus “none.”

4. Data analyses

Interview responses were double entered into EpiData 3.1 (Lauritsen & Bruus, 2008), and then analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis determined the frequencies and distributions of the IPV outcomes (recent or lifetime, physical or sexual), socio-demographic characteristics, and additional candidate explanatory variables. Bivariate crude associations between the *a priori* candidates and recent physical or sexual IPV were determined using *t* tests (for continuous variables), *chi* square statistics (for 2×2 tables) and bivariate logistic regression (for comparisons across more than 2 categories). Upon the discovery of differential univariate association patterns for the two types of IPV, multivariate logistic regression assessed the adjusted effects of the hypothesized risk factors on the two types of IPV outcomes, recent physical and sexual IPV, respectively.

All candidate variables were evaluated for their effects on the two types of IPV, and a liberal approach applied to selecting factors to remain in the multivariate model. Variables of *a priori* interest that did not show a significant crude effect but reached the prescribed significance level ($\alpha=0.25$) on the IPV outcomes were subsequently tested in multivariate modeling. Variables that lacked variability across the sample (i.e. having less than 10% of the total participants differing from the rest) were excluded from the model testing. Some variables believed to be important for IPV, including gender-norm attitudes, childhood history of witnessing IPV, and partner illicit drug use, were also tested in the multivariate model regardless

of their lacking of bivariate effect on the outcomes, and were excluded from the final models due to persistent absence of associations. Well-known factors for the risk of IPV, including partner drug use, number of cohabiting young children, childhood history of witnessing IPV and women's gender role attitudes, were individually entered into the final models regardless of their bivariate association with the IPV outcomes in order to examine the adjusted effects. Those factors would only be removed from the final models when they did not show any effects on the outcomes nor on other factors' relationship with the outcomes. The final multivariate models would always be adjusted for subject age, ethnicity and spousal ethnicity.

C. Results

1. Sample characteristics

Table V reports the socio-demographic characteristics of the participants, alongside the distribution of corresponding partner characteristics as reported by the women. More than half of the women were between 31 and 40 years of age, with a median age of 37. Most (90.4%) are married to the current partner, and over 75% have at least one co-residing child under 18 years old. Fifty-one women (23%) were originally from Myanmar, of whom 43 (84%) moved to Ruili through marrying a Chinese man, while the remainder came for multiple reasons that included moving with family and looking for work. Forty-nine (96%) had lived in Ruili for more than 5 years. Most women in this study (63%) were of Dai ethnicity, followed by Jingpo and Han (16% each).

The women were largely low on the education ladder, with about 34% having never been schooled and only a few (n=6) having met the state-subsidized "9-year compulsory education" requirement (9th year equivalent to the 8th grade in the North American system). Their male partners were slightly more educated, with only 27% never going to school, and over 12%

having more than 9 years of schooling. According to the local statistics, 2012 annual *per capita* disposable income in Ruili was \$3,085 and rural *per capita* income was about \$915 annually at the time of data collection (Ruili Bureau of Statistics, 2013). In this study the reported family annual income median was \$1,640 for a family of four and the personal earning median was \$530, indicating that most participants are economically disadvantaged. About 40% of participants and over 60% of their partners sought some form of paid employment outside the home over the preceding year (Table V).

About two thirds of the women had been diagnosed with HIV for five years or more at the point of interview. Although more than 97% were already linked to care and started on antiretroviral therapy, 69 (31.5%) perceived their current health to be fair or poor (Table V).

2. IPV outcomes

Of the 219 participants, 13% and 11% reported occurrences of physical and sexual IPV over the preceding 12 months, respectively (Table VI). Reports of lifetime ever victimization of physical and sexual IPV amounted to 30% and 18%, respectively. Among the 29 women who reported recent physical IPV, over 65% reported severe acts that included being kicked, dragged, burnt, or threatened with a weapon. Considered together, the sample prevalence of any type of IPV (physical or sexual or both) occurring in the recent year was 21%, and lifetime prevalence was up to 38%. Of 46 women reporting recent IPV, only seven reported concurrently victimization of both types of IPV, indicating that coexistent physical and sexual IPV was relatively uncommon in this group. As such, associations between the explanatory factors and recent IPV were explored separately under the two types of violence.

TABLE V. PARTICIPANT AND PARTNER CHARACTERISTICS

<u>Participant Characteristics</u>			<u>Partner Characteristics</u>		
Total N = 219			Median (range) or n (%)		
Age		37 (23 – 59)			
Married		198 (90.4)			
From Myanmar		51 (23.3)			
Number of young children	0	53 (24.2)			
	1	122 (55.7)			
	>= 2	44 (20.1)			
Income last year (in \$ equivalent)	Family	1,640 (0 – 16,400)			
	Individual	530 (0 – 6,560)			
Ethnicity	Dai	138 (63)	Partner Ethnicity	Dai	93 (42.5)
	Jingpo	35 (16)		Jingpo	31 (14.2)
	Han	36 (16.4)		Han	79 (36.1)
	Others	10 (4.6)		Others	9 (4.1)
Education	Never schooled	74 (33.8)	Partner Education	Never schooled	60 (27.4)
	<= 9 years	139 (63.5)		<= 9 years	131 (59.8)
	>= 10 years	6 (2.7)		>= 10 years	22 (10)
Worked outside home last year		88 (40.2)	Partner worked outside home		140 (63.9)
Alcohol use	Not drinking at all	130 (59.4)	Partner alcohol use	Not drinking at all	53 (24.2)
	Drink at least weekly	3 (1.4)		Drink at least weekly	59 (26.9)
Any drug abuse last year ^a		11 (5)	Partner drug abuse last year ^a		52 (23.7)
Years since HIV diagnosis	>= 5	146 (66.7)	Partner HIV serostatus	Positive	124 (56.6)
	2-4	57 (26)		Negative	81 (40)
	< 2	13 (5.9)		Unknown	14 (6.4)
Self-rated health	Fair or poor	69 (31.5)			
	Good to excellent	150 (68.5)			

^a Use of any of the following illicit drugs over the past year: opium, heroin, non-prescribed methadone or any other opiates/narcotics, cocaine, amphetamine/stimulants/ hallucinogens, marijuana, and tranquilizers/downers.

TABLE VI. IPV REPORTED AMONG THE SAMPLE POPULATION

Physical IPV	Recent ^a	29 (13.2%)
	Recent severe ^b	19 (65.5% ^c)
	Lifetime	65 (29.7%)
Sexual IPV	Recent	24 (11%)
	Lifetime	40 (18.3%)
Both IPV	Recent	7 (3.2%)
	Lifetime	22 (10%)
Any IPV	Recent	46 (21%)
	Lifetime	83 (37.9%)

^a “Recent” is defined as occurrences during the past 12 months throughout the tables.

^b “Severe” is defined as any acts of physical violence beyond the first two groups as described.

^c For the severe IPV, the denominator of the percentage is n=29.

3. Bivariate associations

Unadjusted associations were examined between the set of candidate explanatory variables and respective type of recent IPV (physical or sexual). When examined against the two types of recent IPV, some common candidate predictors appeared to be associated with both types of IPV, while others are only associated with one type (Table VII).

For recent occurrence of physical violence, the male partner’s ethnicity, but not the woman’s, appears to differentiate risks of recent IPV. Men of Jingpo ethnicity were reported having greatest rate of IPV perpetration, and an ethnic Dai partner appeared to be the least prone to violence. The highest rate of recent physical IPV victimization was reported by the women whose education level higher than their partners (n=27, 13%) among all combinations of couple relative education levels.

TABLE VII. BIVARIATE ASSOCIATIONS BETWEEN CANDIDATE INDEPENDENT VARIABLES AND RECENT PHYSICAL/SEXUAL IPV

Total N = 219			Any recent physical IPV			Any recent sexual IPV		
Factor/Covariate	Subgroup total		Yes (n=29) n (row %)/ Mean (stdv)	No (n=190) n (row %)/ Mean (stdv)	<i>p</i> ^a	Yes (n=24) n (row %)/ Mean (stdv)	No (n=195) n (row %)/ Mean (stdv)	<i>p</i> ^a
<i>Socio-Demographic</i>								
Age block	41 or older	59	6 (10.2)	53 (89.8)	0.95	8 (13.6)	51 (86.4)	0.99
	31-40	112	13 (11.6)	99 (88.4)		15 (13.4)	97 (86.6)	
	30 or younger	48	5 (10.4)	43 (89.6)		6 (12.5)	42 (87.5)	
Ethnicity	Han and others	46	6 (13)	40 (87)	0.17	6 (13)	40 (87)	0.027
	Jingpo	35	8 (22.9)	27 (77.1)		8 (22.9)	27 (77.1)	
	Dai	138	15 (10.9)	123 (89.1)		10 (7.2)	128 (92.8)	
Partner ethnicity	Han and others	88	10 (11.4)	78 (88.6)	0.003	9 (10.2)	79 (89.8)	0.011
	Jingpo	31	10 (32.3)	21 (67.7)		8 (25.8)	23 (74.2)	
	Dai	93	8 (8.6)	85 (91.4)		6 (6.5)	87 (93.5)	
Household wealth index	Lower half	110	18 (16.4)	92 (83.6)	0.17	15 (13.6)	95 (86.4)	0.2
	Higher half	109	11 (10.1)	98 (89.9)		9 (8.3)	100 (91.7)	
Origin/migration status	Chinese-born	168	21 (12.5)	147 (87.5)	0.6	17 (10.1)	151 (89.9)	0.5
	Myanmar-born	51	8 (15.7)	43 (84.3)		7 (13.7)	44 (86.3)	
<i>Household</i>								
Number of young children	Two and more	44	9 (20.5)	35 (79.5)	0.18	4 (9.1)	40 (90.9)	0.91
	One	122	16 (13.1)	106 (86.9)		14 (11.5)	108 (88.5)	
	None	53	4 (7.5)	49 (92.5)		6 (11.3)	47 (88.7)	
Household size	>= 6 members	39	4 (10.3)	35 (89.7)	0.74	1 (2.6)	38 (97.4)	0.18
	4-5 members	100	15 (15)	85 (85)		13 (13)	87 (87)	
	<= 3 members	80	10 (12.5)	70 (87.5)		10 (12.5)	70 (87.5)	

TABLE VII (continued)
 BIVARIATE ASSOCIATIONS BETWEEN CANDIDATE INDEPENDENT VARIABLES AND RECENT
 PHYSICAL/SEXUAL IPV

Total N = 219			Any recent physical IPV			Any recent sexual IPV		
			Yes (n=29) n (row %)/ Mean (stdv)	No (n=190) n (row %)/ Mean (stdv)	<i>p</i> ^a	Yes (n=24) n (row %)/ Mean (stdv)	No (n=195) n (row %)/ Mean (stdv)	<i>p</i> ^a
Factor/Covariate	Subgroup total							
<i>Relationship Norms</i>								
Attitude score for male-dominance in relationship ^b			27.1 (18.0)	27.0 (16.1)	0.97	26.5 (15.7)	27.1 (16.5)	0.88
Education level relative	Woman higher	27	8 (29.6)	19 (70.4)	0.02	3 (11.1)	24 (88.9)	1.00
	Man higher	52	7 (13.5)	45 (86.5)		6 (11.5)	46 (88.5)	
	Same level	134	13 (9.7)	121 (90.3)		15 (11.2)	119 (88.8)	
Employment status relative	Both worked	59	9 (15.3)	50 (84.7)	0.51	5 (8.5)	54 (91.5)	0.003
	Woman worked, man not	29	6 (20.7)	23 (79.3)		9 (31)	20 (69)	
	Man worked, woman not	81	9 (11.1)	72 (88.9)		7 (8.6)	74 (91.4)	
	Both did not work	49	5 (10.2)	44 (89.8)		3 (6.1)	46 (93.9)	
<i>HIV Specific</i>								
Ways of HIV disclosure to partner	Undisclosed	14	0	14	0.13	1 (7.1)	13 (92.9)	0.81
	Third-party disclosed	43	9 (20.9)	34 (79.1)		6 (14)	37 (86)	
	Tested-together	94	14 (14.9)	80 (85.1)		11 (11.7)	83 (88.3)	
	Self-disclosed	68	6 (8.8)	62 (91.2)		6 (8.8)	62 (91.2)	
HIV concordance	Unknown	14	2 (14.3)	12 (85.7)	0.78	3 (21.4)	11 (78.6)	0.023
	Concordant	124	18 (14.5)	106 (85.5)		18 (14.5)	106 (85.5)	
	Discordant	81	9 (11.1)	72 (88.9)		3 (3.7)	78 (96.3)	
Years since HIV diagnosis	≥ 5 years	146	23 (15.8)	123 (84.2)	0.08	16 (11)	130 (89)	0.59
	< 5 years	70	5 (7.1)	65 (92.9)		6 (8.6)	64 (91.4)	
<i>Risk History and Behaviors</i>								
Partner drinking at least weekly	Yes	59	16 (27.1)	43 (72.9)	< 0.001	12 (20.3)	47 (79.7)	0.007
	No	160	13 (8.1)	147 (91.9)		12 (7.5)	148 (92.5)	

TABLE VII (continued)
 BIVARIATE ASSOCIATIONS BETWEEN CANDIDATE INDEPENDENT VARIABLES AND RECENT
 PHYSICAL/SEXUAL IPV

Total N = 219			Any recent physical IPV			Any recent sexual IPV		
			Yes (n=29) n (row %)/ Mean (stdv)	No (n=190) n (row %)/ Mean (stdv)	<i>p</i> ^a	Yes (n=24) n (row %)/ Mean (stdv)	No (n=195) n (row %)/ Mean (stdv)	<i>p</i> ^a
Factor/Covariate	Subgroup total							
Partner using any illicit drugs	Yes	52	9 (17.3)	43 (82.7)	0.34	7 (13.5)	45 (86.5)	0.43
	No	157	19 (12.1)	138 (87.9)		15 (9.6)	142 (90.4)	
Childhood witness of IPV		92	15 (16.3)	77 (83.7)	0.27	12 (13)	80 (87)	0.31
<i>Perceived Social Support</i>								
Availability of confidant support	Yes	197	24 (12.2)	173 (87.8)	0.17	20 (10.2)	177 (89.8)	0.25
	No	22	5 (22.7)	17 (77.3)		4 (18.2)	18 (81.8)	
Source and size of perceived confidant support	≥2 confidants (non-partner)	73	11 (15)	62 (85)	0.03	8 (11)	65 (89)	0.46
	One confidant (non-partner)	55	11 (20)	44 (80)		7 (12.7)	48 (87.3)	
	Partner + other(s)	51	2 (3.9)	49 (96.1)		5 (9.8)	46 (90.2)	
	Partner only	18	0 (0)	18 (100)		0 (0)	18 (100)	
	None available	22	5 (22.7)	17 (77.3)		11 (14.3)	66 (85.7)	
Availability of companionship support	Yes	178	22 (12.4)	156 (87.6)	0.39	20 (11.2)	158 (88.8)	0.82
	No	40	7 (17.5)	33 (82.5)		4 (10)	36 (90)	
Availability of tangible support	Yes	195	26 (13.3)	169 (86.7)	0.91	21 (10.8)	174 (89.2)	0.8
	No	24	3 (12.5)	21 (87.5)		3 (12.5)	21 (87.5)	

^a *p*: estimated by *Chi*² for categorical explanatory variables and Student *t*-test for scalar variables. Italic numerals flag a significance level below 0.25 where the association will be further examined in the multivariate model.

^b Score reflects the extent to which a subject endorses male domination in relationship and family life.

None of the HIV specific factors were found significantly associated with recent physical IPV in bivariate assessment although noticeable trends are present that higher rates of recent physical IPV were reported by those knowing their HIV diagnosis over five years and those whose partner knew of her HIV status through a third-party (versus through self-disclosure or couple-testing). Since very few women drank frequently, the effect of alcohol consumption pattern was only examined for the partners, and a man who drank weekly or more often were found to perpetrate physical IPV more often than one who did not drink as frequently or not drink at all.

Of all three types of social support examined, only perceived availability of confidant support was correlated with reduced rate of recent physical IPV. Further categorizing of confidant support by source and size suggested that partner provision of the support is highly protective, regardless of whether he was named the sole confidant or was one of the confidants. When the partner was not named a confidant, the risk of recent physical IPV was only lower among the women perceiving support from more than one confidant. In order to clarify the role of partner, perceived confidant support from partner with or without other confidant supporters was henceforth collapsed into a single category to be compared with other variations of perceived confidant support in further multivariate regression.

For the risk of recent sexual IPV, both the women's and the partners' ethnicity had a significant crude effect, in that recent occurrences seemed to concentrate among the Jingpo ethnic group. Relative to all other combinations of employment statuses within couples, women who sought work outside home while their partners did not were at substantially increased risk of recent sexual IPV. Frequent drinking by the male partner was similarly associated with greater risk of sexual IPV. For these HIV positive women, more occurrences of recent sexual IPV were

reported by those whose partners were also known to be HIV positive. None of the three types of social support seemed to have any association with recent sexual IPV.

No bivariate associations were found between any of the two types of recent IPV and migration status as hypothesized (Table VII). In next step, multivariate adjusted regression still tested migration status and other candidate risk factors that did not seem associated with IPV when unadjusted: age, individual/family incomes, women's attitudes towards gender role norms, their childhood history of witnessing IPV, and male partners' illicit drug use.

4. Multivariate adjusted model of recent IPV

The binary outcomes, recent physical and sexual IPV (any versus none), were modeled, respectively, via multivariate logistic regression on the set of candidate explanatory variables emerging through bivariate analyses. Although not significantly predictive of IPV outcomes by themselves, some variables remained adjusted for in the final models of both types of recent IPV: age, migration status, ethnicity of the participants, and household wealth index.

Models that compare factors associated with recent physical and sexual IPV are compared side by side in Table VIII. In these multivariate regression models, partner ethnicity and partner frequent drinking remained significantly associated with the risks of both recent physical and sexual IPV. Regardless of the women's ethnicity, the male partners' ethnicity differentiated the risk of each type of IPV. Among all women, those with a Jingpo partner had a markedly increased risk of recent physical IPV (AOR = 30 vs. partner of Han or other ethnicity, $p = 0.004$). For the risk of recent sexual IPV, a Dai partner appeared to be least prone to perpetration (AOR = 0.2 vs. partner of Han or other ethnicity, $p = 0.04$). Relative to men who did not drink or drank less frequently, a partner drinking once a week or more often increased the woman's risk

of recent physical IPV for about nine times ($p = 0.001$), and also increased her risk of recent sexual IPV for 3.5-fold ($p = 0.02$).

A couple's relative education level was no longer associated with the risk of recent physical IPV after multivariate adjustment. On the other hand, a couple's relative working status remained a predictor for the woman's risk of recent sexual IPV; in a relationship where only the woman worked outside home, her risk of recent sexual IPV victimization was almost six times greater ($p = 0.03$) than the situation where both were not working outside home.

Among HIV specific factors, length of knowing one's HIV diagnosis was no longer associated with recent physical IPV through multivariate adjustment. Among women whose HIV status was known to the current partner through a third-party disclosure,

almost a 6-fold greater risk ($p = 0.01$) of recent physical IPV was seen compared to women who self-disclosed or disclosed while being tested with partner together. For recent sexual IPV, an HIV-concordant partner versus an uninfected partner posed a more than 8-fold ($p = 0.006$) greater risk to the woman.

Perceived confidant support by source and size was found associated with women's experience of recent physical IPV. Perceiving the male partner as a confidant, regardless of additional availability of the support from other social network members, reduced the women's risk of recent physical IPV by nearly 99% ($p = 0.001$) relative to those perceiving no support at all. Among the women who did not name the male partner as a confidant, the protective effect of confidant support was only evident for women who could nominate at least two confidants relative to those with no confidant in mind (AOR = 0.15, $p = 0.04$). None of the three types of perceived support were associated with the risk of recent sexual IPV after multivariate adjustment.

TABLE VIII. FACTORS ASSOCIATED WITH RECENT PHYSICAL IPV OR RECENT SEXUAL IPV, RESPECTIVELY, AMONG HIV POSITIVE WOMEN IN RUILI, CONFIRMED VIA MULTIVARIATE ADJUSTED LOGISTIC REGRESSION

Factors		Subgroup n (%)	<u>Physical IPV</u>	<u>Sexual IPV</u>
			<u>N = 191^a</u>	<u>N = 212</u>
			AOR ^b (95% C.I.)	AOR ^b (95% C.I.)
Partner ethnicity	Dai	82 (42.9)	0.5 (0.1, 2.1)	0.2 (0.05, 0.9)*
	Jingpo	29 (15.2)	30.2 (2.9, 314.9)**	1.1 (0.1, 9.2)
	(vs. Han and others)	80 (41.9)		
Education relative	Woman higher	26 (13.6)	3.0 (0.7, 14.1)	-
	Man higher	47 (24.6)	1.7 (0.4, 6.6)	-
	(vs. same level)	118 (61.8)		
Employment relative	Both worked outside home	56 (26.4)	-	1.1 (0.2, 6.3)
	Woman worked, man not	29 (13.7)	-	5.9 (1.2, 29.7)*
	Man worked, woman not	78 (36.8)	-	1.6 (0.3, 7.8)
	(vs. Both did not work outside home)	49 (23.1)		
Partner HIV status	Unknown	13 (6.1)	-	6.0 (0.7, 52.6)
	Positive	120 (56.6)	-	8.6 (1.8, 39.8)**
	(vs. Negative)	79 (37.3)		
Mode of HIV disclosure to partner	By a 3rd-party (vs. Self-disclosed or tested together)	39 (20.4) 152 (79.6)	5.9 (1.5, 22.8)**	-
Years since HIV diagnosis	≥ 5 years (vs. < 5 years)		1.7 (0.4, 7.9)	
Source and size of perceived confidant support	≥2 confidants (no partner)	60 (31.4)	0.1 (0.02, 0.9)*	-
	Partner only or partner + other(s)	67 (35.1)	0.01 (0.001, 0.2)**	-
	One confidant (not partner)	46 (24.1)	0.5 (0.1, 2.7)	-
	(vs. None available)	18 (9.4)		
Partner alcohol use	Drinking at least weekly (vs. non-frequent/not drinking)	53 (27.7) 138 (72.3)	9.0 (2.5, 32.4)**	3.5 (1.2, 10.1)*

^a Model excluded 14 participants who did not disclose HIV status to partner.

^b AOR: Adjusted odds ratio. Italic numerals where followed with *: $0.01 < p \leq 0.05$; **: $p \leq 0.01$. Both models have been adjusted for age, ethnicity (participant), migration status, and household wealth index in addition to the listed variables.

D. Discussion

This study is, to our knowledge, the first to examine frequencies and determinants of two types of IPV among women living with HIV in China. Intimate partner violence was self-reported at a notable rate with approximately one out of every eight women reporting at least one occurrence of physical or sexual IPV in the last 12 months. With little overlap between reports of physical versus sexual IPV, the accumulated prevalence of IPV among the 219 women amounted to more than 20% for recent occurrence, and nearly 40% for lifetime occurrence. Our findings of IPV rates are consistent with those of China and other countries for women in general (Decker et al., 2013; Parish et al., 2004; Siemieniuk et al., 2013; X. Xu et al., 2005; C. Zhang et al., 2012) and for those living with HIV (Dhairyawar, Tariq, Scourse, & Coyne, 2013; Pantalone, Rood, Morris, & Simoni, 2014; Wilson et al., 2015).

As anticipated by the study theorization, an array of partner and relationship factors were found to play a role in determining the risk of recent IPV for women living with HIV in Ruili. A finding unexpected is that physical and sexual IPV did not tend to occur concurrently in most women in our study. Physical and sexual IPV have conventionally been studied as a combined outcome and rarely were etiologic distinctions drawn between these two types of IPV. In fact, other researchers have observed that women often fall victim to both types of IPV at the same time, regardless of their HIV serostatus (Abramsky et al., 2011; J. C. Campbell et al., 2008; Dunkle et al., 2004; Rachel Jewkes et al., 2010). When the occurrence of the two types of IPV did not overlap in this study, we were obliged to analyze them as distinct outcomes and did find evidence suggestive of differential mechanisms.

Greater risk of recent sexual IPV was found to be associated with an HIV seroconcordant partner for the women living with HIV. On the other hand, couple HIV status showed no effect

on the risk of physical IPV. The finding was opposite to the study hypothesis that a HIV-positive woman with a HIV negative partner would be more vulnerable to violence as a target of blame relative to women with a HIV positive partner. However, a few sample biases could be involved here in speculating the possible reasons. First, it seems likely that a HIV negative partner may avoid having sex with HIV positive woman for averting transmission. A HIV seroconcordant partner, on the contrary, could feel less inhibited about having sex with the woman, and this might result in more frequent sexual acts overall within a seroconcordant relationship than seen with a discordant couple. Alternatively, Frye, et al. have shown that perpetration of IPV by a HIV positive man was correlated with poor coping and psychological distress (Frye et al., 2007), suggesting that the stress of living with HIV on men can lead to escalated aggression towards female partners. Secondly, ongoing couple counseling support is more available to and accessed by serodiscordant couples in Ruili due to the widely seen emphasis on prevention by local public health practice, which might also have contributed to the lowered risk of IPV seen among the discordant couples. Unfortunately, our study did not measure the frequencies of sexual acts in or counseling service received by the couples. Nonetheless, the finding of the association (or lack thereof) with IPV of couple relative HIV serostatus is novel and warrants further research since few studies have examined the relative risk of IPV between HIV concordant and discordant couples.

When a woman's HIV status was known to her partner through a third-party instead of self-initiated disclosure or disclosure through couple-testing process, elevated risk of recent physical IPV often followed. Since it is known that couples testing process in Ruili is paired with extensive couple counseling service, it seems that the absence of women's willingness or readiness of effective couple communication in disclosure coincides with increased risk of IPV.

This finding is in keeping with the literature on HIV disclosure and IPV, which suggests that disclosure to partner when not well supported by effective means of communication often leads to negative consequences, including new onset or aggravated partner violence (Brown, Serovich, & Kimberly, 2016; W. T. Chen et al., 2011; A. Gielen et al., 2000). In Ruili, like in other parts of China, extensive efforts on HIV/AIDS prevention have been directed at encouraging partner notification post testing (Nie, Walker, Qiao, Li, & Tucker, 2015; Z. Wu, Sun, Sullivan, & Detels, 2006), leaving few cases of undisclosed infection between couples (only 6.4% in our sample, and the group was excluded from the multivariate analysis due to analysis difficulty). A couple tested together usually had full access to counseling help provided along, although not measured in our study, which might have counteracted the onset of conflicts surrounding the test results. Self-initiated disclosure may also be a marker of a more caring and understanding relationship in which violence is less likely to occur. Conversely, when a male partner learns of a woman's HIV status through others, instead of by the woman's choice, it may lead to anger, lingering resentment, and escalation to violence. Due to the cross-sectional nature of this study, these types of temporal sequences cannot be established.

The highly protective effect of women's perceived availability of confidant support against recent physical IPV is expected. A woman was most protected from IPV when she perceived the partner a confidant, either as the sole provider of such support or with additional support from others. If the partner did not provide this form of support, the protective effect would only be evident for those who could name more than one confidant. In other words, when the partner was not perceived a confidant, only increased size of this support could protect women from IPV victimization. This finding is in agreement with the known protective effect of confidant support against IPV (A. C. Gielen, O'Campo, Faden, Kass, & Xue, 1994; Schwarzer & Gutiérrez-Doña,

2005) and also highlights the importance of having the male partner as the source of an intimate emotional support for women living with HIV, or alternatively of an intervention mechanism for IPV by expanding the availability of confidant support to these women. However, the association between IPV and confidant support needs to be interpreted with caution. Social support is known to be associated with IPV bi-directionally; while it can serve as a protective mechanism against the onset of IPV, it can also deteriorate as the violent partner tends to isolate the woman from social resources as a means of control, and/or by her own social withdrawal as a result of the abuse (A.C. Gielen et al., 2001; Levendosky et al., 2004; Mitchell & Hodson, 1983). Nonetheless the strong association suggests that approaches to help women either improve communications with partner or access adequate confidant support need to be part of the ongoing programs for women living with HIV to ameliorate their vulnerability towards IPV.

Male partners' ethnicity played an influential role in differentiating the risk of recent IPV for the women, as expected from the socio-cultural effect of ethnicity on relationship norms (Flood & Pease, 2009; R. Jewkes, 2002; Sorenson, 1996). Men of Dai ethnicity demonstrated the lowest risk for perpetration of both physical and sexual IPV. Dai is the second largest ethnic group in Ruili, following the major ethnic group, Han, in this area of China (Ruili Municipal People's Government, 2012). Of the same origin as Thai, Dai is well known for its female-friendly culture stemming from a matrilineal descent system. Dai women's freedom in mate selection and divorce is endorsed to such an extent that is rarely seen in traditional Han or other ethnicities (Fuquan, 2001; Tian, Li, Zhang, & Guest, 2007). Additionally the codes of behavior for the Dai ethnicity promote harmony in family life and relationships, which is deeply rooted in their Buddhist belief (Limanonda, 1995; Phillips, 1966). Women with a Jingpo partner, on the other hand, appeared to experience greatest risk of IPV, especially recent physical IPV. To date

published anthropology research is largely absent for the Jingpo. Limited studies and anecdotal evidence suggest that the Jingpo society, opposite to the Dai, runs under a strong patriarchal value system, and also is known to highly tolerant of male violent behaviors out of the martial-loving culture (Kui, Juan, Cong, & Huabin, 2007). Since the association between partner ethnicity and IPV is independent of women's gender role attitudes or men's drinking habits, the increased risk may be mostly attributable to the social codes backing male aggression in family life.

Couple relative employment status is believed to differentiate the risk of IPV by influencing consensus over gender role norms within a relationship (S. Y. Choi & Ting, 2008; Macmillan & Gartner, 1999), and was confirmed a risk factor in this study: the greatest risk of recent sexual IPV was seen among couples where women sought work outside home but the men did not, versus all other combinations. Ruili is typical of many rural communities in that along with an emerging regional urban center many present residents pursue economic and employment opportunities outside the traditional agricultural sector. Most of the participants were women from villages, and the prevalent family labor choice was that one or both of the couple sought work off the farmland, partially or completely, to produce family income. The main-stream norm about gender roles stemming in the agricultural tradition, however, still idealizes men to be the primary bread-maker. When women surpassed men in labor-force participation, the male role in relationship norm could be perceived challenged or threatened, and the men would more likely seek other means, including violence, to regain some sense of control. The finding is well in keeping with the feminist and power theories about IPV (Anderson, 1997; Babcock, Waltz, Jacobson, & Gottman, 1993; Coleman & Straus, 1986).

Partner frequent alcohol consumption was accompanied by an elevated risk of both recent physical and sexual IPV among the women as hypothesized and as repeatedly reported by many others (Brecklin & Ullman, 2002; Hershow, Ha, et al., 2020; Hotaling & Sugarman, 1986; R. Jewkes, 2002). Our sample of women was universally abstinent or drinking infrequently, making it impossible to assess the effect of female drinking or couple relative drinking patterns. As suggested by prior studies, both men and women alcohol consumption may be linked to impaired judgement and poor psychological adjustment underpinning onset of violence in relationship, and our study was only able to demonstrate an important association between male drinking and IPV. (Kahler, McCrady, & Epstein, 2003; Kantor, 1997).

Contrary to the migration literature, this study found that being a cross-border migrant from Myanmar versus being a Chinese-borne woman was not predictive of increased risk of IPV victimization. The rates of IPV victimization amongst these Myanmar born and local born women are similarly high. We speculate an explanation for the undifferentiated risk may be that the Myanmar migrants in this sample of women had mostly settled down for long (more than 5 years) and thus they might have become well acclimated to the post-migration life, especially when the receiving communities in Ruili is culturally and ethnically similar to the sending communities in Myanmar due to the historically permeable borders between the Mekong River states. The reduced level of acculturation stress in such a unique setting could have protected the migrant women from added vulnerability to IPV within a cross-border marriage/union. Nonetheless, future research should address the effect of recent migration on IPV.

This study is limited in using a cross-sectional design, thus lacking the ability to draw any causal inferences or conclusions about directionality for some effects. We recruited a convenience sample of women; although according to the estimation from our local liaisons,

more than half of the eligible women in Ruili participated in the study, we have to refrain from extrapolating the results as representative of wider populations. The form of face-to-face interview and the dependence on retrospective self-report also make the data inherently vulnerable to interviewer biases, social desirability bias and recall biases, although we utilized a carefully designed instrument and the rigorous training of interviewers to minimize these potential biases. Another limitation of the study is that the measures of psychological abuse and controlling behaviors were not included in the IPV outcomes. The impact of these types of IPV on HIV positive women's life, however, can be as great as the physical/sexual IPV, and needs to be examined in future research.

E. Conclusion

This study is to our best knowledge the first to examine IPV among women living with HIV in China or throughout Asia. The appreciable magnitude of IPV among these women is an important finding in itself. To date no screening or specific programs in China are available to tackle the issue of IPV for women living with HIV, and our findings call for integration of routine screening into current voluntary counseling and testing and case management, and concurrently preparedness and resources for IPV intervention in counseling and related services for women living with HIV. Our findings highlight an increased likelihood of recent IPV victimization for women living with HIV in association with a series of partner and relationship characteristics, which point out that any IPV intervention strategies for women living with HIV will need to have a focus on male partners risk behaviors and couple engagement.

Overall, this study takes a novel step towards understanding the experience of IPV for women living with HIV in China, where the problem has been largely overlooked to date. The findings of the partner and relational factors that predict the risk of recent physical and sexual

IPV for women living with HIV fill an important gap in the existing body of knowledge about the phenomenon of IPV among an exceptionally vulnerable population. Our findings also point out many new directions for future research as well as new mechanisms to intervene among women living with HIV. Improving the quality of life for HIV positive women would be unattainable without incorporating strategies addressing their vulnerability to partner-perpetrated violence.

VI. AN EXAMINATION OF SATISFACTION WITH INTIMATE PARTNER RELATIONSHIP IN ASSOCIATION WITH QUALITY OF LIFE FOR WOMEN LIVING WITH HIV IN RUILI, CHINA

A. Introduction

The availability of highly active antiretroviral therapy (HAART) has substantially decreased mortality for people living with HIV/AIDS (PLWHA) globally and turned HIV infection into a chronic condition (Murray et al., 2014). Consequently, improving quality of life has become prioritized in the long-term care of PLWHA (Bhatta, Liabsuetrakul, & McNeil, 2017; Catunda, Seidl, & Lemétayer, 2017; Huang, Jones, Bennett, Hall, & Lyons, 2018; Peters, Franke, Tkachenko, Schiffer, & Zimmermann, 2018). While women are being increasingly affected by HIV worldwide, consistent evidence suggests that women living with HIV experience poorer quality of life when compared to their male counterparts (Cederfjäll et al., 2001; Degroote et al., 2014; Ickovics Jr & et al., 2001; Mrus et al., 2005; Wisniewski et al., 2005). Also once a woman is diagnosed with HIV infection, her relationship with an intimate partner can either help or hinder her efforts to cope with the exigencies of HIV treatment and the challenges of living with the infection (Degroote et al., 2014; Preau et al., 2007; Sarna et al., 1999).

Research among the general population has showed that satisfaction with spousal relationship is a critical component of overall sense of life satisfaction and may directly impact health (Janice K Kiecolt-Glaser & Newton, 2001; Janice K. Kiecolt-Glaser & Wilson, 2017) and, in turn, quality of life (Flanagan, 1978; Y. Lin et al., 2020; Michalos, 2013). Studies of married couples consistently found that marital dissatisfaction likely works as a stressor in worsening mental health and subsequently degrading quality of life, especially for wives (Berry & Williams, 1987; Carr et al., 2016). Nonetheless, the role of spousal relationship satisfaction in

quality of life for patients with chronic diseases remains understudied and rarely has been examined for women within the context of living with HIV.

This study examined relationship factors possibly associated with quality of life among a sample of HIV-positive women living with a male partner in Ruili, China. As the location of China's first AIDS outbreak in 1989, Ruili has been regarded as one of the nation's epicenters for HIV/AIDS and provides an ideal setting for the study (E. S. Yu, Q. Xie, K. Zhang, P. Lu, & L. L. Chan, 1996). Sitting on the highly permeable border between China and Myanmar, Ruili houses a large scale mobile population frequently crossing the border in seek of opportunities in various trades. Among them are many women from poverty stricken rural areas in Myanmar moving to Ruili via marital unions with Chinese men, thus adding to the heterogeneity of local Ruili demographics (Chantavanich et al., 2002; Holliday, 2010). Such demographic diversity offers a valuable opportunity to examine the effects of spousal relationships on quality of life among both native-born and migrant women living with HIV in China.

Despite spousal relationship research flourishing in western societies while also emerging in some African countries, research examining quality of life for women living with HIV in the context of an intimate partnership appears nascent in Asia. To address this omission, we sought to answer the question: Is relationship satisfaction with a current male intimate partner associated with quality of life among HIV-positive women living in Ruili, China? In posing this query we recognize that perceptions of health-related quality of life (HRQL) constitute an essential domain of the overall assessment of quality of life for HIV-positive women (McDonnell et al., 2000). Consequently, we conceptualize HIV-positive women's HRQL, as measured by their personal assessment of their mental and physical health, to be a central subconstruct of their self-rated overall quality of life that encompassing more facets beyond

health, such as culture and environment (Ferrans et al., 2005). Our analyses also take into account that women in Ruili are not homogeneous and that their experiences living with HIV can differ by personal characteristics including local ethnicity and cultural background.

1. HIV and women in China

China has seen a rapid increase in sexual transmission of HIV in recent decades that has surpassed intravenous drug use as the primary driver of continuing viral spread in the country (CMOH, 2012). As a result of the shifting trend women share an increasing burden of new infections. National data showed that by 2009 the prevalence of HIV among women in China had grown to surpass that of men (UNAIDS, 2009; Zheng et al., 2009), and that newly diagnosed infection among females of child bearing age rose by 60% from 2010 to 2016 (Chen FF, 2018). Similarly, with a population of over 200,000 residents, by 2016 women accounted for about half of the PLWHA in Ruili (Li, Z., RCDC, personal communication, 2016). In contrast to its earlier history as an epicenter for drug-related HIV, heterosexual contact has become the dominant mode of transmission among newly diagnosed HIV cases in Ruili as the AIDS epidemic transitioned over time from high-risk populations to the general population (Jiang et al., 2019).

Current responses to China's HIV/AIDS, however, have not adequately addressed gender-specific needs (K. Lin et al., 2007). Quantitative evidence regarding the quality of life for Chinese women living with HIV has been especially scanty (W. T. Chen et al., 2011; X. Li et al., 2011; YU, LI, Ray Y, et al., 2012). Assessments of the quality of life outcomes and their risk factors among HIV-positive women within China's cultural context are needed urgently in formulating effective intervention strategies and public health policies. This study sets out to fill this gap in knowledge and to inform current HIV/AIDS programs in China.

2. Spousal relationship for women Living with HIV

Given the current dearth of scientific research on quality of life among HIV positive women in China, we turned to the general literature for possible insight. Research has shown that women's satisfaction with their intimate partner relationships plays a central role in their assessment of wellbeing that contributes to quality of life (Hudson, Lucas, & Donnellan, 2020; Janice K. Kiecolt-Glaser & Wilson, 2017; Robert J. Waldinger & Schulz, 2010). For women living with HIV who have a male intimate partner, coping with the diagnosis and care of HIV forms an integral part of the couple's relationship dynamic (Largu et al., 2012). It also likely impacts the woman's perspective of her personal wellbeing (Jiwatram-Negrón & El-Bassel, 2014; Pomeroy, Green, & Van Laningham, 2002).

Little research on PLWHA's quality of life has been conducted from a couple's perspective. The few studies that exist suggest that a woman's disclosure of her HIV serostatus to her partner, the couple's seroconcordance, and the recency of the woman's HIV diagnosis can affect her quality of life, her intimate relationship, or both (Bagheri, Taheri, & Motazedian, 2019). HIV-positive women also are known to be at increased risk of intimate partner violence and other forms of psychosocial stressors within an intimate relationship that can undermine her quality of life (Degroote et al., 2014; Preau et al., 2007; Sarna et al., 1999). Partner risk behaviors, such as excessive drinking and illicit drug use, can fuel relationship discord that may result in poor health outcomes for HIV infected women (Reniers, 2008). Human immunodeficiency virus sero-concordance or discordance within an intimate partner relationship can yield mutual social support, result in interpersonal discord, or a mix of both (Yona, Ismail, Nurachmah, Levy, & Norr, 2019). Time since HIV diagnosis and also disclosure to others may affect women's overall experience of health with possible implications for their quality of life.

For example, a study in Uganda found that people diagnosed with HIV tended to show initially high depressive symptoms, but their symptoms decreased significantly over time. Also early disclosure, especially to a partner, seemed to coincide with higher depressive symptoms at the time, but was followed by decreasing depression scores over longer period up to 6 months after diagnosis (Kiene, Dove, & Wanyenze, 2018).

Personal characteristics also can affect a woman's quality of life irrespective of HIV status. For example, quality of life may deteriorate for individuals experiencing physical and functional declines (Ferrans et al., 2005). Culturally, women's ethnicity or that of her partner can exert normative influences on expectations and judgements that define both the substance and perception of the quality of her life (Taylor, Hembling, & Bertrand, 2015). Migration status also can render migrant women vulnerable to psychological stressors that influence her spousal relationships and health (Tonsing, 2013; Zou et al., 2014). In the case of cross-border marriages, for example, research shows that migrant women are more likely to fall victim to in-relationship violence and experience dissatisfactory relationship than their non-migrant counterparts (Llácer, Zunzunegui, del Amo, Mazarrasa, & Bolúmar, 2007; Yutani, 2007). Social support has been well-established as a personal buffer against life stressors that helps to improve quality of life for the chronically ill (Hostinar & Gunnar, 2015). Among various sources of support, spousal support has demonstrated particular pertinence (Huang et al., 2018; Ma et al., 2015). In addition, family situations surrounding a co-residing couple, including number of household members, can influence the quality of a couple's relationship and the social support that a woman receives. Wide spread evidence consistently supports a correlation between family size and marital satisfaction with factors such as income influencing the extent to which number of children impacts life satisfaction and overall quality of life (Becchetti, Giachin Ricca, & Pelloni, 2013; Z.

Shi, 2016). Meanwhile, higher family economic status, including household wealth, has been shown to predict greater satisfaction with marital life (Jackson, Krull, Bradbury, & Karney, 2017) and a woman's HRQL (Ham, 2011).

Both physical and mental health appear closely tied to relationship satisfaction. In research on chronic care and cancer survivorship, physical health has been found to directly impact the spousal relationship through caregivers' perception of an increased burden of care (Kim, Carver, Spillers, Crammer, & Zhou, 2011; Y. Lin et al., 2020). Meanwhile, some evidence also suggests that relationship satisfaction affects mental health and quality of life by improving personal affect in an intimate relationship (Boyers & Rowe, 2018; Holt-Lunstad, Birmingham, & Jones, 2008). The strength of this association appears greater for women than men, possibly due to women's tendency toward more intensive processing of daily emotional experience within an intimate relationship (Proulx, Helms, & Buehler, 2007). Both physical and mental health constitute the health dimension of overall quality of life. Consequently, the influence of relationship satisfaction on these quality of life components has been proposed as the explanation to how intimate relationships influence one's perception of quality of life (Khaleque, 2004).

3. A theoretical model of how relationship satisfaction affects quality of life among HIV-positive women

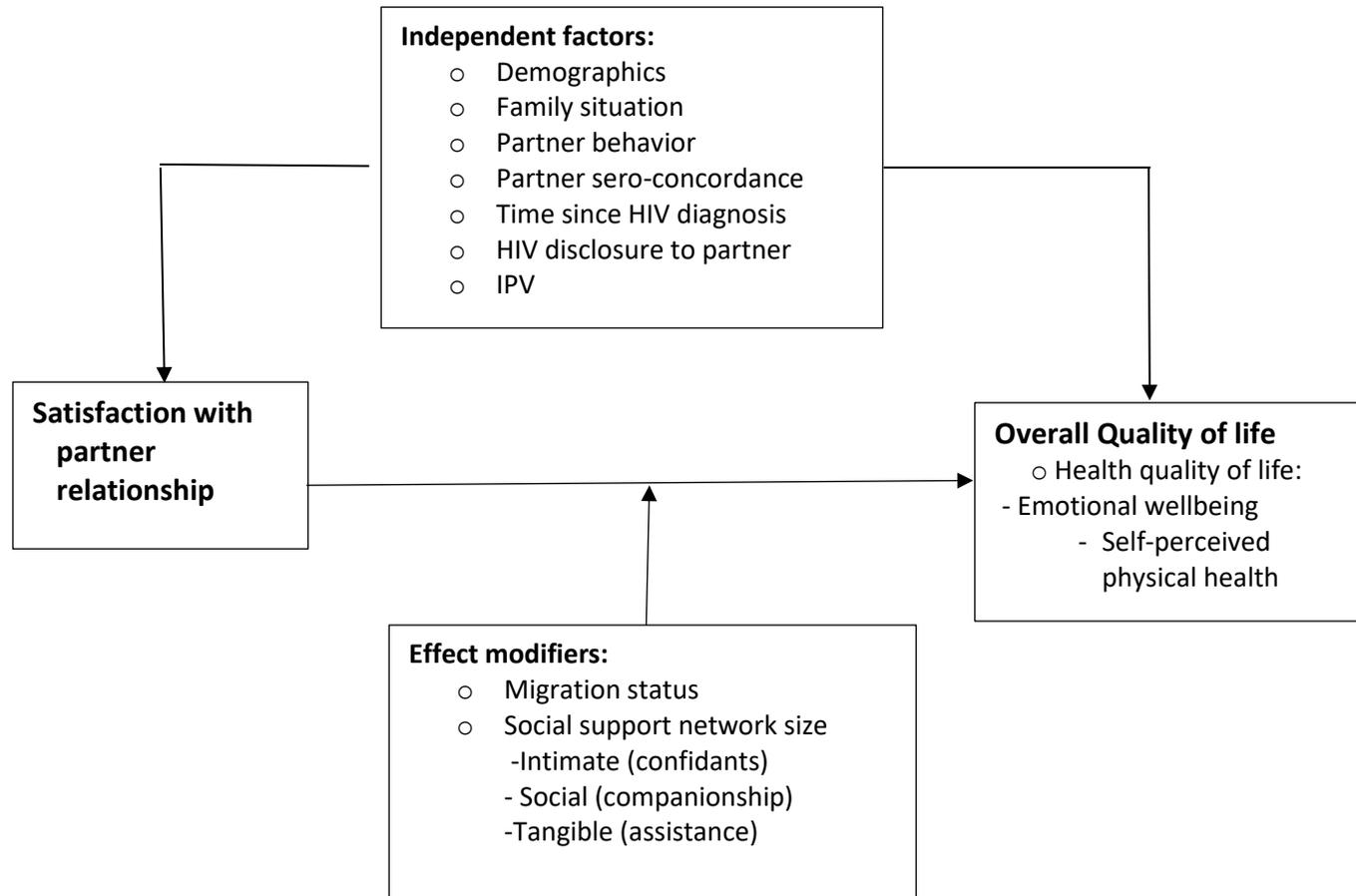
Current popular theories investigating quality of life for PLWHA mostly have focused on barriers to care and support, self-efficacy in coping, and physical health outcomes (Heckman, 2003). The role of intimate relationships has remained minimally studied for PLWHA. Evidence from studying other chronic conditions suggests that marital dissatisfaction contributes to depressive symptoms among post myocardial infarction patients or mental distress among cancer patients (Coyne et al., 2001; Coyne & Smith, 1991; Hagedoorn, Sanderman, Bolks, Tuinstra, &

Coyne, 2008). These findings led to the widely accepted hypothesis that interpersonal relationships affect mental wellbeing and physical health, the major components of a person's HRQL as well as overall quality of life (Berg & Upchurch, 2007; Proulx et al., 2007).

This study is designed to answer the question: Is relationship satisfaction with a current male intimate partner associated with quality of life among HIV-positive women living in Ruili, China? Drawing on a limited literature, we propose the following conceptual framework to guide our research in answering this query (Figure 7).

The model depicts a direct impact of relationship satisfaction on HIV-positive women's self-rated overall quality of life. HRQL as measured by mental wellbeing and self-perceived physical health is conceptualized as a central component of overall quality of life for women living with a major chronic illness. Being a Myanmar migrant (versus local-born) and size of perceived social support networks (three types: intimate interaction, social participation, and tangible assistance) are posited to act as modifiers of the link between relationship satisfaction and overall quality of life. The hypotheses were that quality of life for migrant women (versus local-born) and women with smaller support networks (versus those with larger ones) may be more affected by relationship satisfaction, as perception of greater availability of social support may help to compensate for the detrimental effect of an unsatisfactory partner relationship on a woman's quality of life, and similarly for migrant women who tend to have limited household and other personal resources their reliance on a quality intimate relationship may be elevated. Conversely, smaller social support networks may not offer as much of a buffer to offset the harm of unsatisfactory partner relations on quality of life. To adjust for possible confounding effects, we included the following independent co-factors in our examination: demographics, family and

Figure 7. A theoretical model of the association between relationship satisfaction with a current male intimate partner and quality of life among women living with HIV in Ruili, China



relationship characteristics, time since HIV diagnosis, disclosure to partner, couple sero-concordance, and partner behaviors including alcohol consumption, illicit drug use, and IPV.

B. Methods

1. Participants and procedures

This study was approved for the protection of research subjects by the University of Illinois at Chicago's Institutional Review Board and Kunming Medical University's Medical Ethics Committee.

A convenience sample of HIV seropositive women were recruited through the Ruili Center for Disease Control, four district clinics in Ruili, and two local NGOs serving PLWHA. To be eligible to participate, prospective participants had to be female, between the age of 18 to 59 years, born in Ruili or Myanmar (as self-reported), having a co-habiting male partner during the past 12 months, able to give informed consent, and having been confirmed HIV seropositive for more than six months. The last eligibility requirement was meant to avoid causing possible added distress for participants when they would have to recount personal and sometimes sensitive experiences while simultaneously handling a recent serious health diagnosis.

Prospective participants were told about the study at their physicians' offices, NGO activity sites, during regular home visits, or phone calls made by CDC staff, community physicians or peer educators. A potential subject then voluntarily could contact a research staff member to hear more about the study and, if she wished, to be screened for eligibility and provided informed consent for participation. All participants were interviewed face-to-face, anonymously, and in private by trained interviewers.

In total, 223 women were interviewed of whom five were unable or refused to answer questions that measured key variables of interest. The analysis was based on the 219 women for

whom data were complete. Participants received the equivalent of \$9 USD to compensate for their transportation costs and time spent being interviewed.

2. Measures

Overall quality of life was measured by a single-item visual analogue scale (de Boer et al., 2004). The question asked, “Overall, how would you rate your quality of life?” In answering, participants were provided a colored scale to help anchor their ratings at integers ranging from zero (representing the worst) to 10 (the best). The rating was multiplied by 10 to obtain a final score ranging from 0 to 100. The question has been widely used in health studies and was adopted for its simplicity and validity (Bowling, 2005; Kelley A. Cunny & Perri, 1991).

With a narrowed focus on the health aspect of quality of life, HRQL was self-rated, using a summary index constructed from a 21-item short version of the well-known RAND Medical Outcome Study scale (Bozzette et al., 1994; Bozzette et al., 1995). Bozzette’s validated method generates a weighted average index across the scores of six components of HRQL: role function, pain, physical function, social function, energy/fatigue and emotional wellbeing. The HRQL index score ranges from 0 to 100, with 100 being the highest quality of life. When used in this study, the internal reliability measured by Cronbach’s α for all items is 0.80. The scores of perceived physical health subscale (3 items, Cronbach $\alpha = 0.67$) and emotional wellbeing subscale (3 items, Cronbach’s $\alpha = 0.61$), two components of the HRQL tool, were additionally assessed as individual outcomes. Each score ranges from 0 to 100, with 100 indicating the greatest health. Both the shortened RAND tool and the index derivation method have been used and validated in the Women’s Interagency HIV Study (WIHS) Chicago study (Appendix A. Quality of Life Instrument) (Liu et al., 2006; Smith et al., 1999).

Relationship satisfaction was measured by one question asking, “How are you feeling about the current relationship?” The answer options ranking the satisfaction in the order from low to high in five levels and was dichotomized for main analysis: “very bad”, “Just so-so,” and “not so good,” were categorized as being dissatisfied, and “doing fine” and “very happy” were coded as being satisfied with the current intimate partner relationship. The satisfaction rank was also numerically coded into 1-5 to be used in the correlation analysis. Recent intimate partner violence (IPV), which was defined as the occurrence of one or more violent acts perpetrated by an intimate partner in the last 12 months, was measured using two sets of questions from the WHO Violence Against Women Instrument that were coded as a binary measure of physical and/or sexual violence acts over the past year (García-Moreno et al., 2005).

Demographic and socioeconomic characteristics were self-reported, including age, ethnicity, education, being a Myanmar migrant, marital status, cohabiting family size, number of children, household assets, employment status, and individual and family annual income. To gain a more accurate measurement of family socio-economic status within the context of a rural livelihood, a household wealth chart was used to assess family ownership of assets such as modern electronics, vehicles, livestock and household sanitary facilities such as toilets and other housing conditions. Using information from the chart, a rural “wealth index score” was calculated using the principle component method proposed by the designers of the tool (Filmer & Pritchett, 2001).

Questions on perceived social support were extracted from Manuel Barrera’s Arizona Social Support Interview Schedule (Appendix B) (M. J. Barrera, 1981). Barrera’s instrument has been widely adopted and validated across multiple settings and cultures (Bernazzani et al., 1997; des Rivières-Pigeon et al., 2001; Kaufman et al., 2004). Based on the instrument’s key variables,

“available network size” was used to measure three types of perceived social support: intimate interaction (confidant), social participation (companionship), and tangible help (Levendosky et al., 2004; McDowell & Serovich, 2007). For each type of support, respondents were asked to name up to five people whom they thought would be available to provide it. The cumulative number of distinct network members who were nominated across the 3 networks was used to indicate the size of a woman’s total perceived support network. Next, the size of total support was dichotomized as being composed of either a “larger” support network (3 or more support providers in total) versus a “smaller” network (0-2 support providers).

3. Data analysis

Survey answers were entered and managed in EpiData (Lauritsen & Bruus, 2008). Exported data were analyzed using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis was done to summarize the distributions of the outcome and candidate explanatory variables. Bivariate unadjusted associations between the main outcome measures (overall QoL and HRQL index) and the candidate explanatory variables were examined by Student’s t-tests (for binary factors), ANOVA (for comparisons across more than 2 categories) or Pearson correlation (between continuous variables). Statistical significance was determined by a Type I error rate (α) at 0.05% in a 2-sided test.

After the evaluation of bivariate associations, all eligible independent variables were further tested for their joined effects on the quality of life outcomes with the presence of the main factor of interest, relationship satisfaction, by a stepwise multivariate linear regression process that went backward from a paramount model to a reduced model comprising only the most influential factors/covariates (Draper & Smith, 1981). A liberal approach was applied to selecting factors to comprise the starting full model: If a bivariate association reached a

significance level with $\alpha=0.25$, it would be included in the full model. Only when a variable lacked variability across the sample (i.e. having less than 10% of the total participants differing from the rest) or showed no unadjusted association with the outcomes ($p > 0.25$) it would be excluded. The manual selection of the optimal final model ensured that a variable was only removed from the full model when it neither showed significant association with the outcome ($p \geq 0.05$), nor did it impact the main association of interest (relationship satisfaction on quality of life). Regardless of the bivariate assessments, migration origin (Myanmar versus local) and perceived support were examined in the multivariate model for their hypothesized modifier roles via the tests of interaction terms. The whole model selection process was applied to assess the determinants for the two main outcomes, overall QoL and HRQL index, respectively. The derived optimal multivariate set was further tested on the emotional wellbeing and perceived physical health subscale measures in order to illustrate how the determinants of higher level of quality of life outcomes might influence the two distinct components of HRQL.

C. Results

1. Participant characteristics

The women in this study were mostly married (90%), living with at least one child under 18 years of age (76%), and diagnosed with HIV for a minimum of two years (93%) as shown in Table IX. Fifty-one (23%) participants were Myanmar migrants by origin. Over 60% were of Dai ethnicity, the largest ethnic group indigenous to Ruili. About 64% of the women were coupled with a partner of the same ethnicity. One-third of the women never had attended school, and most of the remainder (63.5%) never had received schooling beyond the state-mandated nine-year minimum education (equivalent to middle school in the USA). The reported family median annual income was equivalent to \$1,429 US dollars (USD), and individual median

income was \$464. This positioned the sample at the lower end of the Ruili socio-economic tiers given that annual disposable income in Ruili in 2013 was around \$3,085 and \$915 USD *per capita* for urban and rural residents respectively (Ruili Bureau of Statistics, 2013). Only 40% of women had worked outside home during the past year, while over 70% of the male partners were reported to have some form of paid job. Few women consume alcohol more than once a week or had used illicit drugs in the past year. In contrast, a quarter of their male partners were reported to either drink at least once weekly or to have used illicit drugs in the last 12 months.

More than 70% of women reported “doing fine” or “very satisfied” with their current intimate partner relationship. Nonetheless, recent partner violence was reported by 46 (21%) of the women. The single-item overall QoL measure scored a median of 60 over a range of zero to 100 among the sample. The median score for HRQL was 62 over a range of 5.8 to 94. The median score for self-perceived physical health was 54.5 over a range of 0-100. Emotional wellbeing scored at a median of 40 with a range of zero to 90. All these scores follow a distribution that approximates normality reasonably, with skewness and kurtosis values falling between -1 and 1.

2. Bivariate associations

Correlations between overall QoL, HRQL and subcomponent measures and numerical independent variables were examined as shown in Table X. As anticipated, significant positive correlations are present between the single-item overall QoL score, the HRQL index, the perceived physical health and emotional wellbeing subscales (Table X). Among the various quality of life measures, HRQL index and the overall QoL rating strongly correlate with each other and also with emotional wellbeing and perceived physical health. Little correlation appears to exist, however, between perceived physical health and emotional wellbeing. The relationship

TABLE IX. CHARACTERISTICS OF PARTICIPANTS

Total N = 219		Median (1 st – 3 rd quartile) or N (%)
Age		37 (31 – 41)
Married		198 (90.4)
Ethnicity	Dai	138 (63)
	Jingpo	35 (16)
	Han	36 (16.4)
	Others	10 (4.6)
Origin	From Myanmar	51 (23.3)
	Local	168 (76.7)
Education level	Never schooled	74 (33.8)
	<= 9 years	139 (63.5)
	>= 10 years	6 (2.7)
Household size	<= 3	80 (36.5)
	4-5	100 (45.7)
	>= 6	39 (17.8)
Number of young children	0	53 (24.2)
	1	122 (55.7)
	>= 2	44 (20.1)
Worked outside home last year		88 (40.2)
Income last year (\$ equivalent)	Family	1,429 (857 – 3,571)
	Individual	464 (143 – 1,143)
Participant alcohol use	Infrequent (< weekly)	130 (59.4)
	Frequent (>= once weekly)	3 (1.4)
Partner alcohol use	Infrequent (< weekly)	53 (24.2)
	Frequent (>= once weekly)	59 (26.9)
Participant illicit drug use (last year)		11 (5)
Partner illicit drug use (last year)		52 (23.7)
Any IPV last year		46 (21)
Satisfaction with relationship	Unsatisfactory	50 (22.9)
	Satisfactory	159 (77.1)
Years since HIV diagnosis	>= 5	146 (66.7)
	2-4	57 (26)
	< 2	13 (5.9)
Overall QoL score		60 (50-70)
HRQL index		62.3 (52.8-69.0)
Emotional wellbeing score		40 (30-60)
Self-perceived physical health score		54.5 (30.4-79.5)

satisfaction rank is positively correlated with the overall QoL, HRQL, and emotional wellbeing scores, but not with perceived physical health.

Either family size or number of children seem to correlate with satisfaction rank or any QoL measures. Age is only negatively correlated with both the overall QoL and the HRQL. Family wealth index correlates with the emotional wellbeing and overall QoL rating, but not with the HRQL index or the perceived physical health score. Hence age and family wealth index would need to be further tested in multivariate regression exploring whether they have independent association with quality of life.

More bivariate associations between candidate risk factors and relationship satisfaction (binary) as well as the QoL measures were examined (Table XI) to determine which ones should be further evaluated in multivariate models. Three factors were found significantly associated with both relationship satisfaction and QoL: ethnicity, recent IPV and partner availability for confidant support (intimate interaction). Ethnic Dai participants reported significantly higher levels of relationship satisfaction and HRQL index (but not different overall QoL) than did Han or Jingpo women. Recent IPV was linked to dissatisfaction with relationship, lower overall QoL and lower HRQL. Perceived confidant support from a partner was associated with relationship satisfaction and a higher HRQL score but did not differentiate the overall QoL scores.

Of other factors examined, partner frequent drinking only coincides with relationship dissatisfaction, while partner use of illicit drugs is linked to lower relationship satisfaction, overall QoL, and HRQL. Larger size of total perceived support, when reported as a sum of members across all three types of support networks, appears to correlate with relationship dissatisfaction but none of the QoL measures. Migration status does not appear to be associated

TABLE X. BIVARIATE CORRELATION BETWEEN NUMERICAL VARIABLES

	Satisfaction with relationship (rank)	Overall QoL	HRQL	Emotional wellbeing	Perceived physical health
Overall QoL	<i>0.40**</i>				
HRQL	<i>0.28**</i>	<i>0.56**</i>			
Emotional wellbeing	<i>.25**</i>	<i>.34**</i>	<i>0.54**</i>		
Perceived physical health	.07	<i>.35**</i>	<i>0.58**</i>	-0.09	
Household size	-0.04	0.01	0.01	-0.03	0.06
Number of young children	-0.1	0.06	-0.02	-0.02	-0.07
Family wealth score	<i>0.19**</i>	<i>0.16*</i>	0.08	<i>.19**</i>	-0.07
age	-0.04	<i>-0.19**</i>	<i>-0.15*</i>	-0.08	-0.02

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

with either relationship satisfaction or any QoL measures when unadjusted. HIV diagnosis recency, disclosure to partner and couple sero- concordance were not significantly associated with either relationship satisfaction or any QoL measures in the unadjusted analysis but were all entered into the starting regression model with relationship satisfaction and the QoL outcomes to further assess their effects.

3. Effect modification by migration and perceived social support

The total sample was stratified on either migration origin (migrant from Myanmar vs. non-migrant) or perceived support network sizes coded as smaller (0-2 support providers) vs. larger

TABLE XI. BIVARIATE ASSOCIATIONS BETWEEN CANDIDATE FACTORS AND RELATIONSHIP SATISFACTION OR HEALTH- RELATED QOL INDEX

Total N = 219			Relationship Satisfaction*			Overall QoL		HRQL Index	
			Satisfied (N=160)	Dissatisfied (N=50)	<i>p</i> **	Mean ± stdv	<i>p</i> **	Mean ± stdv	<i>p</i> **
Subgroup total N			n (%)	n (%)					
Socio-Demographic									
Ethnicity	Han and others	44	25 (15.6)	19 (38)	<i>0.001</i>	57.2 ± 22.9	<i>0.17</i>	55.0 ± 17.42	<i>0.002</i>
	Jingpo	34	24 (15)	10 (20)		53.7 ± 26.4		55.8 ± 14.47	
	Dai	133	111 (69.4)	21 (42)		60.9 ± 19.6		62.2 ± 11.66	
Migration origin	From Myanmar	51	37 (23.1)	10 (20)	0.64	57.1 ± 22.4	0.47	60.0 ± 10.6	0.81
	From local	168	123 (76.9)	40 (80)		59.6 ± 21.4		59.6 ± 14.7	
Education	Ever schooled	137	101 (63.1)	36 (72)	0.25	59.7 ± 21.3	0.49	60.1 ± 14.0	0.55
	Never schooled	73	59 (36.9)	14 (28)		57.6 ± 22.3		58.9 ± 13.61	
Employment status	Worked for pay	83	60 (37.5)	23 (46)	0.28	60.4 ± 19.2	0.27	58.1 ± 15.80	0.20
	Did not work for pay	127	100 (62.5)	27 (54)		56.9 ± 24.7		60.7 ± 12.32	
HIV Related									
HIV disclosure to partner	Undisclosed to partner	57	39 (24.4)	16 (32)	0.28	55.6 ± 24.6	0.17	57.1 ± 13.29	0.09
	Disclosed to partner	162	121 (75.6)	34 (68)		60.2 ± 20.4		60.6 ± 13.96	
Partner HIV concordance	Unknown	14	9 (5.6)	5 (10)	0.52	50.0 ± 24.5	0.27	61.7 ± 13.79	0.16
	Concordant	124	89 (55.6)	28 (56)		59.5 ± 21.0		59.6 ± 14.44	
	Discordant	81	62 (38.8)	17 (34)		59.8 ± 21.9		59.6 ± 13.06	
Years since HIV diagnosis	≥ 5 years	146	109 (68.1)	34 (68)	0.99	60.8 ± 21.6	0.14	61.0 ± 12.82	0.14
	< 5 years	70	51 (31.9)	16 (32)		56.3 ± 20.7		58.1 ± 14.41	

TABLE XI (continued)
 BIVARIATE ASSOCIATIONS BETWEEN CANDIDATE FACTORS AND RELATIONSHIP SATISFACTION OR HEALTH-RELATED QOL INDEX

Total N = 219			Relationship Satisfaction*			Overall QoL		HRQL Index	
			Satisfied (N=160)	Dissatisfied (N=50)	<i>p</i> **	Mean ± stdv	<i>p</i> **	Mean ± stdv	<i>p</i> **
Subgroup total N			n (%)	n (%)					
Partner Behavior									
Partner drinking at least weekly	Yes	59	33 (20.6)	24 (48)	<i><0.001</i>	56.9 (25.7)	0.45	57.9 ± 14.66	0.25
	No	160	127 (79.4)	26 (52)		59.8 (19.9)		60.4 ± 13.53	
Partner using any illicit drugs	Yes	52	33 (21.6)	16 (34)	0.08	55.4 (22.1)	0.08	56.7 ± 13.94	<i>0.045</i>
	No	157	120 (78.4)	31 (66)		61.1 (19.9)		61.0 ± 13.24	
Any recent IPV	Yes	42	21 (13.1)	21 (42)	<i><0.001</i>	50.0 ± 24.3	<i>0.001</i>	55.2 ± 15.6	<i>0.01</i>
	No	168	139 (86.9)	29 (58)		61.4 ± 20.2		60.9 ± 13.1	
Perceived Social Support									
Partner available as a confidant	Yes	69	62 (94)	4 (6)	<i><0.001</i>	62.2 ± 21.4	0.14	63.2 ± 12.05	<i>0.01</i>
	No	150	98 (68)	46 (32)		57.5 ± 21.6		58.1 ± 14.35	
Size of perceived total support	Larger total support network (3+)	167	123 (74)	44 (26)	0.09	58.7 ± 22.5	0.66	59.1 ± 12.12	0.70
	Smaller total support network (0-2)	43	37 (86)	6 (14)		60.2 ± 18.3		61.2 ± 12.13	

* The original five-level relationship satisfaction rating was collapsed into a binary satisfaction measure as described in Methods.

** Significance of bivariate association, estimated by *chi*² test for relationship satisfaction and by Student *t*-test for the QoL index. Italic numerals flag a significance level below 0.25 where the association warrants further examination in the multivariate model.

support network (3 or more providers) to examine how these factors might modify the effect of relationship satisfaction on QoL measures. Means of the overall QoL score and HRQL index were compared as being satisfied versus dissatisfied with the current intimate partner relationship within the strata of migration status and perceived support sizes, respectively (Figure 8). Overall QoL scores seem to increase with relationship satisfaction regardless of migration status, while the HRQL index only increases with relationship satisfaction among non-migrant women (HRQL mean score difference 11, 95% CI 5.7-16.5). When stratified by the size of perceived support, both overall QoL and HRQL increase with relationship satisfaction only among those perceiving a larger total support network (overall QoL: 19, 12.1-26.4; HRQL: 11, 5.9-16.2) but not among those with a smaller support network. Thus, the potential effect modification warranted further testing in the multivariate regression.

4. Multivariate adjusted regression

The associations between relationship satisfaction and various QoL measures adjusted for cofactors/covariates were examined by multivariate regression, and the final model considers the joint effects of age, family wealth, ethnicity, migration, IPV, HIV diagnosis recency, HIV disclosure to partner, and relationship satisfaction as modified by the size of perceived support. The same optimized model was applied to the respective outcomes: overall QoL rating, HRQL, emotional wellbeing, and perceived physical health (Table XII). Partner drug-use, which was borderline significantly associated with both relationship satisfaction and QoL in the bivariate analysis, did not pass as a statistically influential factor through the multivariate adjusted regression.

Figure 8. Associations between QoL measures and relationship satisfaction differ by migration status and size of perceived support network

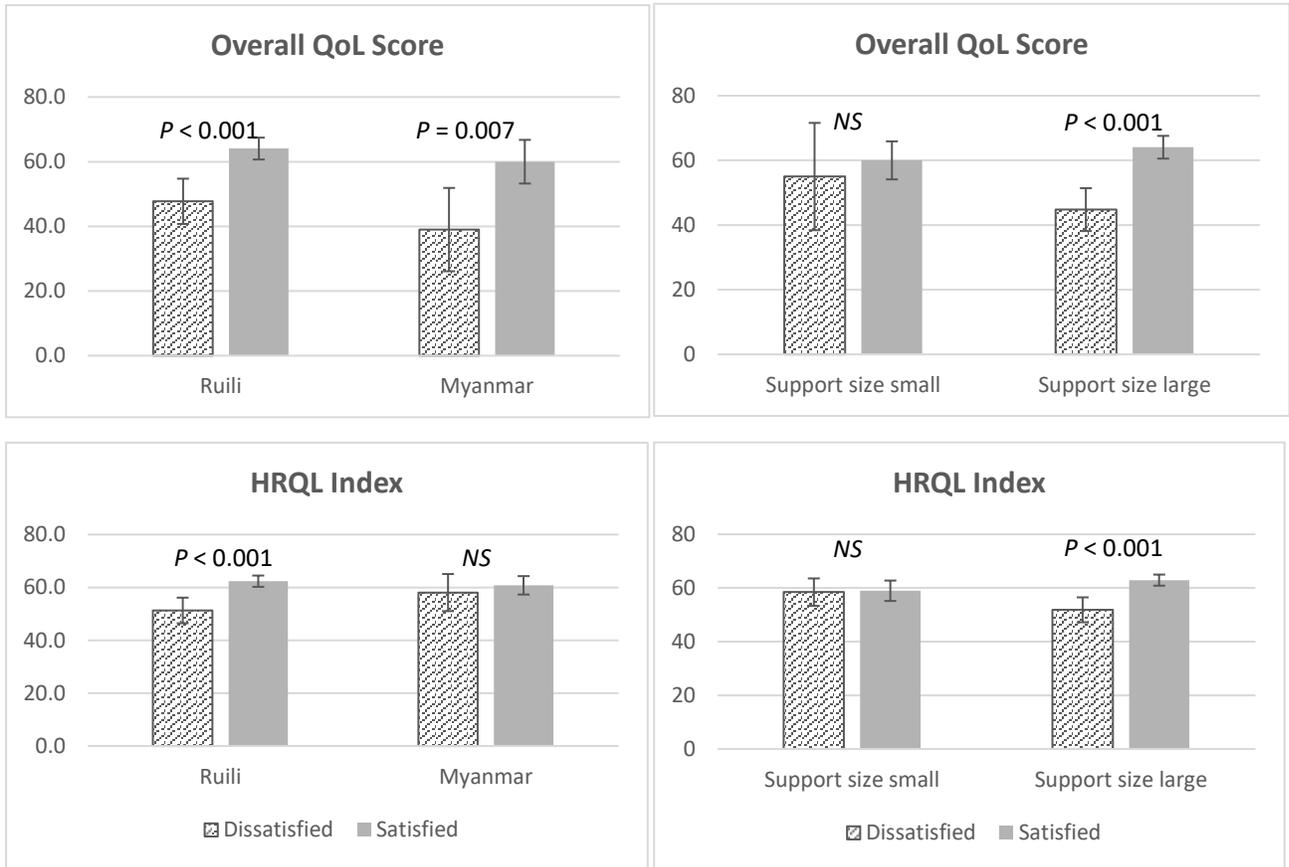


TABLE XII. MULTIVARIATE LINEAR REGRESSION OF OVERALL QOL, HRQL, AND ADDITIONAL SUBSCALE SCORES ON RELATIONSHIP SATISFACTION AND OTHER CANDIDATE VARIABLES

N=210 ^a			<u>Overall QoL</u>	<u>HRQL</u>	<u>Emotional wellbeing</u>	<u>Perceived physical health</u>
Factor/Covariate		Subgroup n (%)	β (SE) ^b	β (SE) ^b	β (SE) ^b	β (SE) ^b
Age	mean (stdv.)	37.2 (7.9)	<i>-0.56 (0.17)**</i>	<i>-0.27 (0.11)*</i>	NS	NS
Ethnicity (ref. Dai)	Han and others	44 (21)	NS	NS	NS	NS
	Jingpo	34 (16.2)	NS	<i>-5.78 (2.42)*</i>	NS	<i>-9.94 (4.82)*</i>
Years diagnosed with HIV (ref. < 5 years)	≥ 5 years	143 (68.1)	NS	<i>3.93 (1.80)*</i>	NS	<i>7.61 (3.59)*</i>
IPV (ref. No recent IPV)	Any recent IPV	42 (20)	<i>-8.5 (3.59)*</i>	<i>-4.6 (2.25)*</i>	<i>-6.6 (2.88)*</i>	NS
Migration status (ref. non-migrant)	From Myanmar	47 (22.4)	NS	NS	NS	<i>13.81 (4.01)**</i>
HIV disclosure between couples (ref. disclosed)	Non-disclosed	55 (26.2)	NS	NS	<i>-6.1 (2.41)*</i>	NS
Household wealth index	mean (stdv.)	0 (1.0)	NS	NS	NS	NS
<i>Effect modification (interaction term):</i>			<i>22.31 (9.25)*</i>	<i>13.76 (5.78)*</i>	<i>14.47 (7.41)*</i>	NS
Satisfied with relationship (ref. Dissatisfied; when social support network size ≥ 3)			<i>18.1 (9.0)*</i>	<i>9.3 (5.6)*</i>	<i>12.9 (7.2)*</i>	NS
Satisfied with relationship (ref. Dissatisfied; when social support network size 0-2)			NS	NS	NS	NS

^a Models excluded 9 participants who did not rate their relationship satisfaction or QoL.

^b Multivariate regression coefficient (β) with standard error (SE). Italic numerals followed with *: $0.01 < p \leq 0.05$; with **: $p \leq 0.01$; NS for non-significant coefficients.

Ref.: reference; stdv.: standard deviation.

Overall QoL rating was found to be associated with recent IPV ($\beta = -8.5, p=0.02$) and relationship satisfaction but only among those perceiving larger networks of social support (interaction term $\beta = 22.3, p=0.05$). No significant effects of ethnicity or HIV diagnosis recency were found for the single-item rating of QoL. Age seems independently predictive of worse overall QoL as well as lower HRQL.

Similar patterns seen on HRQL index also support a significant effect of IPV ($\beta = -4.6, p=0.02$) and an interaction between relationship satisfaction and perceived support (interaction term $\beta = 13.8, p=0.02$). Additionally, significant associations confirm lower HRQL among Jingpo versus Dai women ($\beta = 5.8, p=0.03$) and higher score among those diagnosed with HIV for more than 5 years versus recent diagnosis ($\beta = 3.9, p=0.03$).

Relationship satisfaction is also associated with emotional wellbeing but only so among women who perceived larger support networks (interaction term $\beta = 14.5, p=0.05$). For emotional wellbeing, the association between recent IPV and lower scores was significant ($\beta = -6.6, p=0.02$). Interestingly non-disclosure of HIV diagnosis to partner seems to be detrimental to emotional wellbeing for these women ($\beta = -6.1, p=0.02$). Women from Myanmar appeared to have lower scores with near borderline significance ($\beta = -4.7, p=0.07$). Age, ethnicity, or HIV diagnosis recency did not affect the emotional health of either origin.

Examination of determinants of self-perceived physical health shows no significant effects of either relationship satisfaction or IPV, whereas higher scores were seen among Myanmar women versus local women ($\beta = 13.8, p=0.001$), and those diagnosed with HIV for more than 5 years versus recent diagnosis ($\beta = 7.6, p=0.03$), or Jingpo women seem to score lower when compared to their Dai counterparts ($\beta = -9.9, p=0.04$).

D. Discussion

Considerable research conducted mostly in western societies repeatedly has demonstrated the vital role of a satisfying intimate relationship in improving quality of life (H. Choi, Yorgason, & Johnson, 2016; Janice K. Kiecolt-Glaser & Wilson, 2017) and health outcomes among the chronically ill in resource-rich settings (Berg & Upchurch, 2007; Wray & Beverly, 2008). However, none appear to have explored quality of life, especially health related quality of life, for women living with HIV in the context of an intimate relationship, let alone in a resource limiting setting like Ruili. This study takes up this challenge to address this gap.

The study's main findings confirm that satisfaction with a current intimate relationship is tied to overall quality of life for HIV-positive women living with an intimate partner in Ruili, but this effect is only evident among those women with a relatively larger perceived social support network. The effects of relationship satisfaction were also found to be similarly associated with HRQL and its emotional wellbeing subdomain. This finding lends support to the hypothesis that relationship satisfaction may influence overall quality of life through its effect on the health facets, specifically the mental health component. On the other hand, relationship satisfaction appears to have no effect on perceived physical health. Provided the correlation between perceived physical health and the overall QoL and the lack thereof between it and the emotional health subscale (Table X), apparently the mental and physical health components of HRQL are distinct domains of the same multifaceted construct. This finding echoes general population results from other studies showing that only the mental health component of HRQL appears susceptible to the impact of intimate partner relationship (Coyne et al., 2001; Robert J Waldinger, Cohen, Schulz, & Crowell, 2014).

Opposite to the anticipation that having larger social support networks might counteract the detrimental effect of an unsatisfactory relationship, it appears that a satisfying relationship only concurs with better quality of life among the women with a larger perceived support network. Quality of life for women with smaller perceived support network does not seem to be influenced by relationship satisfaction as much. It is plausible that for those who feel under-supported and socially isolated, even a “good” intimate partner relationship may not suffice in promoting a sense of wellbeing. Similarly, in the absence of relationship satisfaction, greater perceived support by itself appears insufficient to boost quality of life, indicating that larger networks of support and quality relationship mutually condition each other’s effect. Similar evidence has been reported in studies of post-cardiac events survivors’ marital functioning as a determinant of health outcomes (Coyne et al., 2001; Holt-Lunstad et al., 2008). This research also revealed that social support fails to alleviate worsening health that is associated with having a low-quality marital life, in agreement with Waltz’ theory that the traditional, overemphasized stress-buffer role of social support might need to be replaced by a view on the adaptive process of coping with a chronic condition (Waltz, 1986). The perspective argues that supportive resources and a satisfactory intimate relationship needs to synergize to protect mental health; either factor alone will not be sufficient in providing any health benefits. Our findings are well aligned with this assertion.

Recent occurrence of intimate partner violence was independently associated with worse overall QoL, HRQL, and emotional wellbeing regardless of relationship satisfaction. Notably, half of the women who reported recent IPV occurrences still asserted being satisfied with current relationship. This finding echoes other research showing IPV to be largely normalized within Asian culture due to its promotion of traditional patriarchy and male dominance over women in

gender relationships (Janice K Kiecolt-Glaser & Newton, 2001). Nonetheless when women's subjective assessment of relationship satisfaction is taken into account, the objective assessment of IPV is still independently associated with decreased quality of life and mental wellbeing. On the other hand, perceived physical health appears unaffected by intimate relationship. Our results suggest that IPV is a major determinant of quality of life for these women regardless of how they rate the satisfaction of the relationship with partners. As such, relationship-focused interventions need to focus on detecting and intervening the actual occurrence of intimate partner violence in order to help improve quality of life for women living with HIV as well as prevent adverse health outcomes.

The hypothesis that migration status would be an important determinant of quality of life does not prove true in this study. Neither does migration status modify the association between relationship satisfaction and quality of life. Unadjusted analyses suggested that HRQL only increases with relationship satisfaction amongst the native-born women, but not as much among the Myanmar migrants. This differentiation by migration origin for either overall QoL or HRQL disappears after factoring in the size of perceived support network. It should be noted that Myanmar migrants in this study were found to have smaller-sized perceived support overall when compared to the Ruili-born women (Yi Li, Levy, & Hershow, 2020). Consequently, what was seen in the unadjusted analysis could be due to confounding by different levels of social support perceived by the two groups. In other words, relationship satisfaction only correlates with quality of life among the native women because they had larger social support networks compare to the Myanmar migrants. Interestingly, migrant status shows an independent effect on self-perceived physical health in that Myanmar migrants reported being in better shape than did their Chinese counterparts. This finding concurs with the widely reported "healthy immigrant

effect”, which is based off the theory that self-selection of better physical health status at the origin prior to migration (Kennedy, Kidd, McDonald, & Biddle, 2015). An alternative explanation is that these migrant women might have lower expectations than their native-born peers as to what constitutes good health, an attitude reported by other studies of minority population health (J. Chen, 2011; L. Shi & Stevens, 2005).

As expected, age predicted a worsening quality of life in terms of HRQL and overall QoL. However, age does not appear to influence emotional wellbeing or perceived physical health for these women. Considering the context of living a potentially life-threatening virus, it may be that HIV diagnosis and the stress of managing a chronic condition can override the effect of age on health perceptions, mental or physical, of these women. Still, longer time past HIV diagnosis predicted higher HRQL and the perception of better physical health, but not emotional wellbeing or overall QoL. Possibly over time following diagnosis, the women regain some sense of stabilization with their physical health (Catunda et al., 2017) while their mental wellbeing and their overall life satisfaction do not necessarily improve. Also noteworthy is the protective effect of women personally disclosing their HIV diagnosis to her partner exerted a positive effect on the women’s emotional wellbeing, another finding in line with the accepted view of long-term mental health benefits of HIV disclosure in an intimate relationship (Kiene et al., 2018). Although disclosing HIV to the partner does not otherwise impact the other quality of life measures for these women, the confirmed mental health benefit agrees with couple intervention approaches that facilitate safe disclosure.

Another interesting finding is that ethnicity is associated with HRQL and perceived physical health. Dai women reported better HRQL and perceived physical health than did Jingpo women in the study. This advantage disappears statistically when comparing emotional

wellbeing or overall QoL across ethnic groups. Dais are the largest ethnic population in Ruili, well known for their unique culture, strong community and family support networks, harmony-centered Buddhism values, and pro-spiritual life styles. These normative values and group resources may exert a positive influence on Dai women's health perception in terms of HRQL and physical health, but not prove sufficient to affect their perception of overall quality of life or emotional wellbeing. In contrast, the Jingpo ethnic population in Ruili has experienced prolonged issues of dissolved community structure, poor accumulation of social capital, and lagging economic development. These disadvantages may translate into worsened outcomes for Jingpo women when compared to their Dai counterparts. Such ethnic disparity, if confirmed, needs to be addressed if local policies and programs are to succeed in improving quality of life for women living with HIV.

The selection of Ruili as the study's setting lends novel insight into the quality of life among a group of women who crossed the China-Myanmar border and had to cope with the double challenges of being a migrant and living with HIV. Their disclosures provide a first-time account of the size of the social networks that they perceive having available to them in the diaspora and also the effects of their partner relationship satisfaction on their perceived overall quality of life and HRQL sub-dimension.

As a cross-sectional study conducted with a convenience sample, the ability to generalize its findings or to establish the direction of any effects is limited. For example, relationship satisfaction may be profoundly influenced by a woman's mental and/or physical health, and it is not solely the one way around as explored within our analyses. Similarly, the effects of poor health can undermine opportunities to build larger social support networks, as true as it works in reverse. Although we are well aware of the limitations and stay cautiously away from over

interpretation, the findings from this study pilot an in-depth and novel understanding of the experience and needs of women living with HIV and provide valuable information to facilitate local public health policy making.

Research has shown that improving quality of life for PLWHA entails a synergy of efforts across silos of health care and social services. To this end, a wealth of toolsets has been developed to evaluate health states and identify barriers to better quality of life in managing HIV infection, many of which involve couple-centered strategies for those living with a partner (Ruark et al., 2019). Our results suggest that irrespective of other factors, a satisfactory intimate relationship, when combined with a larger social support network, can be part of a success formula towards better health outcomes for women living with HIV. Neither of the factors alone can impact women's overall and health related quality of life. The confirmation of this synergy of factors speaks to the importance of including both components when designing programs or implementing policies to help HIV affected couples manage and cope. Copious research also demonstrates the protective role of social support in improving mental health outcomes. Our findings emphasize that improving emotional wellbeing as a core component of HRQL within the context of an intimate relationship may contribute to enhanced overall quality of life. The proposed mechanism certainly warrants further confirmation via intervention research. Meanwhile, victimization of IPV should remain a focal point in any couple-centered interventions for women with HIV, as our study demonstrates, with additional attention to the possible effects of ethnicity and time since HIV diagnosis. To further inform evidence-based interventions, more research is warranted to better understand how relationship satisfaction can be effectively intervened or problems identified in practice to promote higher quality of life for women living with HIV in a multicultural setting like Ruili.

APPENDICES

APPENDIX A

Survey Instrument

“The influence of cross-border migration on the risk of intimate partner violence of women living with HIV in Ruili, China”

A Research Project of the University of Illinois at Chicago

Principal Investigator: Yi Li, M.S., PhD Candidate

University of Illinois at Chicago

School of Public Health

APPENDIX A (continued)

Participant ID _ _ _ _

Date _____

Interviewer Initials _____

Site _____

Time Start _____

INTERVIEWER: Thank you for participating in the Migration and IPV for Women Study. This survey will ask you basic questions about your family, relationships with male partners, and the current health status. Please answer the questions honestly. If you don't know the answer, please do not guess, rather respond "Don't know." The answers you provide will at no time be associated with your name, only a study ID number. If you have any questions feel free to ask me. This interview will take about

A. BACKGROUND CHARACTERISTICS

INTERVIEWER: First, I would like to begin by asking you some questions about yourself.

A1. In what year were you born? **Year** _____.

Interviewer note: Double check eligibility by confirming that the subject's year of birth is between 1954 and 1995.

APPENDIX A (continued)

A2. Are you originally from Ruili?

Yes01	→Skip to A5.
No02	

A2a. How many years have you lived in Ruili? (In complete number) _____ years.

Interviewer Note: If the subject demonstrates difficulty in recalling, encourage her by saying:

**If you do not remember the exact number of years, please tell me your best approximation.
You do not have to be absolutely precise.**

Interviewer probing: If the respondent has difficulty recalling, please help her by using sequentially narrowing intervals to aid recall.

APPENDIX A (continued)

A2b. After you move to Ruili, did you ever leave Ruili for 3 months or more on one trip?

Yes01	→Skip to A3
No02	

APPENDIX A (continued)

A2c. Please think about all the time you spent away from Ruili after you moved to Ruili. Please look at the card and identify a graph that most closely describes the proportion of time.

Interviewer: show card A, and circle the subject's answer below.

Less than 10%	.....01
10% ~ 30%	.....02
30% ~ 50%	.....03
50% ~ 70%	.....04
70% ~ 90%	.....05
Don't remember	.....97
Decline to answer	.....98

A3. After you moved to Ruili, approximately how often did you visit your home in Myanmar?

Interviewer: READ the answer options in turn until confirmed.

Almost monthly or more frequently	.....01
More than once a year	.....02
Yearly	.....03
Once every few years	.....04
Never	.....05
Don't remember	.....97
Decline to answer	.....98

APPENDIX A (continued)

A4. What was the original reason for your move to Ruili?

Interviewer: READ the answer options in turn until confirmed.

Marriage	.....01
Business	.....02
Moved with family	.....03
Work	.....04
Sold through trafficking	.....05
Other	Specify _____
Don't remember	.....97
Decline to answer	.....98

A5. What is your ethnicity? (Circle best answer)

Bamar	.....01
Dai/Shan	.....02
Jingpo/Kachin	.....03
Han	.....04
Other	.....05
	Specify: _____ ...
	.....97
Don't know	.....98
Decline to answer	

APPENDIX A (continued)

A6. What is your highest level of education? (Circle best answer)

Never attended school	.....01
Elementary to junior high	.....02
High school	.....03
Some College or more	.....04
Don't know	.....97
Decline to answer	.....98

A7. Which language(s) can you speak fluently?

Interviewer: READ in turn, and circle the answer for each option:

	Yes	No
a. Burmese	1	2
b. Dai/Shan	1	2
c. Jingpo/Kachin	1	2
d. Chinese	1	2
e. Other	1	2
	Specify _____	

APPENDIX A (continued)

A8a. Do you work outside of the home?

Yes01	→Skip to A9
No02	

A8b. What do you do primarily? Interviewer: Record what she says about her occupation(s) _____

A8b. Please tell me about your daily work. Are you....

Interviewer: READ in turn, circle the answer for each:

	Yes	No
Employed full-time	1	2
Employed part-time	1	2
Working at informal jobs	1	2
Running a business	1	2
	1	2
Decline to answer		

APPENDIX A (continued)

A9. At home you mainly work on... *Interviewer: Please read all the options.*

	Yes	No
a. The farm	1	2
b. Housework	1	2
c. Nothing	1	2
d. Other	1	2
	Specify _____	
e. Decline to answer	1	2

A10. If you combine all sources, approximately how much was your income in Yuan in year 2012?

(Amount in Yuan) _____

Interviewer note: Offer some examples of sources of income, like government subsidy, low-income aids. If respondent has no numbers, interviewer can ask for a range.

APPENDIX A (continued)

B. HOUSEHOLD INFORMATION

INTERVIEWER: Now, I'm going to ask you some questions about your household.

B1. With whom do you live? Do you live...

Interviewer READ:

	Yes	No
Alone	1	2
	→Skip to B3.	
With family(s) or relative(s)	1	2
With friend(s)	1	2
In a dormitory	1	2
Other	1	2
	Specify _____	

APPENDIX A (continued)

B2. Who are you sharing the household with? Please exclude any temporary guest.

Interviewer READ and fill in the right answer for each option.

	Yes	No
a. Your husband/boyfriend		
	(How many?)	
b. Your child(ren), 18 years or older	1	0
c. Your child(ren), younger than 18 years	___	0
d. Your parent(s)	___	0
e. Your partner's parent(s)	___	0
f. Other relative(s)	___	0
g. Friends(s)	___	0
h. Other	___	0
	Specify _____	
i. Total head counts	_____	

APPENDIX A (continued)

B4. Could you tell me if your household has the items listed below?

Interviewer READ AND confirm answer for each item:

	Yes (1) (0)	No	Don't know answer	Decline to answer
a. Clock/watch	_____	_____	_____	_____
b. Landline/mobile phone	_____	_____	_____	_____
c. Television	_____	_____	_____	_____
d. Refrigerator	_____	_____	_____	_____
e. Bicycle	_____	_____	_____	_____
f. Motorcycle/scooter	_____	_____	_____	_____
g. Car	_____	_____	_____	_____
	Yes (1) (0)	No	Don't know answer	Decline to answer
h. Flush toilet	_____	_____	_____	_____
i. Pit toilet/latrine	_____	_____	_____	_____
j. None/other toilet	_____	_____	_____	_____
k. Drinking water from tap	_____	_____	_____	_____
l. Drinking water from pump/well	_____	_____	_____	_____
m. Drinking water from open source (e.g. pond, river)	_____	_____	_____	_____
n. Main source of lighting electric	_____	_____	_____	_____
o. Main cooking fuel biomass (wood/dung/coal)	_____	_____	_____	_____

APPENDIX A (continued)

p. Main dwelling parquet/tile flooring	Yes (1)	No	Don't know	Decline to answer
q. Main dwelling cement flooring	(0)			
r. Main dwelling dirt/mud flooring	_____	_____	_____	_____
	_____	_____	_____	_____
s. Kitchen a separate room	_____	_____	_____	_____
	_____	_____	_____	_____
t. Number of rooms in dwelling	_____	_____	_____	_____
	(number)		_____	_____

APPENDIX A (continued)

C. SUBSTANCE USE AND COMMERCIAL SEX.

INTERVIEWER: Now I'm going to ask you some questions about your behaviors in personal life. Please answer as honestly as possible. Remember that you are free not to answer at any point if you do not feel comfortable enough.

C1a. During the past year, how often did you have a drink (any beverage containing alcohol)? Would you say:

Interviewer READ:

Never01	→Skip to C2
Or monthly or less	.....02
Or 2 – 4 times a month	.....03
Or 2 or 3 times a week	.....04
Or 4 or more times a week	.....05
Don't know	.....97
Decline to answer	.....98

C1b. How many drinks containing alcohol do you have on a typical day when you are drinking? Would you say:

Interviewer READ:

APPENDIX A (continued)

Never drink01	→Skip to C2
Or 1 or 2 drinks	.....02
Or 3 or 4 drinks	.....03
Or 5 or 6 drinks	.....04
Or 7-9 drinks	.....05
Or 10 or more drinks	.....06
Don't know	.....97
Decline to answer98	

C1c. How often do you have six or more drinks on one occasion? Would you say:

Interviewer READ:

Never	.....01
Or less than monthly	.....02
Or monthly but not as often as weekly	.....03
Or weekly but not as often as daily	.....04
Or daily or almost daily	.....05
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

INTERVIEWER: MANY PEOPLE IN RUILI WOULD TAKE SOME DRUGS SO TO FEEL GOOD OR HAPPY. OUR STUDY NEEDS TO ASK EVERYBODY ABOUT THE SITUATION OF USING DRUGS. PLEASE BE REASSURED THAT YOUR ANSWERS ARE STRICTLY ANONYMOUS AND CONFIDENTIAL. Please answer as honestly as possible. Remember that you are free not to answer at any point if you do not feel comfortable enough.

C2. During the past 12 months, did you ever use any substances as listed below, when they were not prescribed to you by a doctor?

Interviewer READ FROM CARD B and circle the answers for each item below:

	Yes	No	Don't know	Decline to answer
a. Marijuana	1	0	97	98
b. Cocaine	1	0	97	98
c. Heroin	1	0	97	98
d. Methadone/other opiates or narcotics	1	0	97	98
e. Amphetamines/stimulants/Hallucinogens	1	0	97	98
f. Tranquilizers/downers	1	0	97	98
g. Other drugs	1	0	97	98
	1	0	97	98
	Specify			

APPENDIX A (continued)

Interviewer: Many women in Ruili participate in transactional sex for all kinds of reasons. Our study needs to ask everybody about situations like this. Please be reassured that your answers are strictly anonymous and confidential. Please answer as honestly as possible. Remember that you are free not to answer at any point if you do not feel comfortable enough.

C3. During the past 12 months from last _____ (month) till now, did you ever have sex in exchange for ...

Interviewer: Read and circle ALL THAT APPLY.

Money	.....01
Food or goodies	.....02
Drugs	.....03
Shelter	.....04
No	.....05
Don't know	.....97
Decline to answer	.....98

C4. In what places did you usually have transactional sex?

Interviewer: Read and circle ALL THAT APPLY.

APPENDIX A (continued)

	Yes	No	Don't know answer	Decline to answer
a. Night clubs/KTVs/Brothels	1	0	97	98
b. Hair salon/massage parlor/foot massage center	1	0	97	98
c. Motels/Hourly rented rooms	1	0	97	98
d. Own home	1	0	97	98
e. Other	1	0	97	98
	Specify	_____		

D. EXPERIENCE WITH PARTNER VIOLENCE

INTERVIEWER: Now, I would like to talk about your relationship with the male partner(s) in your life. Please answer as honestly as possible. Please remember that you are free not to answer at any point if you do not feel comfortable enough. I also want to reassure you again that all of your answers will be kept strictly anonymous and confidential.

D1. First I'd like to know your current relationship status. Currently you are...

INTERVIEWER READ and CIRCLE the answer for each option:

APPENDIX A (continued)

	Yes	No	Don't know	Decline to answer
Single without any male partner	1	0	97	98
Having a boyfriend	1	0	97	98
Married (registered or not)	1	0	97	98
Separated or divorced	1	0	97	98
Widowed	1	0	97	98
Other	1	0	97	98
	Specify	_____		

D2. During the past 12 months from (month) _____ of 2012 to now, did you have any other sexual or romantic partner(s) in addition to your husband/boyfriend?

Yes	.....01
No	.....02
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

INTERVIEWER: When two people marry or live together, they usually share both good and bad moments. The next questions are about things that happen to many women, and that your current or recent partner, or any other partner may have done to you. If anyone interrupts us I will change the topic of conversation. I would again like to assure you that your answers will be kept anonymous and confidential, and that you do not have to answer any questions that you do not want to.

D3.INTERVIWER: READ through the columns and circle the answers, and then go down each row.

<p>D3a. During the preceding 12 months from (month) _____ in 2012 to the present, has your current/ex-husband/boyfriend, or any other male partner ever...</p>	<p>Yes No →Skip to D3c</p>	<p>D3b. In the past 12 months, would you say that this has happened once, a few times or many times?</p> <p>Once Few Many</p>	<p>D3c. Before (month) 2012, did any male partner ever do this to you?</p> <p>Yes No</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------

APPENDIX A (continued)

a. Slapped you or thrown something at you that could hurt you?	01 02	01 02 03	01 02
b. Pushed you or shoved you or pulled your hair?	01 02	01 02 03	01 02
c. Hit you with his fist or with something else that could hurt you?	01 02	01 02 03	01 02
d. Kicked you, dragged you or beaten you up?	01 02	01 02 03	01 02
e. Choked or burnt you on purpose?	01 02	01 02 03	01 02
f. Threatened to use or actually used a gun, knife or other weapon against you?	01 02	01 02 03	01 02

APPENDIX A (continued)

D4. INTERVIEWER: READ through the columns and circle the answers, and then go down each row.

D4a. During the preceding 12 months from (month) in 2012 to the present, has your current/ex-husband/boyfriend, or any other male partner ever...	Yes No →Skip to D4c	D4b. In the past 12 months, would you say that this has happened once, a few times or many times? Once Few Many	D4c. Before (month) 2012, did any male partner ever do this to you? Yes No
a. Physically forced you to have sexual intercourse when you did not want to?	01 02	01 02 03	01 02
b. Ever forced you to do something sexual that you found degrading or humiliating?	01 02	01 02 03	01 02
c. Did you ever have sexual intercourse you did not want to because you were afraid of what your partner or any other partner might do?	01 02	01 02 03	01 02

APPENDIX A (continued)

D5. INTERVIEWER: Only ask this question if the respondent ever said YES to any violent incidence from last (month) till now.

**You said that someone has done something(s) mentioned above from last (month) to now. May I ask how many men in total did these things to you during that time?
(Number) _____**

INTERVIEWER: write down the number here in the box on the upper right corner above the E section.

D6a. When you were a child, did you ever see or hear that your mother was hit by your father, or her husband or boyfriend(s)?

Yes	.....01
No	.....02
Don't know	.....97
Decline to answer	.....98

D6b. When you were a child, did you ever see or hear that any other woman in your household was hit by her husband or boyfriend(s)?

Yes	.....01
No	.....02
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

NOTE (D5): # of abusive partner(s) _____

E. RELATIONAL AND PARTNER CHARACTERISTICS

INTERVIEWER: (If the # in the top right box is zero or one)

Now I'm going to ask you some more questions about your partner and your relationship with him. When answering the following questions, please think of...

(INTERVIEWER: if the # in the top right box is zero)

your current/most recent husband/boy friend.

(INTERVIEWER: if the # in the top right box is one)

the partner who did the things mentioned above to you during the past 12 months.

INTERVIEWER: if the # is greater than 1, use the following sentences. Use an extra copy of section E for each additional partner, and fill in the Answer Chart 1 with the answer codes.

You told me that you had ____ (#) abusive partners who did some things mentioned above to you during the past 12 months. I would like to ask you some more questions about each of them in turn. Let's start with the first man.

APPENDIX A (continued)

E1. This man is your...

INTERVIEWER: READ.

Husband	.....01
Boyfriend	.....02
Ex-husband	.....03
Ex-boyfriend	.....04
Other	.....05
	Specify _____
Decline to answer	.....98

E2. In your relationship with this man, how often would you say that you quarreled?

INTERVIEWER: READ.

Rarely	.....01
Sometimes	.....02
Often	.....03
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

E3. How did you start your relationship with this partner? Would you say that you were bound with him...

INTERVIEWER: READ and circle ALL THAT APPLY.

Through match-making	.....01
For financial benefits	.....02
For love	.....03
For you were trafficked	.....04
Other	.....05
	Specify _____
Don't know	.....97
Decline to answer	.....98

E4a. Does this man know that you are HIV positive?

Yes	.....01
No	.....02
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

E4b. How did he know your HIV status?

INTERVIEWER: READ.

You told him.	.....01
He found out other ways.	.....02
Don't know	.....97
Decline to answer	.....98

E5. Do you know about his HIV status?

INTERVIEWER: READ.

Yes, he is positive	.....01
Yes, he is negative	.....02
No	.....03
Decline to answer	.....98

APPENDIX A (continued)

E6a. During the past year, how often did this man have a drink containing alcohol?

Interviewer READ:

Never	.....01
Monthly or less	.....02
2 – 4 times a month	.....03
2 or 3 times a week	.....04
4 or more times a week	.....05
Don't know	.....97
Decline to answer	.....98

E6b. How many drinks containing alcohol does he have on a typical day when he is drinking?

Would you say:

APPENDIX A (continued)

Interviewer READ:

Never drinks	.....01
1 or 2 drinks	.....02
3 or 4 drinks	.....03
5 or 6 drinks	.....04
7-9 drinks	.....05
10 or more drinks	.....06
Don't know	.....97
Decline to answer	.....98

E6c. How often does he have six or more drinks on one occasion? Would you say:

Interviewer READ:

Never	.....01
Less than monthly	.....02
Monthly	.....03
Weekly	.....04
Daily or almost daily	.....05
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

E6d. Interviewer: Only ask this question when the subject previously said “Yes” to any violent incidence during the past year from last (month) to now.

We talked about being hit or forced to have sex by a partner previously. Did this man ever do those things to you after he drank alcohol?

Yes	.....01
No	.....02
Don't Know	.....97
Decline to Answer	.....98

E7. During the past 12 months, did this man ever use any substances as listed below, when they were not prescribed to him by a doctor?

Interviewer READ FROM CARD B and circle the answers for each item below::

APPENDIX A (continued)

	Yes (1)	No (0)	Don't know	Decline to answer
a. Marijuana	_____	_____	_____	_____
b. Cocaine	_____	_____	_____	_____
c. Heroin	_____	_____	_____	_____
d. Methadone/other opiates or narcotics	_____	_____	_____	_____
e. Amphetamines/stimulants/Hallucinogens	_____	_____	_____	_____
f. Tranquilizers/downers	_____	_____	_____	_____
g. Other drugs	_____	_____	_____	_____
	Specify		_____	_____
	_____		_____	_____
			_____	_____
			_____	_____

E8. Interviewer note: Only ask this question when the subject previously reported any transactional sex during the past 12 months.

Previously we talked about having sex in exchange for money or things. Does this man know that you had transactional sex?

Yes he does	.....01
No he does not	.....02
Don't know (if he knows)	.....97
Decline to answer	.....98

APPENDIX A (continued)

E9. What is his highest level of education? (Circle best answer)

Never attended school	.....01
Elementary to junior high	.....02
High school	.....03
Some College or more	.....04
Don't know	.....97
Decline to answer	.....98

E10. Please tell me about his daily work. Is he....

Interviewer: READ, circle ALL THAT APPLY:

Employed full-time	.....01
Employed part-time	.....02
Working at informal jobs	.....03
Running his own business	.....04
Working on the farm	.....05
Unemployed	.....06
Other	.....07
	Specify _____
Don't know	
Decline to answer	.....97
	.....98

APPENDIX A (continued)**F. SOCIAL SUPPORT AND SOCIAL NETWORK**

INTERVIEWER: In the next few minutes I would like to get an idea of the people who are important to you in a number of different ways. I will be reading descriptions of ways that people may be important to us. After I read each description, I will be asking you to give me the first names, the initials, or nicknames of the people who fit the description. These people might be your family members, relatives, friends, neighbors, community members, church members, peer group members, social workers, physicians, or any other people who you might know. If you have any questions about the descriptions I have read, please ask me to try to make it clearer.

F1. Intimate Interaction

F1a. If you wanted to talk to someone about the things that are very personal and private, who would you talk to? Please tell me no more than 6 people who are the most important ones you can think of. I do not need full names; just give me the first names, initials, titles or nicknames of those people.

Interviewer: Use the table below to record up to 6 nominations in the first column. If the respondent was ready to give more than 6 persons, let her stop and decide if the six most important persons have been nominated. If the subject is unable to name a single person, go to F2.

F1b. During the last month, which of these people did you actually talk to about things that were personal and private?

Interviewer: Inquire about each person listed in column 1, and check in column 2 if any actual support was received.

APPENDIX A (continued)

F1a. Intimate Interaction: Members	F1b. Actual Support

F2. Social Participation

F2a. Who are the people who you could get together with to have fun or to relax? These could be new names or ones you've listed before.

Interviewer: Use the table below to record up to 6 nominations in the first column. If the respondent was ready to give more than 6 persons, let her stop and decide if the six most important persons have been nominated. If the subject is unable to name a single person, go to F3.

F2b. During the past month, which of these people did you actually get together with to have fun or to relax?

Interviewer: Inquire about each person listed in column 1, and check in column 2 if any actual support was received.

APPENDIX A (continued)

F2a. Social Participation: Members	F2b. Actual Support

F3. Tangible Support

F3a. Who do you feel close to such that you could call on them for help if you were sick and confined to bed?

Remember, you can name some of the same people who you mentioned before, or you can name some new people.

Interviewer: Use the table below to record up to 6 nominations in the first column. If the respondent was ready to give more than 6 persons, let her stop and decide if the six most important persons have been nominated. If the subject is unable to name a single person, go to F4.

If the subject names one or more people, probe for any additional names by asking: is there anyone else you can think of?

APPENDIX A (continued)

F3b. During the last month, which of these people did you actually call on for help when you were sick or confined to bed?

Interviewer: Inquire about each person listed in column 1, and check in column 2 if any actual support was received.

F3a. Tangible Support: Members	F3b. Actual Support

APPENDIX A (continued)

F4. Social Network Member Information

Interviewer: Take out Answer Grid 2. Fill in the first column with each network member nominated in column 1 of the tables in F1 through F3, and remove duplications that show up more than once after confirming with the subject. Fill in the other columns for each network member with the codes corresponding to the answers.

INTERVIEWER: Next I would like to ask a few more questions about each person you just mentioned. Please answer honestly as far as you know about the person. I do not need to know any real names. You can be reassured that all your answers are strictly anonymous and confidential. Now let's first talk about (person X)...

F4a. The gender of this person is...

Interviewer: Do NOT ask respondent but circle the answer directly if the gender is apparent from nomination, e.g. "mom" has to be female.

Male	.....01
Female	.....02

APPENDIX A (continued)

F4b. He/she is originally from...

Ruili	.....01
Myanmar	.....02
Other	.....03
Don't know	.....97

F4c. He/she is currently living in...

Ruili	.....01	
Myanmar	.....02	→Skip to F4e
Other	.....03	→Skip to F4e
	Specify: _____	
Don't know	.....97	
Decline to answer	.....98	

APPENDIX A (continued)

F4d. Is this person living with you in the same household?

Yes	.....01
No	.....02

F4e. Is this person a family member or relative?

Interviewer: Do NOT ask respondent but circle the answer directly if the answer is apparent from nomination, e.g. “mom” has to be a relative.

Yes	.....01
No	.....02

F4f. How is this person related to you? He/she is...

Interviewer: If he/she is a family member or relative, ONLY read the options on the LEFT panel; otherwise ONLY read the options on the RIGHT panel.

APPENDIX A (continued)

My husband	.....0	My boyfriend	.....0
	1		9
My child	.....0	A friend	.....1
	2	A neighbor	0
A parent by birth	.....0	A co-worker	.....1
	3	An acquaintance	1
A sibling by birth	.....0	A minister/priest/monk	.....1
	4	A social worker	.....1
Other relative from the by-birth family	.....0		3
	5	A peer educator	.....1
The partner's parent	.....0	A doctor or a nurse	4
	6	Other	.....1
The partner's sibling	.....0		5
	7		.....1
Other relative of the partner	.....0	Don't know	6
	8		.....1
		Decline to answer	7
			.....1
			8
			Specify:_____
			-
			.....97
			.....98

APPENDIX A (continued)

F4g. His/her ethnicity is...

Interviewer: Circle the ONLY answer.

Bamar	.....01
Dai/Shan	.....02
Jingpo/Kachin	.....03
Han	.....04
Other	.....05
	Specify: _____ _____
Don't know	.....97
Decline to answer	.....98

F4h. We previously talked about some men hitting their women and forcing them to have sex. As far as you know,

(If the person is her own male partner)

Has he ever hit or forced sex with you?

(If the person is male adult non-partner)

Has he ever hit or forced sex with any female partners?

(If the person is female adult)

Has she ever been hit or forced to have sex with by any of her male partners?

APPENDIX A (continued)

Yes	.....01
No	.....02
Don't know	.....97
Decline to answer	.....98

APPENDIX A (continued)

G. GENDER ROLE ATTITUDES

INTERVIEWER: In this community and elsewhere, people have different ideas about families and what is acceptable behavior for men and women in the home. I am going to read you a list of statements, and I would like you to tell me whether you agree or not. There are no right or wrong answers.

Would you agree that...	Yes	No	Don't know/ Declined to answer
G1. A good wife obeys her husband even if she disagrees.	1	2	99
G2. Family problems should only be discussed with people in the family.	1	2	99
G3. It is important for a man to show his wife/partner who is the boss.	1	2	99
G4. A woman should be able to choose her own friends even if her husband disapproves.	1	2	99
G5. It's a wife's obligation to have sex with her husband even if she doesn't feel like it	1	2	99
G6. If a man mistreats his wife, others outside of the family should intervene	1	2	99

APPENDIX A (continued)

G7. In your opinion, does a man have a good reason to hit his wife if:			
a) She does not complete her household work to his satisfaction	1	2	99
b) She disobeys him	1	2	99
c) She refuses to have sexual relations with him	1	2	99
d) She asks him whether he has other girlfriends	1	2	99
e) He suspects that she is unfaithful	1	2	99
f) He finds out that she has been unfaithful	1	2	99
G8. In your opinion, can a married woman refuse to have sex with her husband if:			
a) She doesn't want to	1	2	99
b) He is drunk	1	2	99
c) She is sick	1	2	99
d) He mistreats her	1	2	99

APPENDIX A (continued)

H. HEALTH RELATED QUALITY OF LIFE

<p>INTERVIEWER: Now, I'd like to ask some questions concerning your health and life.</p>

H1. In general, would you say your health is: Interviewer: READ and Circle the ONLY answer.

- Excellent 1
- Very Good 2
- Good 3
- Fair 4
- Poor 5

H2. During the past month, has your health kept you from working at a job, doing work around the house, going to school or taking care of children:

Interviewer: READ and Circle the ONLY answer.

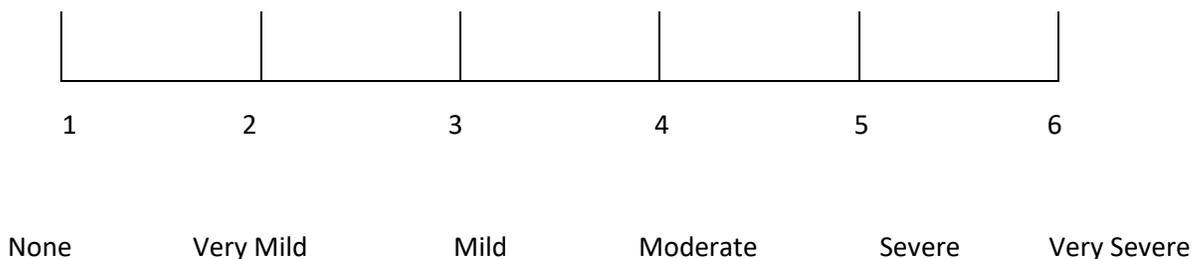
- None of the time..... 1
- Some of the time 2
- All of the time..... 3

APPENDIX A (continued)

H3. How much bodily pain have you generally had during the past month:

Interviewer: SHOW CARD C AND EXPLAIN.

Please look at the ruler and tell me how you have been feeling.



H4. During the past month, to what extent has your health interfered with your normal social activities with family, friends, neighbors, or groups:

Interviewer: READ and Circle the ONLY answer.

- Not at all 1
- Slightly 2
- Moderately 3
- Quite a bit 4
- Extremely 5

APPENDIX A (continued)

H5. During the past month, have you been unable to do certain kinds or amounts of work, housework, school work or caring for children because of your health:

Interviewer: READ and Circle the ONLY answer.

None of the time 1

Some of the time 2

All of the time 3

H6. During the past month, how much did bodily pain interfere with normal work (including work outside the house and housework): **Interviewer: READ and Circle the ONLY answer.**

Not at all 1

Slightly 2

Moderately 3

Quite a bit 4

Extremely 5

**H7. How much, if at all, does your health limit you in each of the following activities?
Please tell me if you are limited a lot, limited a little, or not at all limited.**

INTERVIEWER: READ THE QUESTIONS IN TURN, AND REPEAT THE ANSWER OPTIONS AFTER EACH QUESTION.

APPENDIX A (continued)

How much does your health limit:	LIMITED A LOT	LIMITED A LITTLE	NOT AT ALL LIMITED
a. The kinds or amounts of vigorous activities you can do, like lifting heavy objects, or running for a distance?	1	2	3
b. The kinds or amounts of moderate activities you can do, like moving a table, or carrying groceries?	1	2	3
c. Walking uphill or climbing a few flights of stairs?	1	2	3
d. Eating, dressing, bathing, or using the toilet?	1	2	3

H8. For each of the following questions, please tell me the answer that comes closest to the way you have been feeling during the past month.

INTERVIEWER: HAND RESPONDENT CARD D AND EXPLAIN. Please look at the ruler. For each question, please tell me where on the ruler corresponds the best with your feeling.

INTERVIEWER: FOR EACH QUESTION REPEAT THE ANSWER OPTIONS ON CARD D AND CIRCLE THE ANSWER ON THE TABLE BELOW.

APPENDIX A (continued)

How much of the time during the past month:	NONE OF THE TIME	A LITTLE OF THE TIME	SOME OF THE TIME	A GOOD BIT OF THE TIME	MOST OF THE TIME	ALL OF THE TIME
a. Has your health limited your social activities (like visiting with friends or close relatives)?	1	2	3	4	5	6
b. Did you have trouble keeping your attention on an activity for long?	1	2	3	4	5	6
c. Did you have difficulty reasoning and solving problems?	1	2	3	4	5	6

APPENDIX A (continued)

d. Have you felt calm and peaceful?	1	2	3	4	5	6
e. Have you been downhearted and blue?	1	2	3	4	5	6
f. Did you feel tired?	1	2	3	4	5	6
g. Did you have enough energy to do the things you want to do?	1	2	3	4	5	6
h. Have you been happy?	1	2	3	4	5	6

H9. Please indicate the extent to which the following statements are true or false for you.

APPENDIX A (continued)

INTERVIEWER: HAND RESPONDENT CARD E. READ THROUGH THE ROWS AND REPEAT THE ANSWER OPTIONS, AND CIRCLE THE BEST ANSWER BELOW.

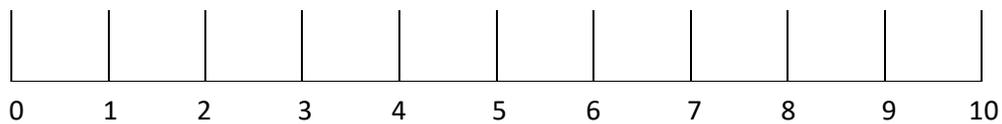
Please look at the ruler, and tell me your feeling about each statement.

	DEFINITELY TRUE	MOSTLY TRUE	NOT SURE	MOSTLY FALSE	DEFINITELY FALSE
a. My health is excellent .	1	2	3	4	5
b. I have been feeling bad lately.	1	2	3	4	5

H10. Overall, how would you rate your quality of life? Please tell me which number is closest with “0” being the worst possible quality of life and “10” being the best possible quality of life.

INTERVIEWER: HAND RESPONDENT CARD F AND EXPLAIN.

APPENDIX A (continued)



WORST POSSIBLE
QUALITY OF
LIFE (AS
BAD OR
WORSE
THAN BEING
DEAD)

BEST POSSIBLE
QUALITY OF
LIFE

The End

End time: _____

APPENDIX B
UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Approval Notice

Initial Review (Response To Modifications)

November 20, 2013

Yi Li

Epidemiology and Biostatistics

1603 W. Taylor St.

Epidemiology + Biostatistics, M/C 923

Chicago, IL 60612

Phone: (312) 307-8712 / Fax: (312) 996-5356

RE: Protocol # 2013-0934

“The influence of cross-border migration on the risk of intimate partner violence of women living with HIV in Ruili, China”

Dear Ms. Li:

Your Initial Review (Response To Modifications) was reviewed and approved by the Expedited review process on November 15, 2013. You may now begin your research

APPENDIX B (continued)

Please note the following information about your approved research protocol:

Protocol Approval Period: November 15, 2013 - November 15, 2014

Approved Subject Enrollment #: 250

Additional Determinations for Research Involving Minors: These determinations have not been made for this study since it has not been approved for enrollment of minors.

Performance Sites: UIC, Kunming University of Medical Science, RCDC (China), Huyu Township Health Clinic (China), Mengmao Township Health Clinic (China), Mengxiu Township Health Clinic (China), Jiegao District Community Health Clinic (China)

Sponsor: NIH-National Institutes of Health

PAF#: - 2011-00687

Grant/Contract No.: 5 D43 TW001419

Grant/Contract Title: UIC AIDS International Training and Research Program

Research Protocol(s):

- a) Protocol; Version 2.0; 11/05/2013

Recruitment Material(s):

- a) Study Info Flyer (English); Version 2; 11/05/2013
- b) Study Info Flyer (Chinese); Version 2; 11/05/2013
- c) Contact Card (English); Version 1; 11/05/2013
- d) Contact Card (Chinese); Version 1; 11/05/2013
- e) Physician Script Pretest (English); Version 2; 11/05/2013
- f) Physician Script Pretest (Chinese); Version 2; 11/05/2013
- g) Physician Script Main Study (English); Version 2; 11/05/2013
- h) Physician Script Main Study (Chinese); Version 2; 11/05/2013
- i) Verbal Consent Script Eligibility Screening Pretest (English); Version 1; 11/05/2013
- j) Verbal Consent Script Eligibility Screening Pretest (Chinese); Version 1; 11/05/2013
- k) Verbal Consent Script Eligibility Screening Main Study (English); Version 1; 11/05/2013
- l) Verbal Consent Script Eligibility Screening Main Study (Chinese); Version 1; 11/05/2013
- m) Eligibility Screening Form (English); Version 2; 11/05/2013
- n) Eligibility Screening Form (Chinese); Version 2; 11/05/2013

APPENDIX B (continued)

Informed Consent(s):

- a) Verbal Consent Script Pretest (English); Version 2; 11/05/2013
- b) Verbal Consent Script Pretest (Chinese); Version 2; 11/05/2013
- c) Verbal Consent Script Main Study (English); Version 2; 11/05/2013
- d) Verbal Consent Script Main Study (Chinese); Version 2; 11/05/2013
- e) A waiver of documentation of consent has been granted under 45 CFR 46.117 for the pilot and main study due to cultural differences; it is uncommon for subjects to sign official-looking documents unless it is a contract, government document, etc; minimal risk; subjects will be provide verbal consent and an information sheet in their primary language will be provided that contains all of the elements of consent.
- f) A waiver of documentation of consent has been granted under 45 CFR 46.116(d) for the eligibility screening; minimal risk; verbal consent will be obtained.

Your research meets the criteria for expedited review as defined in 45 CFR 46.110(b)(1) under the following specific category(ies):

- (7) Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
09/24/2013	Initial Review	Expedited	09/26/2013	Modifications Required
11/13/2013	Response To Modifications	Expedited	11/15/2013	Approved

Please remember to:

→ Use your **research protocol number** (2013-0934) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the enclosure,

"UIC Investigator Responsibilities, Protection of Human Research Subjects"

(<http://tigger.uic.edu/depts/ovcr/research/protocolreview/irb/policies/0924.pdf>)

APPENDIX B (continued)

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Please be aware that if the scope of work in the grant/project changes, the protocol must be amended and approved by the UIC IRB before the initiation of the change.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact OPRS at (312) 996-1711 or me at (312) 355-0816. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Alison Santiago, MSW, MJ

IRB Coordinator, IRB # 2

Office for the Protection of Research Subjects

Enclosure(s):

- 1. UIC Investigator Responsibilities, Protection of Human Research Subjects**
- 2. Informed Consent Document(s):**
 - a) Verbal Consent Script Pretest (English); Version 2; 11/05/2013
 - b) Verbal Consent Script Pretest (Chinese); Version 2; 11/05/2013
 - c) Verbal Consent Script Main Study (English); Version 2; 11/05/2013
 - d) Verbal Consent Script Main Study (Chinese); Version 2; 11/05/2013
- 3. Recruiting Material(s):**
 - a) Study Info Flyer (English); Version 2; 11/05/2013
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 - f) Physician Script Pretest (Chinese); Version 2; 11/05/2013
 - g) Physician Script Main Study (English); Version 2; 11/05/2013

APPENDIX B (continued)

- h) Physician Script Main Study (Chinese); Version 2; 11/05/2013
- i) Verbal Consent Script Eligibility Screening Pretest (English); Version 1; 11/05/2013
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- n) Eligibility Screening Form (Chinese); Version 2; 11/05/2013

cc: Ronald C. Hershow, Epidemiology and Biostatistics, M/C 923
Judith A. Levy (Faculty Sponsor), Epidemiology and Biostatistics, M/C 923
OVCR Administration, M/C 672

CITED LITERATURE

- Abramsky, T., Watts, C. H., Garcia-Moreno, C., Devries, K., Kiss, L., Ellsberg, M., . . . Heise, L. (2011). What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence. *BMC public health, 11*(1), 109.
- Anderson, K. L. (1997). Gender, Status, and Domestic Violence: An Integration of Feminist and Family Violence Approaches. *Journal of Marriage and Family, 59*(3), 655-669.
- Babcock, J. C., Waltz, J., Jacobson, N. S., & Gottman, J. M. (1993). Power and violence: the relation between communication patterns, power discrepancies, and domestic violence. *J Consult Clin Psychol, 61*(1), 40-50.
- Bachman, R., & Saltzman, L. E. (1994). *Violence against women*: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.
- Bagheri, Z., Taheri, M., & Motazedian, N. (2019). The impacts of depression and anxiety on quality of life among patients with HIV/AIDS and their spouses: testing dyadic dynamics using the actor-partner interdependence model. *AIDS Care, 1*-9.
- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology, 14*, 413-445.
- Barrera, M., Jr., & Ainlay, S. L. (1983). The structure of social support: a conceptual and empirical analysis. *J Community Psychol, 11*(2), 133-143.
- Barrera, M. J. (1981). Social support in the adjustment of pregnant adolescents. In B. H. Gottlieb (Ed.), *Social networks and social support* (pp. 69-96). Beverly Hills: Sage.
- Becchetti, L., Giachin Ricca, E., & Pelloni, A. (2013). The Paradox of Children and Life Satisfaction. *Social Indicators Research, 111*, 725-751.
- Berg, C. A., & Upchurch, R. (2007). A developmental-contextual model of couples coping with chronic illness across the adult life span. *Psychological Bulletin, 133*, 920-954.
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science and Medicine.*

- Bernazzani, O., Saucier, J.-F., David, H., & Borgeat, F. (1997). Psychosocial predictors of depressive symptomatology level in postpartum women. *Journal of affective disorders*, *46*(1), 39.
- Berry, R. E., & Williams, F. L. (1987). Assessing the Relationship between Quality of Life and Marital and Income Satisfaction: A Path Analytic Approach. *Journal of Marriage and Family*, *49*, 107-116.
- Beyrer, C., Razak, M. H., Lisam, K., Chen, J., Lui, W., & Yu, X.-F. (2000). Overland heroin trafficking routes and HIV-1 spread in south and south-east Asia. *Aids*, *14*(1), 75-83.
- Bhatta, D. N., Liabsuetrakul, T., & McNeil, E. B. (2017). Social and behavioral interventions for improving quality of life of HIV infected people receiving antiretroviral therapy: a systematic review and meta-analysis. *Health and Quality of Life Outcomes*, *15*, 80.
- Bonomi, A. E., Anderson, M. L., Rivara, F. P., & Thompson, R. S. (2007). Health outcomes in women with physical and sexual intimate partner violence exposure. *J Womens Health (Larchmt)*, *16*(7), 987-997.
- Bowling, A. (2005). Just one question: If one question works, why ask several? *Journal of Epidemiology & Community Health*, *59*, 342-345.
- Boyd, M. (1989). Family and Personal Networks in International Migration: Recent Developments and New Agendas <sup/>. *International Migration Review*, *23*, 638-670.
- Boyers, G. B., & Rowe, L. S. (2018). Social support and relationship satisfaction in bipolar disorder. *Journal of Family Psychology*, *32*.
- Bozzette, S. A., Hays, R. D., Berry, S. H., & Kanouse, D. E. (1994). A Perceived Health Index for use in persons with advanced HIV disease: derivation, reliability, and validity. *Med Care*, *32*(7), 716-731.
- Bozzette, S. A., Hays, R. D., Berry, S. H., Kanouse, D. E., & Wu, A. W. (1995). Derivation and properties of a brief health status assessment instrument for use in HIV disease. *J Acquir Immune Defic Syndr Hum Retrovirol*, *8*(3), 253-265.
- Brecklin, L. R., & Ullman, S. E. (2002). The roles of victim and offender alcohol use in sexual assaults: results from the National Violence Against Women Survey. *Journal of Studies on Alcohol and Drugs*, *63*(1), 57.

- Brown, M. J., Serovich, J. M., & Kimberly, J. A. (2016). Depressive Symptoms, Substance Use and Partner Violence Victimization Associated with HIV Disclosure Among Men Who have Sex with Men. *AIDS and Behavior*, 20(1), 184-192.
- Burgos-Soto, J., Orne-Gliemann, J., Encrenaz, G., Patassi, A., Woronowski, A., Kariyare, B., . . . Becquet, R. (2014). Intimate partner sexual and physical violence among women in Togo, West Africa: prevalence, associated factors, and the specific role of HIV infection. *Glob Health Action*, 7, 23456.
- Campbell, C., & Mannell, J. (2016). Conceptualising the agency of highly marginalised women: Intimate partner violence in extreme settings. *Glob Public Health*, 11(1-2), 1-16.
- Campbell, J. C. (2002). Health consequences of intimate partner violence. *The Lancet*, 359(9314), 1331-1336.
- Campbell, J. C., Baty, M. L., Ghandour, R. M., Stockman, J. K., Francisco, L., & Wagman, J. (2008). The intersection of intimate partner violence against women and HIV/AIDS: a review. *Int J Inj Contr Saf Promot*, 15(4), 221-231.
- Carr, D., Cornman, J. C., & Freedman, V. A. (2016). Marital quality and negative experienced well-being: An assessment of actor and partner effects among older married persons. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 71.
- Catunda, C., Seidl, E. M. F., & Lemétayer, F. (2017). Illness perception and quality of life of HIV-positive persons: mediation effects of tenacious and flexible goal pursuit. *Psychology, Health & Medicine*, 22, 129-137.
- Cederfjäll, C., Langius-Eklöf, A., Lidman, K., & Wredling, R. (2001). Gender differences in perceived health-related quality of life among patients with HIV infection. *AIDS patient care and STDs*, 15(1), 31-39.
- Chantavanich, S., Beesey, A., & Paul, S. (2002). *Mobility and HIV/AIDS in the Greater Mekong Subregion*: Asian Development Bank.
- Chen FF, G. W., Qin QQ, Cai C, Cui Y. (2018). [Spatial-temporal distribution of newly detected HIV/AIDS cases among aged 15 years or older women in China, 2010-2016][Article in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi*, 39, 739-744.

- Chen, J. (2011). Internal migration and health: Re-examining the healthy migrant phenomenon in China. *Social Science & Medicine*, 72, 1294-1301.
- Chen, W. T., Shiu, C. S., Simoni, J. M., Zhao, H., Bao, M. J., & Lu, H. (2011). In sickness and in health: a qualitative study of how Chinese women with HIV navigate stigma and negotiate disclosure within their marriages/partnerships. *AIDS Care*, 23(sup1), 120-125.
- Chiu, W. K., Lam, W. C., Chu, N. H., Mok, C. K., Tung, W. K., Leung, F. Y., & Ting, S. M. (2016). Sexual violence cases in a hospital setting in Hong Kong: victims' demographic, event characteristics, and management. *Hong Kong Med J*, 22(6), 576-581.
- Choi, H., Yorgason, J. B., & Johnson, D. R. (2016). Marital quality and health in middle and later adulthood: Dyadic associations. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*.
- Choi, S. Y., & Ting, K. F. (2008). Wife beating in South Africa: an imbalance theory of resources and power. *J Interpers Violence*, 23(6), 834-852.
- CMOH (Ministry of Health of the People's Republic of China). (2012). *2012 China AIDS Response Progress Report*. Retrieved from <http://www.unaids.org/en/regionscountries/countries/china/>
- Cohen, M., Deamant, C., Barkan, S., Richardson, J., Young, M., Holman, S., . . . Melnick, S. (2000). Domestic violence and childhood sexual abuse in HIV-infected women and women at risk for HIV. *American Journal of Public Health*, 90(4), 560.
- Cohen, S., & Wills, T. A. (1985). Stress, Social Support, and the Buffering Hypothesis. *Psychological Bulletin*, 98, 310-357.
- Coker, A. L., Sanderson, M., & Dong, B. (2004). Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatr Perinat Epidemiol*, 18(4), 260-269.
- Coleman, D. H., & Straus, M. A. (1986). Marital power, conflict, and violence in a nationally representative sample of American couples. *Violence Vict*, 1(2), 141-157.
- Coyne, J. C., Rohrbaugh, M. J., Shoham, V., Sonnega, J. S., Nicklas, J. M., & Cranford, J. A. (2001). Prognostic importance of marital quality for survival of congestive heart failure. *The American Journal of Cardiology*, 88, 526-529.

- Coyne, J. C., & Smith, D. A. (1991). Couples coping with a myocardial infarction: A contextual perspective on wives' distress. *Journal of Personality and Social Psychology*, *61*, 404-412.
- Cunney, K. A., & Perri 3rd, M. (1991). Single-item vs multiple-item measures of health-related quality of life. *Psychol Rep.*
- Cunney, K. A., & Perri, M. (1991). Single-Item Vs Multiple-Item Measures of Health-Related Quality of Life. *Psychological Reports*, *69*, 127-130.
- Cutrona, C. E. (1996). *Social support in couples: Marriage as a resource in times of stress* (Vol. 13): Sage Publications.
- Davidson, A. J., Bertram, S. L., Lezotte, D. C., Marine, W. M., Rietmeijer, C. A., Hagglund, B. B., & Cohn, D. L. (1998). Comparison of Health Status, Socioeconomic Characteristics, and Knowledge and Use of HIV-Related Resources Between HIV-Infected Women and Men. *Medical Care*, *36*(12), 1676-1684.
- de Boer, A. G. E. M., van Lanschot, J. J. B., Stalmeijer, P. F. M., van Sandick, J. W., Hulscher, J. B. F., de Haes, J. C. J. M., & Sprangers, M. A. G. (2004). Is a single-item visual analogue scale as valid, reliable and responsive as multi-item scales in measuring quality of life? *Quality of Life Research*, *13*(2), 311-320.
- Decker, M. R., Miller, E., McCauley, H. L., Tancredi, D. J., Anderson, H., Levenson, R. R., & Silverman, J. G. (2013). Recent partner violence and sexual and drug-related STI/HIV risk among adolescent and young adult women attending family planning clinics. *Sex Transm Infect.* doi:10.1136/sextrans-2013-051288
- Degroote, S., Vogelaers, D., & Vandijck, D. M. (2014). What determines health-related quality of life among people living with HIV: an updated review of the literature. *Archives of Public Health*, *72*(1), 40.
- des Rivières-Pigeon, C., Séguin, L., Goulet, L., & Descarries, F. (2001). Unravelling the complexities of the relationship between employment status and postpartum depressive symptomatology. *Women & Health*, *34*(2), 61-79.
- Dhairyan, R., Tariq, S., Scourse, R., & Coyne, K. M. (2013). Intimate partner violence in women living with HIV attending an inner city clinic in the UK: prevalence and associated factors. *HIV Med*, *14*(5), 303-310.

- Dobash, R. E. (1992). *Women, violence, and social change*: Psychology Press.
- Draper, N., & Smith, H. (1981). *Applied Regression Analysis*, 2d Edition, New York: John Wiley & Sons.
- Du Guerny, J., Hsu, L.-N., & Hong, C. (2003). *Population movement and HIV/AIDS: the case of Ruili, Yunnan, China*: UNDP South East Asia HIV and Development Programme.
- Dunkle, K. L., Jewkes, R. K., Brown, H. C., Gray, G. E., McIntyre, J. A., & Harlow, S. D. (2004). Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *The Lancet*, 363(9419), 1415-1421.
- Fehringer, J. A., & Hindin, M. J. (2009). Like parent, like child: intergenerational transmission of partner violence in Cebu, the Philippines. *J Adolesc Health*, 44(4), 363-371.
- Feng, L. (2011). *A study on infection of HIV/STDs on the cross borders and local female sex workers, as well the possible reasons in a board county, Yunnan Province, China (云南省某边境县跨境和当地女性性工作者 HIV/STDs 感染及其影响因素研究)*. (M.A.), China CDC, China - Beijing. Retrieved from <http://cdmd.cnki.com.cn/Article/CDMD-84501-1011210889.htm> CNKI database.
- Ferrans, C. E., Zerwic, J. J., Wilbur, J. E., & Larson, J. L. (2005). Conceptual Model of Health-Related Quality of Life. *Journal of Nursing Scholarship*, 37, 336-342.
- Ferraro, K. J., & Johnson, J. M. (1983). How Women Experience Battering: The Process of Victimization. *Social Problems*, 30(3), 325-339.
- Filmer, D., & Pritchett, L. (1999). The effect of household wealth on educational attainment: evidence from 35 countries. *Population and development review*, 25(1), 85-120.
- Filmer, D., & Pritchett, L. H. (2001). Estimating Wealth Effects Without Expenditure Data—Or Tears: An Application To Educational Enrollments In States Of India*. *Demography*, 38(1), 115-132.
- Flanagan, J. C. (1978). A research approach to improving our quality of life. *American Psychologist*, 33, 138-147.

- Flood, M., & Pease, B. (2009). Factors influencing attitudes to violence against women. *Trauma Violence Abuse, 10*(2), 125-142.
- Frye, V., Latka, M. H., Wu, Y., Valverde, E. E., Knowlton, A. R., Knight, K. R., . . . Team, f. t. I. S. (2007). Intimate Partner Violence Perpetration Against Main Female Partners Among HIV-Positive Male Injection Drug Users. *JAIDS Journal of Acquired Immune Deficiency Syndromes, 46*, S101-S109.
- Fu, L., Zhao, Q., Luo, H., Lu, J., Guo, J., Jia, M., . . . Song, L. (2011). An investigation of HIV infection and its risk factors among Myanmar women in cross-border marriage in Tengchong County (in Chinese). *Chinese Journal of AIDS and Venereology, 17*(3), 316-319.
- Fulu, E., Jewkes, R., Roselli, T., & Garcia-Moreno, C. (2013). Prevalence of and factors associated with male perpetration of intimate partner violence: findings from the UN Multi-country Cross-sectional Study on Men and Violence in Asia and the Pacific. *The Lancet Global Health, 1*(4), e187-e207.
- Fuquan, Y. (2001). The Fireplace: Gender and Culture among Yunnan Nationalities. *Gender, Technology and Development, 5*(3), 365-381.
- Gao, Y., Wang, Y., & An, L. (2011). Suicidal Ideation and the Prevalence of Intimate Partner Violence Against Women in Rural Western China. *Violence against women, 17*(10), 1299-1312.
- García-Moreno, C., Jansen, H. A., Ellsberg, M., Heise, L., & Watts, C. (2005). *WHO multi-country study on women's health and domestic violence against women: initial results on prevalence, health outcomes and women's responses*: World Health Organization.
- Garcia-Moreno, C., Jansen, H. A., Ellsberg, M., Heise, L., Watts, C. H., & null. (2006). Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet, 368*(9543), 1260-1269.
- Gielen, A., Fogarty, L., O'Campo, P., Anderson, J., Keller, J., & Faden, R. (2000). Women living with HIV: Disclosure, violence, and social support. *Journal of Urban Health, 77*(3), 480-491.
- Gielen, A. C., McDonnell, K. A., Burke, J. G., & O'campo, P. (2000). Women's lives after an HIV-positive diagnosis: disclosure and violence. *Maternal and Child Health Journal, 4*(2), 111-120.

- Gielen, A. C., McDonnell, K. A., & O'Campo, P. J. (2002). Intimate Partner Violence, HIV Status, and Sexual Risk Reduction. *AIDS and Behavior*, 6(2), 107-116.
- Gielen, A. C., McDonnell, K. A., O'Campo, P. J., & Burke, J. G. (2005). Suicide risk and mental health indicators: Do they differ by abuse and HIV status? *Women's health issues : official publication of the Jacobs Institute of Women's Health*, 15(2), 89-95.
- Gielen, A. C., McDonnell, K. A., Wu, A. W., O'Campo, P., & Faden, R. (2001). Quality of life among women living with HIV: the importance violence, social support, and self care behaviors. *Social Science & Medicine*, 52(2), 315-322.
- Gielen, A. C., O'Campo, P. J., Faden, R. R., Kass, N. E., & Xue, X. (1994). Interpersonal conflict and physical violence during the childbearing year. *Soc Sci Med*, 39(6), 781-787.
- Golding, J. M. (1999). Intimate partner violence as a risk factor for mental disorders: a meta-analysis. *Journal of Family Violence*, 14(2), 99-132.
- Goode, W. J. (1971). Force and Violence in the Family. *Journal of Marriage and Family*, 33(4), 624-636.
- Goodman, L. A., Koss, M. P., & Felipe Russo, N. (1993). Violence against women: Physical and mental health effects. Part I: Research findings. *Applied and Preventive Psychology*, 2(2), 79-89.
- Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, 1, 201.
- Grundy-Warr, C. (2004). The silence and violence of forced migration: The Myanmar-Thailand border. *International Migration in Southeast Asia*, 228-272.
- Guo, S., & Li, N. (2012). Investigation of cross-border marriages between China and Myanmar [in Chinese]. Retrieved from <http://www.xzbu.com/9/view-3786224.htm>
- Gurung, R., Sarason, B., & Sarason, I. (1997). Close personal relationships and health outcomes: A key to the role of social support. *Handbook of personal relationships: Theory, research and interventions (2nd ed)* Chichester, UK: Wiley, 547-573.

- Hackney, L. K. (2015). Re-evaluating Palermo: The case of Burmese women as Chinese brides. *Anti-Trafficking Review*.
- Hagedoorn, M., Sanderman, R., Bolks, H. N., Tuinstra, J., & Coyne, J. C. (2008). Distress in couples coping with cancer: A meta-analysis and critical review of role and gender effects. *Psychological Bulletin*, *134*, 1-30.
- Ham, O. K. (2011). Predictors of Health-Related Quality of Life Among Low-Income Midlife Women. *Western Journal of Nursing Research*, *33*, 63-78.
- Heaney, C. A., & Israel, B. A. (2008). *Social Networks and Social Support* (4th ed.): Jossey-Bass.
- Heckman, T. G. (2003). The chronic illness quality of life (CIQOL) model: Explaining life satisfaction in people living with HIV disease. *Health Psychology*, *22*, 140-147.
- Heise, L., & Garcia-Moreno, C. (2002). Violence by intimate partners. In E. G. Krug, L. L. Dahlberg, J. A. Mercy, A. B. Zwi, & R. Lozano (Eds.), *World report on violence and health* (pp. 87-121). Geneva, Switzerland: World Health Organization.
- Heise, L. L. (1998). Violence Against Women: An Integrated, Ecological Framework. *Violence Against Women*, *4*(3), 262-290.
- Hershow, R. B., Bhadra, M., Mai, N. V. T., Sripaipan, T., Ha, T. V., & Go, V. F. (2020). A Qualitative Study With Women Living With HIV on Perceived Gender Norms and Experiences of Intimate Partner Violence in Northern Vietnam. *J Interpers Violence*, *35*(23-24), 5905-5925.
- Hershow, R. B., Ha, T. V., Sripaipan, T., Latkin, C., Hutton, H. E., Chander, G., . . . Go, V. F. (2020). Perpetration of Intimate Partner Violence Among Men Living with HIV in Northern Vietnam. *AIDS and Behavior*, *24*(9), 2555-2571.
- Hindin, M. J., Kishor, S., & Ansara, D. L. (2008). *Intimate partner violence among couples in 10 DHS countries: predictors and health outcomes*. Calverton, Maryland, USA: Macro International Inc.
- Hoffman, E., Nishimura, M., Isaacs, J., & Kaneshiro, S. (2013). Confidant Relations Among Taiwanese: Implications for Ethnic Chinese Health Care Treatment. *Current Psychology*, *32*(1), 60-70.

- Hoffman, K. L., Demo, D. H., & Edwards, J. N. (1994). Physical Wife Abuse in a Non-Western Society: An Integrated Theoretical Approach. *Journal of Marriage and Family*, 56(1), 131-146.
- Holliday, I. (2010). Ethnicity and Democratization in Myanmar. *Asian Journal of Political Science*, 18(2), 111-128.
- Holt-Lunstad, J., Birmingham, W., & Jones, B. Q. (2008). Is There Something Unique about Marriage? The Relative Impact of Marital Status, Relationship Quality, and Network Social Support on Ambulatory Blood Pressure and Mental Health. *Annals of Behavioral Medicine*, 35, 239-244.
- Hostinar, C. E., & Gunnar, M. R. (2015). Social Support Can Buffer Against Stress and Shape Brain Activity. *AJOB Neuroscience*, 6, 34-42.
- Hotaling, G. T., & Sugarman, D. B. (1986). An analysis of risk markers in husband to wife violence: The current state of knowledge. *Violence Vict*, 1(2), 101-124.
- House, J. S., Umberson, D., & Landis, K. R. (1988). Structures and Processes of Social Support. *Annual Review of Sociology*, 14, 293-318.
- Huang, E. R., Jones, K. D., Bennett, R. M., Hall, G. C. N., & Lyons, K. S. (2018). The role of spousal relationships in fibromyalgia patients' quality of life. *Psychology, Health & Medicine*, 23, 987-995.
- Hudson, N. W., Lucas, R. E., & Donnellan, M. B. (2020). The Highs and Lows of Love: Romantic Relationship Quality Moderates Whether Spending Time With One's Partner Predicts Gains or Losses in Well-Being. *Personality and Social Psychology Bulletin*, 46, 572-589.
- Hupcey, J. E. (1998). Clarifying the social support theory-research linkage. *Journal of Advanced Nursing*, 27, 1231-1241.
- Ickovics Jr, H. M. E. V. D., & et al. (2001). Mortality, cd4 cell count decline, and depressive symptoms among hiv-seropositive women: Longitudinal analysis from the hiv epidemiology research study. *JAMA*, 285(11), 1466-1474.

- Jackson, G. L., Krull, J. L., Bradbury, T. N., & Karney, B. R. (2017). Household Income and Trajectories of Marital Satisfaction in Early Marriage. *Journal of Marriage and Family*, 79, 690-704.
- Jewkes, R. (2002). Intimate partner violence: causes and prevention. *The Lancet*, 359(9315), 1423-1429.
- Jewkes, R., Dunkle, K., Nduna, M., & Shai, N. (2010). Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *The Lancet*, 376(9734), 41-48.
- Jewkes, R., Levin, J., & Penn-Kekana, L. (2002). Risk factors for domestic violence: findings from a South African cross-sectional study. *Social science & medicine (1982)*, 55(9), 1603-1617.
- Jia, M., Luo, H., Ma, Y., Wang, N., Smith, K., Mei, J., . . . Lu, L. (2010). The HIV Epidemic in Yunnan Province, China, 1989-2007. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 53, S34-S40.
- Jiang, L., Li, Z., Huang, J., Liu, B., Yang, Y., Lin, L., . . . Li, H. (2019). Spatiotemporal clusters of HIV/AIDS infections caused by drug use and heterosexual contact in Ruili city, China 1989–2016. *BMC Infectious Diseases*, 19, 925.
- Jirattikorn, A., Tangmunkongvorakul, A., Musumari Patou, M., Ayuttacorn, A., Srithanaviboonchai, K., Banwell, C., & Kelly, M. (2020). Sexual risk behaviours and HIV knowledge and beliefs of Shan migrants from Myanmar living with HIV in Chiang Mai, Thailand. *International Journal of Migration, Health and Social Care*, ahead-of-print(ahead-of-print).
- Jiwatram-Negrón, T., & El-Bassel, N. (2014). Systematic Review of Couple-Based HIV Intervention and Prevention Studies: Advantages, Gaps, and Future Directions. *AIDS and Behavior*, 18, 1864-1887.
- Kahler, C. W., McCrady, B. S., & Epstein, E. E. (2003). Sources of distress among women in treatment with their alcoholic partners. *J Subst Abuse Treat*, 24(3), 257-265.
- Kantor, G. K. (1997). Alcohol and spouse abuse ethnic differences. *Recent Dev Alcohol*, 13, 57-79.

- Kaplan, B. H., Cassel, J. C., & Gore, S. (1977). Social support and health. *Medical Care, 15*, 47-58.
- Kaufman, J., Yang, B.-Z., Douglas-Palumberi, H., Houshyar, S., Lipschitz, D., Krystal, J. H., & Gelernter, J. (2004). Social supports and serotonin transporter gene moderate depression in maltreated children. *Proceedings of the National Academy of Sciences of the United States of America, 101*(49), 17316-17321.
- Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health, 78*, 458-467.
- Kennedy, S., Kidd, M. P., McDonald, J. T., & Biddle, N. (2015). The Healthy Immigrant Effect: Patterns and Evidence from Four Countries. *Journal of International Migration and Integration, 16*, 317-332.
- Khaleque, A. (2004). Intimate Adult Relationships, Quality of Life and Psychological Adjustment. *Social Indicators Research, 69*, 351-360.
- Khamarko, K., & Myers, J. J. (2013). *The Influence of Social Support on the Lives of HIV-Infected Individuals in Low- and Middle-Income Countries*. Paper presented at the World Health Organization.
- Kiecolt-Glaser, J. K., & Newton, T. L. (2001). Marriage and health: His and hers. *Psychological Bulletin, 127*, 472-503.
- Kiecolt-Glaser, J. K., & Wilson, S. J. (2017). Lovesick: How Couples' Relationships Influence Health. *Annual Review of Clinical Psychology, 13*.
- Kiene, S. M., Dove, M., & Wanyenze, R. K. (2018). Depressive Symptoms, Disclosure, HIV-Related Stigma, and Coping Following HIV Testing Among Outpatients in Uganda: A Daily Process Analysis. *AIDS and Behavior, 22*, 1639-1651.
- Kim, Y., Carver, C. S., Spillers, R. L., Cramer, C., & Zhou, E. S. (2011). Individual and dyadic relations between spiritual well-being and quality of life among cancer survivors and their spousal caregivers. *Psycho-Oncology, 20*, 762-770.
- Knowlton, A. R., & Latkin, C. A. (2007). Network financial support and conflict as predictors of depressive symptoms among a highly disadvantaged population. *J Community Psychol, 35*, 13-28.

- Koenig, L. J., & Moore, J. (2000). Women, violence, and HIV: a critical evaluation with implications for HIV services. *Maternal and Child Health Journal*, 4(2), 103-109.
- Krantz, G., & Garcia-Moreno, C. (2005). Violence against women. *Journal of Epidemiology and Community Health*, 59(10), 818-821.
- Kui, C., Juan, D., Cong, D., & Huabin, H. (2007). Cultural Relevance for Rural Community Development in China: A Case Study in Bai, Jingpo and Huyaodai Communities of Yunnan Province. *Chinese Journal of Population Resources and Environment*, 5(2), 78-83.
- Kuo, B. C. H. (2014). Coping, acculturation, and psychological adaptation among migrants: a theoretical and empirical review and synthesis of the literature. *Health Psychology and Behavioral Medicine*, 2, 16-33.
- Langford, C. P. H., Bowsher, J., Maloney, J. P., & Lillis, P. P. (1997). Social support: a conceptual analysis. *Journal of Advanced Nursing*, 25, 95-100.
- Largu, A., Manciu, C., Vâță, A., Nicolau, C., Prisacaru, L., Ciubotaru, F. F., . . . Dorobăț, C.-M. (2012). DYADIC ADJUSTMENT IN HIV SERO-CONCORDANT AND SERO-DISCORDANT COUPLES. *Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi*, 116(3), 718-721.
- Lauritsen, J. M., & Bruus, M. (2008). EpiData entry. A comprehensive tool for validated entry and documentation of data.
- Lee, G. R. (1988). Marital Intimacy among Older Persons - the Spouse as Confidant. *Journal of Family Issues*, 9(2), 273-284.
- Levendosky, A., Bogat, G. A., Theran, S., Trotter, J., Eye, A., & Davidson, W., II. (2004). The Social Networks of Women Experiencing Domestic Violence. *American Journal of Community Psychology*, 34(1-2), 95-109.
- Li, H. (2012, 11/28/2012). Accumulated HIV/AIDS cases in Yunnan have exceeded 100,000. Retrieved from http://yn.xinhuanet.com/newscenter/2012-11/28/c_132003935.htm
- Li, X., Hong, Y., & Poston, D. (2011). Preventing HIV in women: a top priority in China's efforts in fighting AIDS. *AIDS Care*, 23(sup1), 1-4.

- Li, Y., Hershow, R., Irwanto, Praptoraharjo, I., Setiawan, M., & Levy, J. (2014). Factors associated with symptoms of depression among injection drug users receiving antiretroviral treatment in Indonesia. *Journal of AIDS and Clinical Research*, 5.
- Li, Y., Levy, J., & Hershow, R. (2020). Comparing perceived social support among Myanmar migrants versus local women living with HIV in Ruili, China. *In preparation*.
- Li, Z., Peng, K., Yang, Z., Liu, B., Fang, K., & Chu, X. (2009). The survey of cross-border couples' living condition and HIV infection in Ruili. [in Chinese]. *Soft Science of Health (Chinese)*, 23(4), 473-476.
- Li, Z., Yin, Z., Duan, Y., Yang, Z., Liu, B., Peng, K., . . . Zhang, G. (2010). The analysis of HIV/AIDS epidemiology and trends in Ruili between 1989 and 2009 (in Chinese). *Chinese Journal of AIDS & STD*(2), 187-188.
- Limanonda, B. (1995). Families in Thailand: Beliefs and realities. *Journal of Comparative Family Studies*, 26(1), 67.
- Lin, D., Li, X., Fang, X., & Lin, X. (2011). Childhood sexual abuse and sexual risks among young rural-to-urban migrant women in Beijing, China. *AIDS Care*, 23(sup1), 113-119.
- Lin, K., McElmurry, B. J., & Christiansen, C. (2007). Women and HIV/AIDS in China: Gender and Vulnerability. *Health Care for Women International*, 28(8), 680-699.
- Lin, Y., Luo, X., Li, J., Xu, Y., & Li, Q. (2020). The dyadic relationship of benefit finding and its impact on quality of life in colorectal cancer survivor and spousal caregiver couples. *Supportive Care in Cancer*.
- Liu, C., Weber, K., Robison, E., Hu, Z., Jacobson, L. P., & Gange, S. J. (2006). Assessing the effect of HAART on change in quality of life among HIV-infected women. *AIDS Research and Therapy*, 3, 6.
- Llácer, A., Zunzunegui, M. V., del Amo, J., Mazarrasa, L., & Bolúmar, F. (2007). The contribution of a gender perspective to the understanding of migrants' health. *Journal of Epidemiology and Community Health*, 61(Suppl 2), ii4-ii10.
- Lopez, E. J., Jones, D. L., Villar-Loubet, O. M., Arheart, K. L., & Weiss, S. M. (2010). Violence, coping, and consistent medication adherence in HIV-positive couples. *AIDS Education & Prevention*, 22(1), 61-68.

- Lu, L., Jia, M., Ma, Y., Yang, L., Chen, Z., Ho, D. D., . . . Zhang, L. (2008). The changing face of HIV in China. *Nature*, *455*(7213), 609-611.
- Ma, W., Kang, D., Song, Y., Wei, C., Marley, G., & Ma, W. (2015). Social support and HIV/STDs infections among a probability-based sample of rural married migrant women in Shandong Province, China. *BMC Public Health*, *15*, 1170.
- Macmillan, R., & Gartner, R. (1999). When She Brings Home the Bacon: Labor-Force Participation and the Risk of Spousal Violence against Women. *Journal of Marriage and Family*, *61*(4), 947-958.
- Maman, S., Campbell, J., Sweat, M. D., & Gielen, A. C. (2000). The intersections of HIV and violence: directions for future research and interventions. *Social Science & Medicine*, *50*(4), 459-478.
- Martínez García, M. F., García Ramírez, M., & Maya Jariego, I. (2002). Social support and locus of control as predictors of psychological well-being in Moroccan and Peruvian immigrant women in Spain. *International Journal of Intercultural Relations*, *26*, 287-310.
- Matsumoto, S., Yamaoka, K., Takahashi, K., Tanuma, J., Mizushima, D., Do, C. D., . . . Oka, S. (2017). Social Support as a Key Protective Factor against Depression in HIV-Infected Patients: Report from large HIV clinics in Hanoi, Vietnam. *Scientific Reports*, *7*, 15489.
- McDonnell, K. A., Gielen, A. C., Wu, A. W., O'Campo, P., & Faden, R. (2000). Measuring health related quality of life among women living with HIV. *Quality of Life Research*, *9*(8), 931-940.
- McDowell, T. L., & Serovich, J. M. (2007). The effect of perceived and actual social support on the mental health of HIV-positive persons. *AIDS Care*, *19*(10), 1223-1229.
- McMichael, C., & Healy, J. (2017). Health equity and migrants in the Greater Mekong Subregion. *Glob Health Action*, *10*(1), 1271594.
- Medley, A., Garcia-Moreno, C., McGill, S., & Maman, S. (2004). Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. *Bulletin of the World Health Organization*, *82*, 299-307.

- Michalos, A. C. (2013). Job Satisfaction, Marital Satisfaction and the Quality of Life: A Review and a Preview. 123-144.
- Mitchell, R., & Hodson, C. (1983). Coping with domestic violence: Social support and psychological health among battered women. *American Journal of Community Psychology, 11*(6), 629-654.
- Mo, L. (2010). "Imported wives of Dai" - Identity and its construction for women in China-Myanmar cross-border marriages (in Chinese). Retrieved from http://www.cuhk.edu.hk/ant/PostgraduateForum2011/Ethno_on_Id/MOLi.pdf
- Mrus, J. M., Williams, P. L., Tsevat, J., Cohn, S. E., & Wu, A. W. (2005). Gender differences in health-related quality of life in patients with HIV/AIDS. *Quality of Life Research, 14*(2), 479-491.
- Murray, C. J., Ortblad, K. F., Guinovart, C., Lim, S. S., Wolock, T. M., Roberts, D. A., . . . Vos, T. (2014). Global, regional, and national incidence and mortality for HIV, tuberculosis, and malaria during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet, 384*(9947), 1005-1070.
- Nie, J. B., Walker, S. T., Qiao, S., Li, X., & Tucker, J. D. (2015). Truth-telling to the patient, family, and the sexual partner: a rights approach to the role of healthcare providers in adult HIV disclosure in China. *AIDS Care, 27 Suppl 1*, 83-89.
- Njau, J., Goodman, C., Kachur, S., Palmer, N., Khatib, R., Abdulla, S., . . . Bloland, P. (2006). Fever treatment and household wealth: the challenge posed for rolling out combination therapy for malaria. *Tropical Medicine & International Health, 11*(3), 299-313.
- Pantalone, D. W., Rood, B. A., Morris, B. W., & Simoni, J. M. (2014). A systematic review of the frequency and correlates of partner abuse in HIV-infected women and men who partner with men. *J Assoc Nurses AIDS Care, 25*(1 Suppl), S15-35.
- Parish, W. L., Wang, T., Laumann, E. O., Pan, S., & Luo, Y. (2004). Intimate Partner Violence in China: National Prevalence, Risk Factors and Associated Health Problems. *International Family Planning Perspectives, 30*(4), 174-181.
- Peltzer, K. (2014). Sexual behaviour among HIV-infected new mothers in South Africa 3-12 months after delivery. *AIDS Care, 26*(2), 186-190.

- Peng, B.-l., & Ling, L. (2019). Association between rural-to-urban migrants' social medical insurance, social integration and their medical return in China: a nationally representative cross-sectional data analysis. *J BMC Public Health*, *19*(1), 86.
- Peters, L., Franke, L., Tkachenko, D., Schiffer, M., & Zimmermann, T. (2018). Einfluss von Emotionsregulation und emotionaler Erregung auf Lebensqualität und Adhärenz bei Paaren nach Nierentransplantation. *PPmP - Psychotherapie · Psychosomatik · Medizinische Psychologie*, *68*, 202-211.
- Phillips, H. P. (1966). *Thai peasant personality*: University of California Press.
- Plankey, M., Bacchetti, P., Jin, C., Dass-Brailsford, P., Gustafson, D., Cohen, M. H., . . . Tien, P. C. (2013). The association of self-perception of body fat changes and quality of life in the Women's Interagency HIV Study. *AIDS Care*, *25*, 1544-1550.
- Pomeroy, E. C., Green, D. L., & Van Laningham, L. (2002). Couples Who Care: The Effectiveness of a Psychoeducational Group Intervention for HIV Serodiscordant Couples. *Research on Social Work Practice*, *12*, 238-252.
- Preau, M., Marcellin, F., Carrieri, M. P., Lert, F., Obadia, Y., & Spire, B. (2007). Health-related quality of life in French people living with HIV in 2003: results from the national ANRS-EN12-VESPA Study. *Aids*, *21*.
- Proulx, C. M., Helms, H. M., & Buehler, C. (2007). Marital Quality and Personal Well-Being: A Meta-Analysis. *Journal of Marriage and Family*, *69*, 576-593.
- Qiu, G., Zhang, S. X., & Liu, W. (2019). Trafficking of Myanmar women for forced marriage in China. *Crime, Law and Social Change*, *72*, 35-52.
- Raj, A., & Silverman, J. (2002). Violence Against Immigrant Women: The Roles of Culture, Context, and Legal Immigrant Status on Intimate Partner Violence. *Violence against women*, *8*(3), 367-398.
- Raj, A., & Silverman, J. G. (2003). Immigrant South Asian women at greater risk for injury from intimate partner violence. *American Journal of Public Health*, *93*(3), 435.
- Reniers, G. (2008). Marital Strategies for Regulating Exposure to HIV. *Demography*, *45*, 417-438.

- Riggs, D. S., & O'LEARY, K. D. (1996). Aggression between heterosexual dating partners an examination of a causal model of courtship aggression. *J Interpers Violence, 11*(4), 519-540.
- Rothenberg, K. H., & Paskey, S. J. (1995). The risk of domestic violence and women with HIV infection: implications for partner notification, public policy, and the law. *American Journal of Public Health, 85*(11), 1569-1576.
- Ruark, A., Green, E. C., Nunn, A., Kennedy, C., Adams, A., Dlamini-Simelane, T., & Surkan, P. J. (2019). Navigating intimate sexual partnerships in an era of HIV: dimensions of couple relationship quality and satisfaction among adults in Eswatini and linkages to HIV risk. *SAHARA-J: Journal of Social Aspects of HIV/AIDS, 16*, 10-24.
- Ruili Bureau of Statistics. (2013). A brief analysis of 2012 annual income and product accounts in Ruili. . http://ynxxgk.yn.gov.cn/M1/view.aspx?int_Document_ID=1819173
- Ruili Municipal People's Government. (2012). A rough guide to Ruili - Demographics. . <http://www.rl.gov.cn/contents/93/4548.html>
- Ryan, L., Sales, R., Tilki, M., & Siara, B. (2008). Social Networks, Social Support and Social Capital: The Experiences of Recent Polish Migrants in London. *Sociology, 42*, 672-690.
- Sabin, L. L., Desilva, M. B., Hamer, D. H., Keyi, X., Yue, Y., Wen, F., . . . Gill, C. J. (2008). Barriers to adherence to antiretroviral medications among patients living with HIV in southern China: a qualitative study. *AIDS Care, 20*(10), 1242-1250.
- Sarna, L., van Servellen, G., Padilla, G., & Brecht, M. L. (1999). Quality of life in women with symptomatic HIV/AIDS. *J Adv Nurs, 30*.
- Schafer, K. R., Brant, J., Gupta, S., Thorpe, J., Winstead-Derlega, C., Pinkerton, R., . . . Dillingham, R. (2012). Intimate partner violence: a predictor of worse HIV outcomes and engagement in care. *AIDS Patient Care STDS, 26*(6), 356-365.
- Schwarzer, R., & Gutiérrez-Doña, B. (2005). More Spousal Support for Men Than for Women: A Comparison of Sources and Types of Support. *Sex Roles, 52*(7-8), 523-532.
- Shi, L., & Stevens, G. D. (2005). Vulnerability and unmet health care needs: The Influence of Multiple Risk Factors. *Journal of General Internal Medicine, 20*, 148-154.

- Shi, Z. (2016). Does the number of children matter to the happiness of their parents? *The Journal of Chinese Sociology*, 3, 16.
- Shumaker, S. A., & Hill, D. R. (1991). Gender differences in social support and physical health. *Health Psychology*, 10, 102-111.
- Siemieniuk, R. A., Krentz, H. B., Miller, P., Woodman, K., Ko, K., & Gill, M. J. (2013). The clinical implications of high rates of intimate partner violence against HIV-positive women. *J Acquir Immune Defic Syndr*, 64(1), 32-38.
- Smith, K. W., Avis, N. E., & Assmann, S. F. (1999). Distinguishing between quality of life and health status in quality of life research: A meta-analysis. *Quality of Life Research*, 8, 447-459.
- Sorenson, S. B. (1996). Violence against women. Examining ethnic differences and commonalities. *Eval Rev*, 20(2), 123-145.
- Psychosocial interventions in cancer: Group therapy techniques. 215-233 (2001).
- Spiwak, R., Afifi, T. O., Halli, S., Garcia-Moreno, C., & Sareen, J. (2013). The relationship between physical intimate partner violence and sexually transmitted infection among women in India and the United States. *J Interpers Violence*, 28(13), 2770-2791.
- Straus, M. A. (1976). *Sexual inequality, cultural norms, and wife-beating: Betsy Warrior*.
- Tardy, C. H. (1985). Social support measurement. *American Journal of Community Psychology*, 13, 187-202.
- Taylor, T. M., Hembling, J., & Bertrand, J. T. (2015). Ethnicity and HIV risk behaviour, testing and knowledge in Guatemala. *Ethnicity & Health*, 20, 163-177.
- Thoits, P. A. (1995). Stress, Coping, and Social Support Processes: Where Are We? What Next? *Journal of Health and Social Behavior*, 35, 53.
- Tian, L., Li, J., Zhang, K., & Guest, P. (2007). Women's status, institutional barriers and reproductive health care: A case study in Yunnan, China. *Health Policy*, 84(2-3), 284-297.

- Tjaden, P. G., & Thoennes, N. (2000). *Extent, nature, and consequences of intimate partner violence: Findings from the National Violence Against Women Survey*: National Institute of Justice Washington, DC.
- Tonsing, K. N. (2013). Predictors of psychological adaptation of South Asian immigrants in Hong Kong. *International Journal of Intercultural Relations*, 37, 238-248.
- Trimble, D. D., Nava, A., & McFarlane, J. (2013). Intimate partner violence and antiretroviral adherence among women receiving care in an urban Southeastern Texas HIV clinic. *J Assoc Nurses AIDS Care*, 24(4), 331-340.
- Tsevat, J., Leonard, A. C., Szaflarski, M., Sherman, S. N., Cotton, S., Mrus, J. M., & Feinberg, J. (2009). Change in quality of life after being diagnosed with HIV: a multicenter longitudinal study. *AIDS Patient Care STDS*, 23(11), 931-937.
- Turner, B. J., Laine, C., Cosler, L., & Hauck, W. W. (2003). Relationship of Gender, Depression, and Health Care Delivery With Antiretroviral Adherence in HIV-infected Drug Users. *Journal of General Internal Medicine*, 18(4), 248-257.
- UNAIDS (The Joint United Nations Programme on HIV/AIDS). (2009). HIV AND AIDS ESTIMATES (2009). Retrieved from <http://www.unaids.org/en/regionscountries/countries/china/>
- USAID (The United States Agency for International Development), C. I. (2006). *Mapping HIV/AIDS Service Provision for Most At-Risk and Vulnerable Populations in the Greater Mekong Sub-Region*.
- Waldinger, R. J., Cohen, S., Schulz, M. S., & Crowell, J. A. (2014). Security of Attachment to Spouses in Late Life: Concurrent and Prospective Links With Cognitive and Emotional Well-Being. *Clinical Psychological Science*, 3, 516-529.
- Waldinger, R. J., & Schulz, M. S. (2010). What's love got to do with it? social functioning, perceived health, and daily happiness in married octogenarians. *Psychology and Aging*, 25, 422-431.
- Waltz, M. (1986). Marital context and post-infarction quality of life: Is it social support or something more? *Social Science & Medicine*, 22, 791-805.

- Wang, H.-X., Mittleman, M. A., & Orth-Gomer, K. (2005). Influence of social support on progression of coronary artery disease in women. *Social Science & Medicine*, *60*, 599-607.
- Watts, C., & Zimmerman, C. (2002). Violence against women: global scope and magnitude. *The Lancet*, *359*(9313), 1232-1237.
- Wethington, E., & Kessler, R. C. (1986). Perceived Support, Received Support, and Adjustment to Stressful Life Events. *Journal of Health and Social Behavior*, *27*, 78.
- WHO (World Health Organization). (2013). *Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence*: World Health Organization.
- Wilson, K. S., Deya, R., Masese, L., Simoni, J. M., Vander Stoep, A., Shafi, J., . . . McClelland, R. S. (2015). Prevalence and correlates of intimate partner violence in HIV-positive women engaged in transactional sex in Mombasa, Kenya. *Int J STD AIDS*.
- Wisniewski, A. B., Apel, S., Selnes, O. A., Nath, A., McArthur, J. C., & Dobs, A. S. (2005). Depressive symptoms, quality of life, and neuropsychological performance in HIV/AIDS: The impact of gender and injection drug use. *Journal of Neurovirology*, *11*(2), 138-143.
- Wray, L. A., & Beverly, E. A. (2008). The role of collective efficacy in exercise adherence: a qualitative study of spousal support and Type 2 diabetes management. *Health Education Research*, *25*, 211-223.
- Wu, Z., Sun, X., Sullivan, S. G., & Detels, R. (2006). Public health. HIV testing in China. *Science*, *312*(5779), 1475-1476.
- Wu, Z., & Wang, Y. (2010). Introduction: China meets new AIDS challenges. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *53*, S1-S3.
- Xiang, L., Xu, J., Tang, R., Han, W., Yang, Z., Yang, J., . . . He, N. (2011). The HIV Prevalence and Related Health Service Situation Among Borderers in Dehong Prefecture, Yunnan Province. *Chinese Primary Health Care*, *25*(11), 8-11.
- Xiao, Y., Kristensen, S., Sun, J., Lu, L., & Vermund, S. H. (2007). Expansion of HIV/AIDS in China: lessons from Yunnan Province. *Soc Sci Med*, *64*(3), 665-675.

- Xu, X., Zhu, F., O'Campo, P., Koenig, M. A., Mock, V., & Campbell, J. (2005). Prevalence of and risk factors for intimate partner violence in China. *Am J Public Health, 95*(1), 78-85.
- Xu, X., Zhu, F., O'Campo, P., Koenig, M. A., Mock, V., & Campbell, J. (2005). Prevalence of and Risk Factors for Intimate Partner Violence in China. *American Journal of Public Health, 95*(1), 78-85.
- Yllo, K., & Bograd, M. L. (1988). *Feminist perspectives on wife abuse*: Sage Newberry Park.
- Yona, S., Ismail, R., Nurachmah, E., Levy, J., & Norr, K. (2019). Gaining a “normal life”: HIV-positive Indonesian female injection drug users in drug recovery. *Journal of Ethnicity in Substance Abuse, 1*-18.
- Yu, E., Xie, Q., Zhang, K., Lu, P., & Chan, L. (1996). HIV Infection and AIDS in China, 1985 through 1994. *American Journal of Public Health, 86*(8), 1116-1122.
- Yu, E. S., Xie, Q., Zhang, K., Lu, P., & Chan, L. L. (1996). HIV Infection and AIDS in China, 1985 through 1994. *American Journal of Public Health, 86*(8), 1116-1122.
- Yu, L., Li, W.-y., Chen, R. Y., Tang, Z.-r., Pang, J., Gui, X.-z., . . . Zhang, F.-j. (2012). Pregnancy outcomes and risk factors for low birth weight and preterm delivery among HIV-infected pregnant women in Guangxi, China. *Chinese Medical Journal, 125*(3), 403-409.
- YU, L., LI, W.-y., Ray Y, C., TANG, Z.-r., PANG, J., GUI, X.-z., . . . ZHANG, F.-j. (2012). Pregnancy outcomes and risk factors for low birth weight and preterm delivery among HIV-infected pregnant women in Guangxi, China. *Chinese Medical Journal, 125*(3), 403-409.
- Yutani, J. E. (2007). *International brides: Cross-border marriage migration in China and Japan through a feminist lens*. (1447023 M.A.), University of Southern California. Retrieved from <https://search.proquest.com/openview/c4801569cfe5f670db62c0ae1cf2ce65/1?pq-origsite=gscholar&cbl=18750&diss=y> .
- Zhang, C., Li, X., Hong, Y., Chen, Y., Liu, W., & Zhou, Y. (2012). Partner Violence and HIV Risk Among Female Sex Workers in China. *AIDS and Behavior, 16*(4), 1020-1030.
- Zhang, J., & Bao, Y. (2013). Research on Cross-Border Marriage and Social Stability in the Minority Borderland of Yunnan. *Journal of Yunnan Nationalities University (Social Sciences), 30*(1), 47-54.

- Zhang, X. (2009). *Cross-border ethnicity and China's foreign policies (in Chinese)*: Central University of Ethnicity (Chinese).
- Zhang, Y., Cai, C., Wang, X., Li, Y., Tang, H., & Ma, J. (2020). Disproportionate Increase of New Diagnosis of HIV/AIDS Infection by Sex and Age — China, 2007–2018. *China CDC Weekly*, 2, 69-74.
- Zhao, S. (2011). A Survey of Cross-border Marriages - A Case Study of Sino-Burmese Border in Yunnan. *Journal of Chuxiong Normal University*, 26(10), 89-95.
- Zhao, Y., Han, M., Ma, Y., & Li, D. (2019). Progress Towards the 90-90-90 Targets for Controlling HIV — China, 2018. *China CDC Weekly*, 1, 4-7.
- Zheng, K., Li, H., Shu, Y., Liu, H., & Duo, L. (2009). Risk assessment and strategic discussion for the transmission of HIV among Myanmar women in cross-border marriages in Yunnan. *Journal of Dermatology and Venereology (Chinese)*, 31(1), 47-49.
- Zhou, Y., Li, X., Zhang, C., Tan, G., Stanton, B., Zhang, X., & Cui, Y. (2013). Rates of HIV, syphilis, and HCV infections among different demographic groups of female sex workers in Guangxi China: Evidence from 2010 national sentinel surveillance data. *AIDS Care*, 1-9.
- Zhu, J., Yuan, R., Hu, D., Zhu, Z., Wang, N., & Wang, B. (2018). HIV prevalence and correlated factors of female sex workers and male clients in a border region of Yunnan Province, China. *International Journal of STD & AIDS*, 29, 424-434.
- Zou, X., Chow, E. P., Zhao, P., Xu, Y., Ling, L., & Zhang, L. (2014). Rural-to-urban migrants are at high risk of sexually transmitted and viral hepatitis infections in China: a systematic review and meta-analysis. *BMC Infectious Diseases*, 14, 490.

VITA

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- M.S. in Biostatistics, School of Public Health, University of Illinois, at Chicago, 2010
- M.S. in Biophysics, Zhejiang University, China, 1998
- B.S. in Biology, Zhejiang University, China, 1995
- HONOR** UIC SPH 10th Annual Research Day Awards in two categories: public health research and global health, 2015.
- National Institute on Drug Abuse (NIDA) International Forum Travel Award, 2010
- Fogarty UIC AITRP Fellowship, 2009 – 2014
- EXPERIENCE** Advocate Aurora Health, Advocate Center for Pediatric Research, Senior Patient Centered Out Research Consultant/Associate, Oak Lawn, IL (07/2016 – present).
- Partners with clinical investigators and/or industrial sponsors in the design, conduct and data analysis of clinical trials and patient outcomes research.
 - Provides methodology guidance in reporting of metrics for pediatric patient centered outcomes research and development of study design. Contributes to the writing/review of protocols and or manuscripts.
 - Oversees the management and function of Advocate Research Electronic Data Capture (REDCap) system for all sites.
 - Ensures regulatory compliance of investigator initiated pediatric research.
 - Educates and trains clinical investigators and research teams in understanding research methodology, biostatistics and IRB or FDA regulatory frameworks.
- UI Health, Department of Surgery, Biostatistician, Chicago, IL (12/2014 – 08/2017)
- Worked as the leading biostatistician in fulfilling the clinical needs of the UI Health Islet Transplantation in Brittle Type 1 Diabetic Patients Biologics License Application (BLA).
 - Drafted three Statistical Analysis Plans and over a dozen clinical SOPs for

- Phase I/II and Phase III trials of islet transplantation at UI Health.
- Developed evaluation algorithms of critical efficacy and safety outcomes in relate to severe hypoglycemic events in treating Type 1 diabetes.
 - Reviewed and strategized database design to ensure the compatibility between eCRF transformed 10-year legacy data in REDCap and the CDISC standards. Directed the trial data management plan to sustain the needs of quality control, source reconciliation, and documentation.
 - Led a team of research assistants and contracted SAS programmers to manage and analyze clinical data for submission to FDA.
 - Generated and proofread deliverables for CSRs and ISS/ISE modules. Collaborates closely with the CRO representatives in project planning and document reviewing.

UIC AIDS International Training and Research Program, Pre-doctoral Trainee, Chicago, IL (05/2009 – 12/2014)

- Designed and implemented the dissertation study on “Intimate partner violence among HIV infected women in Southwestern China”. Analyzed the data and prepared manuscripts for peer-reviewed publication and international conference presentations on the study results.
- Analyzed the data and published the results for a pilot study on “Social factors affecting antiretroviral adherence among injection drug users in Indonesia”.

UIC Institute for Health Research and Policy, Graduate Research Assistant, Chicago, IL (2009)

- Analyzed data for a collaborative project on food quality study for the Women, Infants and Children program in Northern Illinois.

Asian Health Coalition of Illinois, Data Analyst Intern, Chicago, IL (2008)

- Performed data management, analysis and community services for the Hepatitis B education and prevention program.

University of Chicago, Research Technologist, Chicago, IL (2005 – 2008)

- Performed biochemical assays and data analysis for a collaborative clinical research project on sleep and obesity at the Dept. of Medicine.
- Conducted molecular biology research for a NIH funded project on human breast cancer 1 gene regulation and function at the Dept. of Radiation Oncology.

Dept. of Otolaryngology, University of Michigan, Research Technologist, Ann Arbor, MI (2004 – 2005)

- Conducted research and published the results on the identification of ion channel genes regulating hearing development.

Dept. of Zoology, Michigan State University, Graduate Assistant, East Lansing, MI (2001-2004)

- Assisted in research and teaching.

Chongqing Association for Science and Technology, Biotech, Consultant, Chongqing, China (1998 – 2001)

- Provided R&D advisory and consultation to local clients from biotechnology and pharmaceutical industries.

**PUBLICATIONS
AND
ABSTRACTS**

1. Li, Y., Levy, J., Partner and relationship factors determining physical and sexual intimate partner violence against women living with HIV/AIDS in Ruili, China. *Manuscript in preparation*.
2. Liu, Y., Khatib R., Li, Y., et al., Statin Treatment and Risk of Subsequent Cardiovascular Outcomes among Patients with Acute Myocardial Infarction in an Integrated Healthcare System. World Congress of Cardiology, 2020, Chicago, IL.
3. Thoele DG, Gunalp C, Baran D, Harris J, Moss D, Donovan R, Li Y, Getz MA. Health care practitioners and families writing together: The Three Minute Mental Makeover. *Perm J* 2020;24:19.056.
4. Penk J, Mukadam S, Zaidi SJ, Cui V, Roberson DA, Li Y, Comparison of Semi-Automated Versus Manual Quantitative Right Ventricular Assessment in Hypoplastic Left Heart Syndrome. *Pediatric Cardiology* 2020;41(1):69-76.
5. Parashar N, Amidon M, Milad A, Devine A, Yi L, Penk J, Noninvasive Neurally Adjusted Ventilator Assist vs. High Flow Cannula post Congenital Heart Surgery. *World J. Pediatr. Congenit. Heart Surg.* 2019 Sep;10(5):565-571.
6. Baez Hernandez N, Milad A, Li Y, Van Bergen AH. Utilization of Neurally Adjusted Ventilatory Assist (NAVA) Mode in Infants and Children Undergoing Congenital Heart Surgery: A Retrospective Review. *Pediatr Cardiol.* 2019;40(3):563–569.
7. Li, Y., Levy, J., Male partner frequent drinking in association with intimate partner violence against women living with HIV/AIDS in Ruili, China. *2015 International Conference on Global Health: Prevention and Treatment of Substance Use Disorders and HIV Abstracts*.
8. Li, Y., Hershow, R., et al., Factors Associated with Symptoms of Depression among Injection Drug Users Receiving Antiretroviral Treatment in Indonesia. *J AIDS Clin Res.* 2014;5(303): 2.

(More upon request)