

Transactional Fish-for-Sex Relationships Amid Declining Fish Access in Kenya

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Summary. — Women's access to natural resources for food and livelihoods is shaped by resource availability, income, and the gender dynamics that mediate access. In fisheries, where men often fish but women comprise 90% of traders, transactional sex is among the strategies women use to access resources. Using the case of Lake Victoria, we employed mixed methods (in-depth interviews, $n = 30$; cross-sectional survey, $n = 303$) to analyze the influence of fish declines on fish-for-sex relationships. We found that fish declines affect relationship duration and women's bargaining power. Our results have broad implications for the dynamics of economies dependent on increasingly scarce resources throughout the world.

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1. INTRODUCTION

Populations reliant on natural resources for their food and livelihoods are particularly vulnerable to environmental change and resource extraction (Brashares *et al.*, 2014; IPCC, 2014). For harvesters of fish, crops, and forest products, the natural resources they depend on serve not only as a source of livelihoods, but also a dietary safety net during times of hardship (FAO, 2014; WRI, 2013). Efforts to maintain access to critical and declining natural resources may involve many forms of violent conflict and social injustice (Brashares *et al.*, 2014). Recent research has highlighted a pervasive but less studied strategy for accessing natural resources, the exchange of sex for goods. Transactional sex has been reported as a strategy to access a range of natural resources, including forest products, fuelwood, food, and water (Malawi Government, 2007; Samuels, Harvey, & Bergmann, 2008; UNHCR, 2011). In their groundbreaking paper, Béné and Merten (2008) highlight the role of transactional sexual relationships as a means of gaining access to a globally significant and declining natural resource: fish.

An estimated 10–12% of the world's population relies on fisheries to meet their food and income needs (FAO, 2014). Yet, nearly all global fish stocks are fully or overexploited (FAO, 2014). Losing access to fish resources results in a range of negative social and development consequences, including exploitative labor practices, food and nutrition insecurity, and environmentally destructive fishing practices (Belton & Thilsted, 2014; Cinner, Folke, Daw, & Hicks, 2011; FishWise, 2014). These consequences of fish decline extend also to fish traders and processors, 90% of whom are women (FAO, 2014). The study of fish-for-sex relationships has illuminated their consequences for HIV transmission (e.g., Camlin, Kwen, & Dworkin, 2013; MacPherson, 2012; Merten & Haller, 2007). We extend the existing literature on

these relationships to focus specifically on the ways fish availability affects female fish traders' power to negotiate access to fish, both in the business and sexual aspects of their relationships.

Harvested natural resources, like fish, are uniquely subject to overharvest, shortfalls, and declines. Changes in resource availability affect global prices, trade dynamics, and, ultimately, who has access to resources and at what cost. We analyze fishery resources and the effects of their decline on women's bargaining power. Our work also offers a broader analog for the ways environmental change affecting other resources may shift power dynamics in gendered economies.

Using the case of Lake Victoria, where harvest pressures to export Nile perch to international markets has precipitated

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dramatic fishery decline (Johnson, 2010; Omwoma *et al.*, 2014), we analyze the ramifications of fish decline on a local scale, in the communities where fish are harvested. We employ a mixed methods approach that pairs a survey of 303 households with 30 in-depth interviews with men and women who participate in fish-for-sex exchanges. The transactional sexual relationships themselves and partners within them are locally called *jaboya*. We characterize the prevalence and factors associated with fish-for-sex exchanges, and situate these findings within community experiences of *jaboya* participation and altered relationship dynamics in the face of changing fish catch. We discuss the consequences of declining fish catch for negotiation in both the resource access and sexual aspects of the relationship. Our analysis illuminates both the ways declining resources can influence relationships on the lakeshore, and the implications of natural resource decline for human well being.

2. BACKGROUND

(a) Lake Victoria fisheries and gender

In the 1960s, British colonial authorities introduced nonnative Nile perch into Lake Victoria to commercialize the fishery (Pringle, 2005b). By the 1980s, the fishery entered a period of rapid growth with the catch of Nile perch a key factor in driving migration to the lakeshores, infrastructure development, and a burgeoning international export market (Balirwa, 2007; Johnson, 2010). Ecologically, Nile perch overwhelmed the area's tremendous biodiversity and caused the demise of over 300 cichlid species (Witte *et al.*, 1992).

Socially, the influx of migrants and money quickly transformed the fishery, and, in particular, the roles of women. Where women traditionally traded and processed fish, male traders and fish packing plants increasingly dominated the Nile perch fishery, which grew into a booming export market sending Nile perch to the Middle East, Europe, and beyond (Geheb *et al.*, 2008; Johnson, 2010; Medard & Wilson, 1996). However, economic conditions for the people of Nyanza Province, who continue to experience the highest poverty rates in Kenya, have only improved slowly (Kenya National Bureau of Statistics 2010). Today, the Lake Victoria fishery remains strikingly gendered, with women largely excluded from fishing and trading within the main Nile perch economy (Lwenya & Yongo, 2012; Mojola, 2011), with consequences for local fish consumption (Fiorella *et al.*, 2014).

As the Nile perch population expanded underwater, the region experienced a rapid influx of migrant fisherman from across Africa and a shift to more extractive fishing methods (Pringle, 2005a). As part-time fishers invested in new fishing technology, many shifted to full-time fishing to make the investment worthwhile. Fishing strategies newly deployed on Lake Victoria included beach seines and "drifting" gill-nets (known as *tembea* in Swahili), each deleterious to local fish stocks. Today, Kenya's Lake Victoria fisheries are co-managed by local beach management units and the Ministry of Fisheries Development and accessed with a license and small registration fee.

Recently, the Nile perch catch has declined amidst high fishing pressure and related environmental concerns (LVFO, 2012). From 1995 to 2009, Nile perch catch in the highly productive Winam Gulf of Lake Victoria declined by 23% while catch-per-unit-effort declined by 40% (Omwoma *et al.*, 2014). In the wake of a declining Nile perch fishery, a small, sardine-like fish has risen in prominence. *Dagaa* in Kiswahili,

or *omena* in Dholuo, the local language, is best fished at night, targeted for local and regional sale, and sold within a more informal system that remains somewhat separate from the larger Nile perch economy. Where women are often excluded from the trade of exportable Nile perch, they maintain a role in drying *dagaa* for sale and in the regional trade of tilapia and Nile perch too small or otherwise unfit for sale to fish packing plants. Female traders travel between beaches and trading centers across the region to procure, process, transport and sell these fish in markets for local consumption (Camlin *et al.*, 2013).

(b) Transactional sex

One of many types of "transactional sex", exchanges of sex-for-fish are a phenomenon that has been described worldwide, with reports from economically developed and undeveloped countries (Béné & Merten, 2008; Dunkle, Wingood, Camp, & DiClemente, 2010). Though transactional sex involves the exchange of goods or money, these relationships provide more than instrumental support. Often with a semi-regular partner, these relationships many involve the provision of care, such as food or housing, emotional support or be intertwined with courtship (Hunter, 2002; Poulin, 2007). This is the case for many *jaboya* relationships. Relationships involving exchanges of sex have been described as "one of many ties of unequal exchange" in a context of complex social interdependences and traditions of patron-client relationships (Swidler & Watkins, 2007). A rich literature on transactional sexual economies in sub-Saharan Africa complicates our understanding of these relationships (e.g., Hunter, 2002; Poulin, 2007; Swidler & Watkins, 2007).

In *jaboya* relationships, fish traders exchange sex with fishermen to gain preferential fish access. Also termed fishwives, fish mongers, and *jakambi* (or "customers" in Dholuo), women fish traders have long played a role in procuring, processing, transporting and selling fish (Camlin *et al.*, 2013). *Jaboya* also existed for generations on Lake Victoria in the context of the polygamous marriages of traveling cichlid fisherman, but in the context of the Nile perch economy has shifted from a relational "anchor" into increasingly short-term transactional exchanges (Salmen, 2009). Interestingly, the Swahili word *tembea* (to drift or wander) locally refers to extramarital sexual relationships, semiotically linking the emergence of drifting *tembea* Nile perch nets on the lake to the emergence of drifting Nile perch fisherman on shore (Salmen, 2009). Today, *jaboya* relationships continue to be entwined with the gendered Lake Victoria fisheries (Mojola, 2011).

Transactional relationships in which people exchange fish-for-sex have been observed across the African and Asian continents, in inland and marine systems (Béné & Merten, 2008; MacPherson *et al.*, 2012; Merten & Haller, 2007). In sub-Saharan Africa, fish-for-sex has garnered particular attention largely because of exceptionally high prevalence of HIV around inland lakes, including Lake Victoria (Béné & Merten, 2008; Kwena, Camlin, Shisanya, Mwanzo, & Bukusi, 2013; MacPherson *et al.*, 2012). More broadly, a burgeoning literature seeks to link HIV to environmental change (Fiorella, 2013; Hunter, Reid-Hresko, & Dickinson, 2011; Mojola, 2011; Talman, Bolton, & Watson, 2013).

(c) *Jaboya* and HIV

The growth of the Nile perch fishery in the 1980s and 1990s paralleled the emergence of the HIV/AIDS epidemic (Salmen, 2009). Today, the prevalence of HIV on the lake's shores is the

highest in the region at 27% among adults (Kenya Ministry of Health, 2013; UNAIDS, 2012). Suggested causes include food insecurity, a culture of risk among fishers, prostitution, and fish-for-sex exchanges. HIV/AIDS in fishing communities has a breadth of enduring effects on fisher livelihoods, fishing communities, and the fisheries themselves (Allison & Seeley, 2004a, 2004b). Further, both male and female migration to and around Lake Victoria has compounded fishery gender dynamics, exchanges of sex, and HIV risk (Camlin *et al.*, 2013; Camlin, Kwena, Dworkin, Cohen, & Bukusi, 2014).

Jaboya relationships wherein men and women risk exposure to HIV are complex and diverse. Though prevailing narratives have posited women as victims, entrepreneurial, or in search of small luxuries, recent research shows that men or women may initiate these relationships, and women may compete for relationships with fishermen (Béné & Merten, 2008; Camlin *et al.*, 2013). Further, the value of *jaboya* relationships is compounded by a “gendered economy” that constrains women’s job options, compensation, and power. Exchanges of sex are a livelihood strategy in response to gendered labor markets and opportunities as well as health shocks (Mojola, 2011; Robinson & Yeh, 2011).

The interaction of the Lake Victoria fishery with the social dynamics of the people on the lake’s shores means that neither sexual relationships nor resultant HIV transmission can be fully understood in isolation. Fishery health, dynamism, and political ecology (how social and political factors interact with the environment) also matter. *Jaboya* relates not only to poverty, sex, and disease transmission on the lakeshore. Rather, these relationships extend to the depths of Lake Victoria and the array of ecological factors that influence fish catch and embed *jaboya* within complex, globalized social and ecological dynamics.

We explore here the ways Lake Victoria ecology influences *jaboya* relationships. Using mixed quantitative and qualitative methods, we analyze the ways these relationships are intertwined with the fishery, and, in particular, how declines in fish catch affect both women’s power to negotiate resource access and their sexual relationships.

3. METHODS

In this study, we paired qualitative and quantitative research methods in data collection from June 2012 to August 2013. Quantitative data on prevalence of and associations with fish-for-sex informed in-depth interviews on perceptions and experiences of *jaboya* relationships.

The quantitative data used in this study are a subset of a larger study of fishing livelihoods, fish consumption, and childhood nutrition. The quantitative data are comprised of cross-sectional survey data for 303 participant households randomly selected from an enumerated sampling list of all households with a child <2 years of age and within a pre-defined region with a population of ~21,000. In households headed by a male and female, both heads of household consented to participate in the survey; in female-headed households, only females provided consent (17% of households had only a female head of household). Men and women were interviewed separately and in private by local enumerators who conducted surveys in Dholuo, the local language. Household recruitment was facilitated by a community-based organization with strong community ties and households were offered a small token of appreciation for their participation; all households approached to join the study chose to participate.

When asked about participation in exchanges of sex, men were asked whether “you” had given food, money, job, or accommodations “in exchange for sex or a sexual relationship.” Female heads of household were asked whether “anyone in your household, including you,” had received food, money, job, or accommodations “in exchange for sex or a sexual relationship.” The responses to this question were also categorized to include any type of exchange as disentangling the mode of exchange for fish – at once money, a job, and food – proved impossible. The phrasing of this question provided a cover for women to disclose participation in sexual exchanges despite facing higher stigma than men, and to gathered data about female youth. While the commercial sex trade is relatively rare in the study region, it is possible that these questions also capture commercial sex relationships.

Chi-square tests were used to compare the relationship among participant characteristics for those households where sexual exchanges were and were not reported. Chi-square tests thus compare households where men do and do not report sexual exchanges, and where women do and do not report they or someone in their household participated in sexual exchanges. Where small numbers violated the chi-square assumptions, Fisher’s exact tests were used, including for categorized maternal age, household size, maternal education, food insecurity, and monthly income. Quantitative data were used to guide the development of interview guides and target participants for qualitative interviews.

Qualitative data included 6 months of participant observation and field notes, and in-depth semi-structured interviews with 14 men and 16 women. Interview participants were nested in the quantitative household surveys, and were selected to participate based on reports that they or someone in their household participated in exchanges of sex. Additional interview participants were selected to represent variation in livelihood activities. Interviews were conducted in English and Dholuo by an American co-investigator and Kenyan research assistant and translator.

We also conducted observations of daily dynamics at 13 of the region’s 19 fish landing sites with co-managed Beach Management Units. We selected a range of small, medium, and large beaches to visit and analyzed field notes in conjunction with interview data. In some instances, the triangulation of field notes and interviews revealed inconsistencies (i.e., the under-report of stigmatized behaviors such as fish-for-sex exchanges) that were resolved through informal follow-up conversations.

Interview translations and notes were analyzed with ATLAS.ti 7 (Cincom Systems, Berlin, 2002–2014). We used grounded theory methods to generate codes and code data (Strauss & Corbin, 1998). We double coded 25% of the sample to assure validity of code application.

The study protocol was reviewed and approved by the University of California, Berkeley Committee on Human Research and the Ethics Review Committee of the Kenya Medical Research Institute. We omit names of individuals, beaches, and villages to protect the confidentiality of study participants.

4. RESULTS

(a) *Quantitative findings*

Results of a cross-sectional household survey conducted with 303 households (303 women, 253 men) show that 34% of men (85 men) reported they gave food, money, a job or

accommodations in exchange for sex, and 10% of women (31 households) reported they or another household member gave sex in exchange for food, money, a job, or accommodations (Table 1). Men most often reported providing food (23%) and money (25%). Women most often reported they or another household member received food (5%) and money (8%). Of those who reported exchanging sex, 52% of women and 56% of men reported multiple categories (e.g., food, money, accommodation, job) of exchanges (Table 2).

Most men and women who exchange sex are in marital or domestic partnerships (95% of men, 74% of women) with sexual exchanges being predominantly extra-couple partnerships. Men who exchanged sex (34%) were more likely to fish for *dagaa* and to have a partner with lower educational status, compared to men who did not exchange sex (66%). Women who exchanged sex (10%) were more likely to have lower educational status, be unmarried or not in a relationship, and have more severe food insecurity, compared to women who did not exchange sex (90%). Further, households where women exchanged sex more often had a fisher (Table 3).

We contextualize our quantitative prevalence of and associations with sexual exchanges in our qualitative findings to elucidate the ecological and economic factors that affect participation and negotiations in *jaboya* relationships.

(b) Qualitative findings

We examine below the ways fish access influences relationships in the *jaboya* economy, the role of changing fish stocks in the short- and long-term, and the balance of risks faced by participants in the *jaboya* economy.

(i) Characteristics of study participants

Our sample of 30 individuals included 14 men and 16 women. Twenty-four participants were primarily engaged in the beach-based fish trade, representing Nile perch fishers, *dagaa* fishers, boat owners, hired fishers, and Nile perch traders for large and small size fish, and *dagaa* processors and traders. The remaining six were engaged in other forms of informal sector work in the beach vicinity, former fishers or fish traders, and spouses of fishers. Participants were based at or regularly visited 18 different beaches in and around the study region. Eleven participants discussed their current or past participation in the *jaboya* economy. The age range of the participants was 18–53 years with an average age of 31 for men and 27 for women (Appendix A).

(ii) Fish access

The introduction of the invasive Nile perch precipitated the growth of an international trade where, above a certain size, Nile perch are subject to prices set by fishery managers and international traders. Participants describe access to Nile perch as a simple monetary process; a male boat owner states, “With *mbuta* [large Nile perch] there are prices that are regularly fixed.” He adds that for women who are largely excluded from this economy the *jaboya* system has arisen around the types of fish where “[...] actually you can bargain.”

In contrast to the fixed prices of the Nile perch fishery, women access the fish in ancillary fisheries: *dagaa*, undersized

Nile perch, and “rejects”, or Nile perch not accepted by fish packers. The less profitable fish that women trade in are sold locally and regionally. Participants describe *jaboya* relationships as an oft requisite extra-monetary strategy to access fish in this economy. Both men and women repeatedly referenced money as insufficient to access fish for sale or food: though money is availed, a sexual relationship with a fisherman is often necessary to be allowed to make the purchase. Without a *jaboya*, a female beach dweller says, “You have money, but you can’t get [fish]. You can’t.” A male fisher and landlord concurs, “If you have your *jaboya*, you may be sure of getting [fish], but if you don’t have [a *jaboya*] you may have your money but miss to get food.”

Some participants also indicate the structure of the fishery payments plays a role in *jaboya* relationships. Boat and net owners reap the biggest monetary rewards of fish sales. Hired fishers, who may hold *jaboya* relationships, are paid a substantially smaller percentage but given the opportunity to allocate fish. Thus, the disjoint between monetary benefits (largely borne by boat owners) and sexual benefits (available to hired fishers) of fish access may also foster *jaboya*’s entrenchment in the fisheries. Though the monetary benefits to laborers are relatively small, they are positioned to negotiate extra-monetary benefits by allocating fish, such as sex with traders. A male fisher describes the system from his perspective as a boat owner:

When they [the fishers] are selling, you’re [the owner] supervising. You want to see your fish is being sold. To whom it is being sold is none of your business.

Marital relationships and other familial ties may also avail fish for women. The same fisher goes on to say, “I can sometimes plead with them if my relative comes.” Thus, privileged access to fish through *jaboya* relationships may only be necessary when other relationships do not provide enough fish or one does not hold other types of relationships with fishers. Further, *jaboya* relationships are most common in particular aspects of the fishing economy, from which many of our interview participants were drawn. Our quantitative findings that those who exchange sex more likely fish for *dagaa* bears this out.

That *jaboya* relationships are used for fish access entrenches these relationships within both ecological and social aspects of the fishery. Further, this portends the way changes in fish availability affect *jaboya* relationships.

(iii) Influences of changing fish stocks

Changes in the fisheries’ ecology that influence fish catch, species available, and fish sizes emerge as elements that also motivate, moderate, and transform *jaboya* relationships. Participants widely agreed that fish availability had declined in recent decades and thereby elevated the importance of *jaboya* relationships in accessing fish. A male *dagaa* fisher shares that when fish catch is low, “there is that scramble for the fish and this is now when *jaboya* is very necessary.” As described below, participants elucidated consequences of variability in both long- and short-term fish availability. While long-term fish declines often weakened *jaboya* relationships and pushed people out of the fishery, acutely limited fish availability was also among the range of factors motivating entry into *jaboya*

Table 1. Participation in sexual exchanges

	Any	Food	Money	Job	Accommodation
Female household member gave sex for [Item] (women report, $n = 303$), n (%)	31 10%	16 5%	23 8%	9 3%	7 2%
Male gave [Item] for sex (men self report, $n = 253$), n (%)	85 34%	57 23%	62 25%	13 5%	19 8%

Table 2. Multiple exchanges. Count of categories of items exchanged, including food, money, job, and accommodation among people who exchanged sex

	1 Exchange	2+ Exchanges	3+ Exchanges
Female household member gave sex for [Item] (women report, $n = 303$), n (%)	31 100%	16 52%	8 26%
Male gave [Item] for sex (men self report, $n = 253$), n (%)	85 100%	48 56%	12 14%

Table 3. Characteristics of all households, and households reporting sexual exchanges; Chi-squared tests compare relationships between characteristics for those that did exchange sex (characteristics listed in the table), to those who did not exchange sex. Fisher's exact tests are used where small numbers violate chi-square assumptions. The statistical comparisons are made among 84 men and 31 women who did exchange sex to 169 men and 272 women, respectively, who did not exchange sex

Characteristic	All households ($n = 303$)		Households with men who exchanged sex ($n = 84$)		Households with women who exchanged sex ($n = 31$)	
Maternal age, mean (SD)	28.1	8.4	26.8	7.5	26.9	7.2
Household size, mean (SD)	5.7	1.9	5.5	1.8	5.2	1.8
Married/in a relationship, n (%)	267	88%	80	95%	23	74%*
Maternal education, n (%)						
None/some primary	156	51%	50	60%	21	78%
Primary	92	31%	21	25%	4	15%
Some secondary +	55	18%	13	15%	2	7%
Food insecurity (<i>Max.</i> 36), mean (SD)	18.3	5.1	17.9	4.3	20.4	4.6*
Asset index, n (%)	1.9	1.2	2	1.2	1.6	1
Monthly income (USD), mean (SD)	\$109	\$107	\$126	\$151*	\$106	\$103
Income from, n (%):						
Fisher	114	38%	36	43%	18	58%*
Farmer	52	17%	14	17%	2	6%
Small business	158	52%	45	54%	16	52%
Charcoal	11	4%	2	2%	1	3%
Teacher	20	7%	4	5%	0	0%
Target species fished, n (%):						
Dagaa	58	23%	26	31%*	5	24%
Tilapia	31	13%	11	13%	2	10%
Nile perch	146	59%	52	62%	15	72%

* 0.05.

relationships. Acute declines or increases in fish availability also played out within jaboya relationships – increasing or decreasing partners' reliance on each other, and sometimes driving one or both partners out of the fishery and their relationship.

Example pathways linking fish availability to jaboya relationships are depicted visually in Figure 1. This diagram draws from the qualitative data presented below to provide a schematic of possible pathways linking fish availability to jaboya relationships.

Long-term fish declines. In conjunction with declines in Nile perch fish catch, participants described declining profitability and opportunities associated with fishing. Participants frequently described the current “scramble”. The “scramble” depicted both fishers' efforts to succeed in capturing fish and women's to secure a sufficient quantity for sale or consumption. A male boat owner says,

There could be a lot of demand for fish, and the supply is less, so in the process of the scramble women want to please these people so they get this thing [fish]. She may have the money and just need [a jaboya] for this process of scrambling.

Most often, the “scramble” referenced fish available to local markets – undersized or reject Nile perch and dagaa. In these markets competition to access fish and the struggle to meet financial needs is most acute and directly elevates jaboya's importance in navigating constrained access. Importantly, fish prices are not sufficiently responsive to demand; when too

many women have funds to purchase fish, jaboya relationships, not prices, serve to distinguish the “success” of fish traders in procuring fish. This dynamic further reinforces quantitative findings that income and assets are not related to women's participation in sexual exchanges.

In the context of dwindling stocks, relationships become increasingly short-lived. A male jaboya participant describes his experience of how declining fish catch affects jaboya relationships:

When we go back to the 90s [...] the catch of fish was good and you find that the [women] could get all that they wanted due to enough catch [...] But the time we are in today, the catch, or the population of fish in the lake, has gone down. Very much! It has really gone down. So you find that maybe your jaboya can go and come without fish. The following day, the same thing will happen. If it happens maybe three consecutive days [...] she may start to look like someone who is wasting her time and switch to another person.

Declines in fish availability strengthen the ties that bind the social and ecological systems of the lake. In the current context, even short disruptions in fish availability can affect partner choice and relationship strength, including the longevity of partnerships or the degree of reliance within them. Access to the fishery is of particular import in buffering against uncertain resource availability. In addition to raising the importance of a secure fish supply via jaboya relationships for those that remain in the fishery, declining fish availability also motivates exits from the fishery for both men and women. In

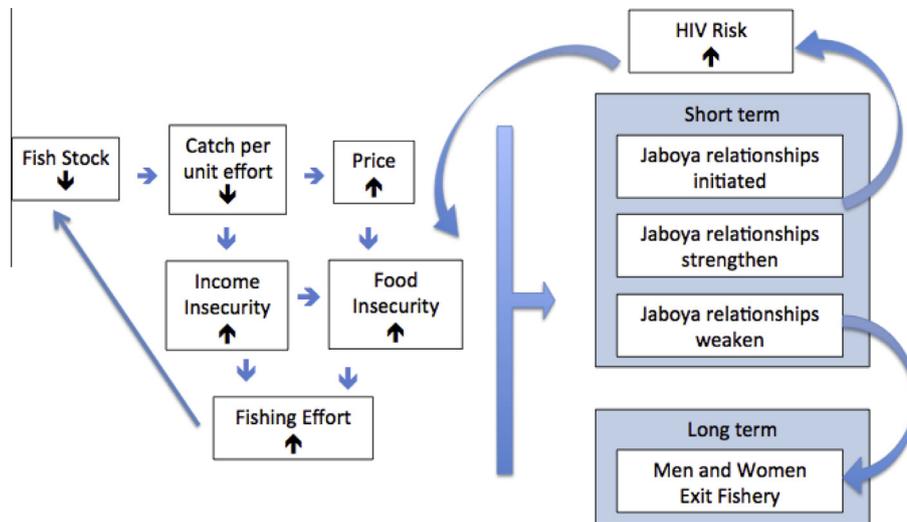


Figure 1. Illustrative depiction of pathways that may link fish catch to both short-term and long-term changes in jaboya relationships.

many instances, participants linked declines in fish availability to local declines in *jaboya* relationships as people switched livelihoods (i.e., to agriculture, burning charcoal, small businesses), fewer migrants arrived, and more people migrated out. A male Nile perch trader encapsulated this common dynamic saying, "If the price is low [fishers] cannot stay there [...] the females also cannot stay once the jaboyas are running away."

Short-term fish availability. Male and female partners reported that fish availability rippled through their relationships. Changes in catch and price cycle together to affect who accesses fish, the benefits derived from relationships, and the relationships' necessity. Short-term fish availability refers to time spans as little as a few days or up to several weeks. In the short-term, acute fish declines may motivate or reinforce *jaboya* relationships with traders and fishers each facing increased vulnerability.

When the short-term Nile perch or *dagaa* catch is low and prices rise, access to fish is restricted and *jaboya* may resolve or temper limits on fish access. In this way, declines in available fish affect the social system, with particular ramifications for *jaboya* relationships that link users to fish resources. Several people describe their entry into *jaboya* relationships as, among other things, at a time of acute shortfalls in fish availability. A female fish trader describes this as follows:

When the fish catch goes down many people will be in need of fish, so this one usually gives the fisherman [an] advantage. Maybe he has been looking for a lady for quite some time, so he takes advantage when the fish goes down and that lady cannot get fish from anybody apart from him.

For those already participating in *jaboya* relationships, declines in fish availability were repeatedly linked to the power dynamics of these relationships. A female *jaboya* participant describes her experience in the face of Nile perch declines:

It is the issue of decline in fish catch that has really created all these messes. Long time ago I could go and make money at the beach so I really could depend on myself and it was really not really a bother that I needed someone to stand for me in order to get fish, because fish was so many. Today people are scrambling for fish. So I can even go as low as accepting 50KES [\$0.60] from someone, or as little as just fish-for-food to go to bed with someone.

Vulnerability in the face of fish declines, however, was not confined to women. In some cases, female *jaboya* partners who paid for gears or provided funds in times of low fish catch

supported male hired laborers. The men described periods of low fish catch compelling them to accept the woman's price for fish. A male hired laborer says that "The issue of price brings conflict [...] she will find her way, maybe by talking to mother [the boat captain], so the price will remain the same or be lowered."

Momentary rises in fish availability also altered power dynamics in *jaboya* relationships. When fish catch is high, participants describe sharp increases in women's power over how they access fish. A female *dagaa* trader states that when fish catch is high "I see him less [...] because I can get what I want with my money." A male boat owner says, "when the supply becomes high, actually you will be pleading with these women, these buyers. So they dictate the terms; they can do without *jaboya*."

At the same time, women may target fishermen anew or within an existing relationship when a fisher is flush with money in times of plentiful fish. A male *jaboya* participant states that, "if I get [...] more fish it means I'll be getting more money [...] that's when the relationship increases, it strengthens. Because she'll be looking [to] me, seeing [...] I am] now getting money and [I] may be giving her support in very many ways."

(iv) Balancing risks

The gendered fishery economy, declining fish availability, and the coupling of these with *jaboya* relationship dynamics makes fisherfolk vulnerable to risks of food, income, and livelihood insecurity. Our quantitative findings similarly suggest this through a relationship between women's participation in sexual exchanges and food insecurity. Participants weigh these insecurities against a paucity of other options and another widely recognized risk: HIV infection. For both men and women, the current context of fish availability may directly motivate a sexual exchange, despite the risks.

While references to the fishery often accompanied descriptions of increases in *jaboya* as competition for fish rises, narratives of declining *jaboya* were usually paired with descriptions of fear of HIV infection. A female *dagaa* trader reflects this link saying "The issue of *jaboya* is decreasing because many people nowadays know that issue of HIV." The commonality of participants' focus on a single risk – of either limited fish access or HIV infection – connoted an individual's ability to mitigate only one of these risks. For both men and

women, limited fish availability may tip the scales in motivating a sexual exchange, despite acknowledged risks. In describing this tradeoff, a female fish trader states (note: women often assist in pulling in beach seines, in these instances they are not considered the fishers but helpers and given a tiny fraction of the income relative to what fishers receive):

When you pull the net and nothing comes out of it, you get nothing. You get discouraged because you will have nothing to take home [...] Sometimes you have no other ways or you have no option. Somebody may be sick [and] you don't know his or her status but then you have to engage in [a] sexual relationship. Sometimes you don't even mind using the protection because it is the decision of the owner of the money maybe to use condoms or not.

In addition to motivating *jaboya* relationships, declines in fish availability may also drive HIV risk factors including migration, changing partners and multiple partnerships. A male former fisher says, “If you are a trader you don't stick to one beach because you want more fish [...] nowadays there's a bad disease.”

Despite augmenting the risk of contracting HIV, *jaboya* was often described as a safety net providing entry into the fishery economy for those with few resources. Widows, often HIV-affected, were regularly depicted as the female *jaboya* partners and male participants often described their roles as providers of both fish and a business opportunity. The scope of HIV within this heavily affected community may also affect *jaboya* relationships on more complex levels, as understood in the experience of a migratory female fish trader and *jaboya* participant:

*I'm a widow; I buried my husband. I'm not thinking of getting married again so I better stay in [a *jaboya*] relationship [...] Through my experience I am scared. I lost my parents [...] my sister died, plus her husband, so they left an orphan that I'm taking care of. I have a burden and it is not really going to be a comfort to marry.*

Within the globalized, declining Lake Victoria fishery, decisions about risks to health and well-being are made in a challenging context. Participants describe balancing complex risks that are not easily evaluated or mitigated, be they concern about losing another spouse or securing reliable access to an increasingly ephemeral resource. Importantly, participants describe the *jaboya* sexual economy both as a threat to wellbeing, health, and resource control, and also as an option, in a context in which there are few.

5. DISCUSSION

The natural resources that are involved in transactional sex shape these exchanges. *Jaboya* relationships are embedded in environmental dynamics that affect fish availability and women's bargaining power. The economic structure of the Nile perch fishery and changing fish stocks interact to influence the initiation, gendered power dynamics, and strength of *jaboya* relationships. The *jaboya* sexual economy is linked to the ecosystem changes that positioned Nile perch atop the food chain and economy, and, today, is entangled with current declines in fish stocks.

We find that transactional sexual exchanges in a Lake Victoria community are remarkably common, with 34% of men reporting they exchanged items for sex, and 10% of women reporting they or another household member exchanged sex. This finding relates to research showing that in a nearby urban areas transactional exchanges are normative, occurring in three quarters of nonmarital, noncommercial partnerships (Luke, 2006). As reported previously, *jaboya* and fish-for-sex relationships in similar settings are stigmatized, with HIV prevention messages and blame frequently levied on the *jaboya*

economy (Camlin *et al.*, 2013; Merten & Haller, 2007). The relative commonality of these relationships, despite potential under-reporting due to the social desirability bias of self-reports of stigmatized behaviors, reinforces qualitative findings that negotiating fish access is a primary function of *jaboya* relationships.

Our study demonstrates the salience of ecological and economic factors for understanding the sexual economy as a range of fishery features and their management, including fish availability, access, price, species, sizes, and catch, influence *jaboya* relationships. We extend the work of other studies that describe the effects on *jaboya* of exogenous environmental factors, such as well documented algal blooms, water hyacinth, or pollution (Mojola, 2011) to consider the centrality of the fisheries' ecology for these relationships.

Within a household, however, it is often a struggle over cash, to which men have privileged access, that dictates food and income available to women and children (Geheb *et al.*, 2008). Declines in fish catch that affect the availability of cash in lakeshore communities thus drive changes in the ways that cash is distributed to and in households. In this way, the commodity at the center of these transactions is broadly generalizable – the resource in decline could be an agricultural commodity, money, or fish.

In contrast, at a wider scale, the processes that shape this particular economy are intimately interwoven with the dynamics of resource extraction and environmental change that set in motion shortfalls in availability. That changes in availability of natural resources precipitate the dynamics we describe above is important because natural resource declines are challenging to reverse and often defy economic expectations. Whereas we might expect fishers to change activities when it becomes more difficult to harvest scarce wildlife, in practice, effort to secure wildlife often increases in the face of scarcity (Cinner, 2011; Clark & Lamberson, 1982; Hutchings & Myers, 1995; Mainka & Trivedi, 2002). The feedbacks of wildlife decline thus have the potential to uniquely influence dynamics of *jaboya* participation and power within relationships.

Positioning the *jaboya* economy within the broader ecological system has implications not only for appreciating the consequences of resource declines, but for mitigating the interacting ecological, economic, food security, and health risks *jaboya* participants face. In a sense, *jaboya* relationships are extra-monetary. In both quantitative findings and qualitative descriptions, women's participation in *jaboya* relationships is associated with food insecurity. Participation is not, however, associated with monetary factors like household income and assets. Qualitative descriptions further bear out this unique finding in demonstrating the ways power dynamics in sexual relationships, rather than prices alone, respond to small fluctuations in fish availability. Our results have parallels to other literature demonstrating links between food insecurity, economic vulnerability, gendered power dynamics, and transactional sex or sex work (Chatterji, Murray, London, & Anglewicz, 2005; Cluver *et al.*, 2012; Dunkle *et al.*, 2007; Fielding-Miller, Mnisi, Adams, Baral, & Kennedy, 2014; Lwenya & Yongo, 2012; McCoy, Ralph, Njau, Msolla, & Padian, 2014; Robinson & Yeh, 2011). Further, these results position a gendered economy and environmental change as structural drivers of HIV, with parallels to other work on such drivers (Dworkin *et al.*, 2013; Govender, Seeley, & Watts, 2014; MacPherson *et al.*, 2012) and the roles that persistent food insecurity and poverty play in perpetuating stigma (Tsai, Bangsberg, & Weiser, 2013) and undermining treatment adherence (Singer, Weiser, & McCoy, 2014; Weiser *et al.*, 2014).

While ideas about structural factors and engagement in transactional sex have been complicated in an academic

literature, the predominant narratives remain focused on economic hardship or opportunistic entrepreneurship to explain women's motivations for engaging in transactional sex. Yet, the framing of transactional sex and HIV risk solely in microeconomic terms neglects the full context of resource access and the broader political economy in which social and ecological systems shape each other.

The dependence of *jaboya* relationship dynamics on changes in fish catch and access suggests also that addressing fundamental issues of fish availability and access are critical to addressing *jaboya* relationships. An important implication of this study is that efforts to advocate behavior change in fishing communities are likely ineffective. Further, even efforts to increase women's incomes may not necessarily result in their increased access to fish and power within relationships, especially if fish stocks continue to fall. A deeper understanding of the ways in which *jaboya* relationships are embedded within the context of fishery ecology permits a consideration of strategies to address not only social but also ecological aspects of the system and more fundamentally change access to fish and relationship power (e.g., Lowen, 2014). Increasing women's representation in fishery management and co-management and providing opportunities for women to enter more formalized sectors of the fishing economy are promising strategies. More generally, curtailing fishery overharvest and managing for the longevity of healthy fisheries and fishing communities are critical. Of course, these measures are not simple to enact.

Still, acknowledging the complex ecological and social roots of the *jaboya* economy allows for constructive consideration of these relationships' functionality and the diverse possible effects of their persistence or termination. The benefits and costs of these types of relationships cannot be categorically assigned; a fish-for-sex exchange presents both risks and opportunities. An analog is offered by the case of widow inheritance, whereby a widow is absorbed into a patrilineal family upon her husband's death. This has been branded a key factor in the spread of HIV and broadly discouraged. Yet, with appreciation of the role of resources, particularly property rights, widows who are *not* inherited are now recognized to be at risk of losing rights to land and property, resulting in migration and subsequent vulnerability to HIV (Camlin *et al.*, 2014; Dworkin *et al.*, 2013). The repudiation of widow inheritance does not have simple or summarily beneficial consequences, and, we suggest, much the same can be expected from treatment of *jaboya* relationships where participants may balance risks of HIV infection with persistent food insecurity and environmental and economic change. Further, although short-term fish declines appear to increase HIV risk, long-term fish declines may decrease HIV risk as fishers and traders leave the fishery, the fishery drives less migration, and the fishing economy erodes.

Ultimately, *jaboya* relationships do not exist in isolation, but rather function within shifting local, regional, and global ecologies and their parallel systems of exchange, cooperation, and exploitation. In turn, these dynamics determine their ultimate impact on human populations and natural resources.

Changes to the ecological or social systems, be they resource decline or sharp mitigation of *jaboya* relationships, affect fishing communities and fishery resources.

(a) *Limitations*

Conducting this research effort within the context of an on-going research study focused in part on the growth and development of young children biases our sample. We include in both the quantitative and qualitative pieces of this research households where there was a child <2 years in residence. Although our sample represents the preponderance of households in the study region, we do not include the perspectives of men and women past childbearing age, single men and women who do not have a child, and transient fishers and fishmongers who are not in residence in the region. Further, this may explain in part the higher prevalence of men who report engaging in sexual exchanges. Our sample contains all women with a young child, whereas women who do not have a child could be more likely to be unmarried, not have a partner who is a fisher, or participate in sexual exchanges. Although our interview data suggest *jaboya* relationships and knowledge of others' participation in these relationships is common, our survey data likely underreports participation in the stigmatized behavior of sexual exchanges, especially for women. The disparity in these findings is likely also due to our targeting of interview participants who acknowledged participation in fish-for-sex relationships and that these participants thus shared perspectives from their own experiences and their work in industries where sexual exchanges are most common. Finally, we use a cross sectional survey and therefore cannot infer causation and our quantitative results cannot necessarily be generalized outside the study community.

6. CONCLUSION

Fish declines have severe consequences for livelihoods and food security, with effects that may also extend much further into traditionally social realms to influence the persistence and power dynamics of a transactional sexual economy. Within Lake Victoria and elsewhere, the world's poor remain most vulnerable to the consequences of resource declines; galvanizing support to address these declines requires recognition of the full array of social consequences. Researchers and programs concerned with sexual economies and HIV risk must recognize the role of natural resources and environmental change as drivers of social phenomena. The experiences of people reliant on natural resources are embedded in the gendered economies and changing ecologies of the world. When we appreciate the ways people navigate the risks of declining resource access we can improve policy and foster more productive efforts to mitigate the compounding challenges driven by our changing ecosystems.

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APPENDIX A. INTERVIEW PARTICIPANT
CHARACTERISTICS (N = 30)

	Number	Percentage
Gender		
Women	16	53
Men	14	47
Food security		
Secure	0	0
Mildly insecure	2	7
Moderately insecure	7	23
Severely insecure	21	70
Household demographics		
Fisher only	9	30

Seller only	4	13
Fisher and seller	9	30
Neither fisher nor seller	8	27
Housing materials (SES)		
Iron with improved floor	15	50
Iron with natural floor	4	13
Improved floor and walls	1	3
Iron roof	7	23
All natural	3	10
Land ownership		
Owns	16	53
No land	14	47
highest schooling (woman)		
Some primary	9	56
Primary	3	19
Some secondary	5	31
Woman's relationship status		
In relationship	11	69
Widowed	3	19
Separated	2	12
*Note: All men are married		
Exchanged sex (Questionnaire)		
Females	11	69
Males	10	77

	Average	Minimum	Maximum
Age (women)	26.8	18	53
Age (men)	31.4	25	45
Number in household	5	3	10
Asset scale (9-point)	2	0	6

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