The Real Risks of Fishing: Occupational Context and the Intersection of Social Networks, Masculinity and Drug-Related HIV Risk Behavior among Fishermen in Malaysia

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ABSTRACT

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Fishermen are a high-risk group for HIV, having higher HIV rates than typically high-risk groups like truck drivers and military personnel (Kissling, et al., 2005a). Despite this, fishing communities have consistently fallen through the net of HIV research initiatives and in Southeast Asia, there are few such projects targeting fishermen and their communities. In Malaysia, there is particular cause for concern as estimates suggest that fishing communities have an HIV prevalence rate 10 times that of the general population (Kissling, et al., 2005a). Although only 1.3% of the working population are employed in the fishing industry (Department of Statistics Malaysia, 2005), fishermen constitute 3.8% of the total reported HIV cases in the country (Ministry of Health Malaysia, 2008).

The dearth of research initiatives targeting HIV within Malaysian fishing communities, and the criminalization of drug users, more broadly, underscores the need for a greater understanding of *why* fishermen are at increased risk for HIV, but also what approaches might be most effective at curbing the HIV epidemic for these men. This research examines HIV among fishermen by focusing on the social drivers of drug use and drug-related risk behavior in this community. Drawing on theories of risk, this research employs an approach that situates HIV risk behavior within the larger social context. Specifically, I ask: what social factors support an environment conducive to risk behavior and the transmission of HIV among this population of fishermen and what makes some men more vulnerable than others?

Using a mixed-methods approach, this dissertation examines multi-level determinants of

HIV among fishermen in Malaysia, assessing how occupational characteristics, social networks, and conceptions of masculinity shape drug use and HIV risk behaviors. The focus on occupational characteristics contributes to the literature on occupational cultures and workplaces as sites for the production of health vulnerabilities, particularly HIV. The focus on masculinity speaks to the to need to better understand the cultural meanings and gender norms associated with HIV risk behaviors among men and the attention to social networks complements a growing body of research that recognizes the role of informal networks in amplifying or attenuating health-related risk.

The data for this dissertation comes from Project WAVES, a study conducted by the University of Malaya in collaboration with the Social Intervention Group at Columbia University. The study was conducted in and around the Kuantan jetty, one of the busiest fishing jetties in the country, located in Pahang State on the east coast of peninsular Malaysia. The data consist of 28 in-depth semi-structured interviews with drug-using fishermen and survey data from 406 fishermen who were recruited using respondent-driven sampling.

The findings of this research suggest that multilevel factors tied to occupational structure shaped drug use and risk behavior contexts. The mechanization of the fishing industry created shifts in the local labor market that shaped fishermen's daily work and lives. In this new occupational context, the social and economic organization of the occupation of fishing supported drug use in this community. In particular, boat captains loaned money to buy drugs and some supplied drugs for the purpose of work, which resulted in unsafe injection practices and more limited access to clean needles/syringes. The integration of drug use and drug users into the occupational culture of fishing also shaped social and drug-using networks. I find that multidimensional aspects of social network relationships, including social support, trust,

participation, and isolation were significantly associated, both positively and negatively, with recent injection and sharing needles/syringes. The results also demonstrate connections between masculinity and injection-related HIV risk behavior. Of note, drug using men were marginalized in their communities and drug use posed a threat to masculinity as men who used drugs were seen as "less of a man" or lacking in "reason." When this marginalization was internalized, men were more likely to engage in receptive sharing of a needle/syringe.

Collectively, these results indicate that occupational characteristics, networks and masculinity intersect in complex ways to increase drug use and HIV among fishermen in Kuantan. Although the findings highlight a number challenges to reducing HIV in this population, they also point to a number of possible interventions, which are discussed in the final chapter.

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DEDICATION

This dissertation is dedicated to my partner and best friend, Josh. I could not have survived this process without the daily infusion of humor and love that you so effortlessly provided. I am grateful for you.

CHAPTER 1

INTRODUCTION

It is 90 degrees, humid, and the acrid smell of long-dead fish permeates the air. The Kuantan jetty is quiet at this time day: the fish have all been unloaded and weighed in the early morning hours, the boats have refueled and some have returned to sea. The calm of the jetty is even more pronounced because it is Thursday afternoon and many boats are docked in preparation for Friday prayer. It is also November, the beginning of monsoon season, when the northeast winds blow and the sea becomes much more dangerous. At this point in the season, the rains and strong winds are only beginning to reach their full potential.

The jetty is quiet, but the four boats that are currently docked at the main unloading area are loud with color: yellow, blue, red, teal. The unloading area is really just a large concrete slab covered by a pavilion; a bright yellow catwalk runs above it along the front edge, serving as a panopticon of sorts, and the jetty offices overlook the boats as fish are unloaded and weighed. Only one boat is in the process of removing its haul of fish: six men methodically carry plastic bags, bursting with small silver fish, from plastic barrels used for storage on the boat deck to large blue plastic bins on the ground. From here they will likely be transported to local fish markets for sale. A young man in rubber boots, jeans, a faded red t-shirt, and a floppy hat systematically hoses down the entire unloading area, washing away what remains of the fish, shark, and crab that once occupied this space. Farther down the jetty, other men lethargically untangle lines and repair huge nets, cigarettes dangling from their lips.

The calm at this hour is deceptive, however. Just six hours earlier the jetty was buzzing with people and activity, cartons of fish were stacked ten high, boats were docked two to three deep all along the length of the main dock, more boats motored up the muddy waters of the Kuantan river, and the clamor of trucks and boats and people filled the open pavilion. During the peak fishing season on the East coast of Malaysia, the "dry" or "hot" season when seasonal southwest winds blow from Sumatra toward the West coast leaving Kuantan untouched, the activity at the jetty is even more kinetic. Fishing boats start arriving before dawn. Smaller vessels may have only been out for a day, but the largest boats could be returning to shore after two weeks or more at sea. The boats must unload their catch, the captain must sell to a wholesaler, the crew must clean, and the boat must be refueled before they do it all over again.

After the work of the day is done and the sun sets, the jetty becomes quiet again, but it is not without life. Many boats stay docked at the main unloading area all night; others dock near the jetty or at smaller docks closer to the sea. The boats are not empty; many fishermen sleep on boats every night regardless of whether they are out to sea - for some it is easier, for others it is the only option. At night, the smell of fried noodles or curry occasionally rises above the ever-present stench of fish and you can hear idle chatter or the sound of music on the radio wafting up from the boats. You can also hear mysterious whistles and animal calls, as if you were in the jungle rather than at a fishing jetty. These sounds, however, are human and a form of communication that allows fishermen to notify their peers of coming danger: the police or officials of the national anti-drug agency, perhaps, conducting a raid. These lookouts and whistles are an important form of protection for fishermen, many of whom use drugs, as they remain vigilant to avoid arrest.

Drug use was not always so common at the Kuantan jetty, however, or among fishermen

in Malaysia, and the days and nights at the jetty did not always look this way. Malaysia, like many countries in Southeast Asia, experienced substantial shifts in the organization of the fishing industry: there has been a push away from small-scale traditional fishing towards large-scale commercial fishing in an effort to both modernize and deal with depleting fish stocks (FAO, April 2001). Although changes in the fishing industry have been ongoing since the 1960s, in the past two decades, there has been rapid commercialization of fisheries on the east coast of Malaysia (Department of Fisheries Malaysia, 2006).

During this same period, HIV became a major health threat throughout the world. Southeast Asia has one of the largest HIV epidemics and a correspondingly high concentration of drug users (UNAIDS, 2010). With almost 80,000 people currently living with HIV or AIDS – an HIV prevalence rate of .5% in 2007 for those aged 15-49 – Malaysia has an established epidemic (Wolfe, Carrieri, & Shepard, 2010) and warrants particular attention as I unravel the social determinants of HIV risk behaviors. People who inject drugs (PWIDs) in Malaysia compose roughly 1% of the adult population, yet account for 53% of newly reported HIV infections (Malaysian AIDS Council, 2009) and may make up 70% of all people living with HIV (PLWH) (Wolfe, et al., 2010). In a recent study of five Malaysian cities, more than 40% of street-recruited PWIDs tested positive for HIV (Vicknasingam, Narayanan, & Navaratnam, 2009). At the same time, in 2008, PWIDs only represented about 25% of the total number of people on antiretroviral therapy (ART) (Wolfe, et al., 2010), which suggests a systematic patterning of HIV risk that places some populations at greater risk than others.

Fishermen are a high-risk group for HIV, having higher HIV rates than typically high-risk groups such as truck drivers and military personnel (Kissling, et al., 2005a). Despite this, fishing communities have consistently fallen through the net of HIV research initiatives, and in

Southeast Asia there are few such projects targeting fishermen and their communities. In Malaysia, there is particular cause for concern as estimates suggest that fishing communities have an HIV prevalence rate 10 times that of the general population (Kissling, et al., 2005a). Although only 1.3% of the working population is employed in the fishing industry (Department of Statistics Malaysia, 2005), fishermen constitute 3.8% of the total reported HIV cases in the country (Ministry of Health Malaysia, 2008).

Drug users in Malaysia also face a highly punitive environment, with some of the harshest drug policies in the world. Needle-exchange is available in some locations in Malaysia, but this is a relatively new development, beginning in February 2006 (IHRD, 2008), and despite the government's public commitment to harm reduction, drug use is highly criminalized. This is evidenced by the government's goal of a "drug-free Malaysia" by 2015, which includes "forced drug testing at roadblocks, factories, and schools, registration of offenders, flogging and/or imprisonment of those convicted of possession of illicit substances, and prolonged compulsory institutionalization of those with a history of illicit drug use" (IHRD, 2008). For fishermen, this means that commercial fishing jetties and boats are frequent targets of drug raids by police.

The dearth of research initiatives targeting HIV within Malaysian fishing communities, and the criminalization of drug users more broadly, underscores the need for a greater understanding of *why* fishermen are at increased risk for HIV, but also what approaches might be most effective at curbing the HIV epidemic for these men. This research examines HIV among fishermen by focusing on the social drivers of drug use and drug-related risk behavior in this community. Drawing on theories of risk this research employs an approach that situates HIV risk behavior within the larger social context. Specifically, I ask: what social factors support an environment conducive to risk behavior and the transmission of HIV among this population of

fishermen and what makes some men more vulnerable than others?

From this perspective, I start by focusing on how macroeconomic changes in the fishing industry shifted the organization of local labor in ways that affected men's health. In Malaysia, the commercialization of the fishing industry resulted in fewer available jobs and an increase in foreign labor, leading to intense job competition, displaced local labor, diluted earning capacity, and rising concerns about unemployment and poverty among local fishermen who could not compete (Department of Fisheries Malaysia, 2006). As the Malaysian fishing industry changed, so too did fishermen's work: commercial fishers tend to go farther and stay longer out to sea, changing everyday life and relationships for fishermen. Given these shifts in the organization of labor within the fishing industry, I argue that occupational context may be a primary social driver of fishermen's health that contributes to drug use and HIV risk behavior.

Health decisions and behaviors are shaped by both larger social structures and by social interactions (Farmer, 2005; Parker, Easton, & Klein, 2000), which provide both the context within which risk behavior occurs and also the opportunities people have to navigate risk (Cockerham, 2005; Rhodes, 1995, 1997). These occupational shifts not only changed the work of fishermen, but also their social interactions. This research starts from the premise that risk behavior is fundamentally a social process and that social conditions and relationships shape HIV risk behaviors and individuals' abilities to negotiate risk (Hirsch, et al., 2010). Special attention is paid to the organization of social relationships and risk, with a particular focus on the relationships *among* men. Specifically, I examine how social network relationships and conceptions of masculinity may influence HIV risk behavior and how the contours of these social relationships are shaped by social, economic, and occupational factors.

The relationship between social networks and health is a growing area of research.

Network connections can provide social support, establish and enforce collective norms, and encourage risk and/or protective health beliefs and behaviors (Szreter & Woolcock, 2004). The social connections between people, the structure of these relations, and the location of individual actors within those structures all have "important behavioral, perceptual and attitudinal consequences both for individual units and for the system as a whole" (Emirbayer & Goodwin, 1994). Social networks can mediate the relationship between social structures and individual behaviors, operating through four primary pathways: 1) provision of social support; 2) social influence; 3) social engagement and attachment; 4) and access to resources and material goods (Berkman, Glass, Brissette, & Seeman, 2000).

I also look at the gendered nature of these social networks relationships: gender is a primary way in which relationships are organized and gender is widely acknowledged as a determinant of health. At the same time, health is a "means for demonstrating…. masculinities," such that the very practice of being a man can result in beliefs and behaviors that undermine health and drive risk (Courtenay, 2000). Given that fishing is a dangerous, male-dominated occupation characterized by a constant and real threat to life and limb, a focus on the connections between masculinities and health in this context contributes to our understanding of the social drivers of drug use and HIV risk behavior among fishermen in Malaysia. Specifically, I examine risk in the context of fishermen's everyday gendered lives and social interactions, which provides a useful lens through which to understand how social structures shape health behaviors.

METHODS

In order to understand the factors that drive HIV risk and vulnerability among fishermen, it is necessary to examine both individual behaviors and the influence of broader social structures. Using a mixed-methods approach, this dissertation examines multi-level determinants

of vulnerability to HIV among fishermen in Malaysia, assessing how occupational characteristics, social networks, and conceptions of masculinity shape drug use and HIV risk behaviors among fishermen. The focus on occupational characteristics contributes to the literature on occupational cultures and workplaces as sites for the production of health vulnerabilities, particularly HIV. The focus on masculinity speaks to the need to better understand the cultural meanings and gender norms associated with HIV risk behaviors among men, and the attention to social networks complements a growing body of research that recognizes the role of informal networks in amplifying or attenuating health-related risk. Attention to these factors at the individual and interpersonal level was based on their capacity to inform the empirical literature on men's health and our understanding of the social nature of risk and vulnerability. The aims of this dissertation include:

1. To describe occupational shifts in the Malaysian fishing industry and, given these shifts, to examine how current work conditions are conducive to drug use and HIV risk behavior among fishermen. Specifically, I assess the extent to which occupational characteristics, such as vessel type, and the relationships between boat captains and crewmembers, including the intersection of drug use and labor, predict HIV risk behavior.
2. To describe the social networks of Malaysian fishermen, including network structures, levels of social support, social influence, and social engagement. Further, to examine the association between aspects of social network relationships and injection-related HIV risk behaviors and the extent to which relationship characteristics amplify or attenuate risk.
3. To describe conceptions of masculinity for men who use drugs and to examine the association between conceptions of masculinity and HIV risk behaviors. Specifically, I assess the extent to which adherence to or departures from notions and norms of

manhood predict the sharing of needles/syringes and unsafe injection practices, more generally.

Through an analysis of the ways in which health behavior intersects with larger social forces, such as political economy, gender, social networks, and occupational context, I further understanding of the structural conditions that increase vulnerability for some men and that drive HIV risk behavior. The overall goal is to contribute to a multi-level conceptualization of men's health within settings where men's behavior is constrained and to examine the social structures within which drug-related risk behaviors unfold among this specific population of Malaysian fishermen.

THEORETICAL AND CONCEPTUAL FRAMEWORK

This dissertation utilizes theories of risk to inform an argument about the social nature of risk behavior and vulnerability and for how multi-level factors shape drug use and HIV outcomes. In assessing the factors that increase health vulnerabilities for some men relative to others, I integrate literature on occupational health, social network relationships, and conceptions of masculinity as key social drivers of HIV risk behavior. In this dissertation, theories of risk guide hypotheses, measurement, and the interpretation of results.

Risk, Vulnerability and Risk Environments

Risk is defined in numerous ways in the literature, but MacGill and Siu (2004), in their dualistic treatment of the concept of risk as a "physical entity coupled with a characteristic social orientation," provide a particularly useful model. They distinguish the physical (or scientific) and social aspects of risk, where physical/scientific refers to the material effects of risk, like the potential for morbidity and mortality, and other physical, economic, or technological influences (ranges from low to high expected detriment). The social perspective refers to the socially

constructed nature of risk and people's feelings, knowledge, and views of the acceptability of risk. This distinction provides an important backdrop for an approach to risk that can account for risk processes at the macro and micro levels and which distinguishes, as MacGill and Siu (2004) do, between the socially constructed nature of risk and its physical aspects.

Theories of risk can be organized into those that focus more on structural, or macro, processes and those that are more concerned with individual, or micro, processes. The major macro-sociological perspectives on risk, include the Risk Society perspective discussed by Beck (1992), governmentality, established largely from Foucault's (1991) work, and the Cultural Theory of Risk credited to Douglas and Wildavsky (1983). They vary in the extent to which they discuss social actors, but they all focus on structural change over time and how these changes influence assumptions about risk.

Briefly, Beck (1992) looks at processes of modernity and argues that new dangers tied to industrialization and the development of technology and science have greatly affected the public's daily lives and perceptions of risk. Foucault (1991) treats risk as a sociocultural phenomenon that is directly tied to forms of social regulation and control employed by the institutional authority of modern political powers. Power is especially important in this perspective as authority is derived from knowledge (Zinn, 2006) and experts play a key role in processes of social control and the rendering of productive bodies (Lupton, 1999). For Douglas and Wildvasky (1983), levels of the acceptability and unacceptability of risk are political and moral matters, which are socially constructed by institutions, cultural values and ways of life. Similar to the governmentality approach (Foucault, 1991), risk is intricately tied to forms of social control and differentiation; however, in the Cultural Theory of Risk, it is not a government project, but a social one, as ideas about risk are an integral part of social cohesion (Douglas and

Wildvasky, 1983).

Micro approaches, on the other hand, tend to focus more on subjective differences in individual risk perceptions, communication, decision-making and management through the use of models of cognitive/learning processes or the psychometric approach (Taylor-Gooby & Zinn, 2006). These approaches do not necessarily ignore structural influences, but rather, focus more extensively on individual interpretations of and responses to risk. The primary component of the cognitive/learning perspective is that humans, as rational actors, work within the constraints of their learning, cognitive capacity, experiences and the social context in which they live to make assessments about the maximization or optimization of the utility of their actions (Taylor-Goodby and Zinn 2006). The psychometric approach, on the other hand, focuses more on risk behavior and communication, characteristics of risks, and the influence of social factors on risk, stressing the importance of affect and emotion in understanding risk (Taylor-Goodby and Zinn 2006). Unlike cognitive/learning approaches to risk, psychometric models recognize that people do not always act as rational actors, arguing instead that cultural and affective factors like emotions play a prominent role in risk attitudes and decisions (Druckman & McDermott, 2008); Taylor-Goodby and Zinn 2006).

Both macro- and micro-oriented theories of risk are criticized for being either overly reliant on top-down functionalism, thus giving little agency to individuals (Taylor-Goodby and Zinn 2006), or for failing to account for the structural factors that shape risk and how individuals differently respond to risk (Lupton 1999). In response, MacGill and Siu (2004) attempt to create a framework for risk that assesses processes across levels. They argue that individuals are the key to understanding risk because of its socially constructed nature, which depends on the interpretations and judgments of individuals to determine what is considered a risk or not. At the

micro-level, they distinguish between the "active" and "inner" knowledge of individuals to describe the difference between knowledge that is actively processed by people during learning, reflection, and experience, and knowledge that is embedded as dispositions, cultural conditioning and tacit unquestioned beliefs. In this model, inner and active knowledge compete for attention in determining views on risk acceptability (MacGill & Siu, 2004). Although MacGill and Siu (2005) begin to recognize the interactive nature of risk, arguing that it is dynamic and changes through "networks of reflective interaction with society and recursive interrelationships between social constituencies and their environment," their presentation of the "social" aspects of risk as feelings and beliefs seems more psychological than truly social. Collectively, the weaknesses of these theoretical approaches highlight the need for greater attention to the interaction between actors and social structures and to the social relationships between actors in understandings of risk.

Scholars of HIV have also made substantial contributions to our theoretical understanding of risk, making a distinction between risk, which is more heavily focused on individual choice and behavior, and vulnerability, which addresses the social structures that shape behavior. As discussed by Kippax, Stephenson, Parker and Aggleton (2013), early HIV prevention research was dominated by psychological models of risk that focused on the modification of individual behavior through the provision of information and prevention tools, like needles or condoms. In this individualistic approach to HIV risk, the beliefs, attitudes and norms of rational actors who possessed self-efficacy were essential to creating behavior change (Kippax et al. 2013). As such, the goal was often safety and the prevention of disease transmission rather than the promotion of rights or recognition of pleasure (Kippax et al. 2013). Kippax et al. note that this approach to HIV prevention fails to account for the structural factors

that affect health behaviors and falsely imposes the notion that people engage in static rather than social acts. Further, the labeling of populations as "risky" may indicate some moral failing, blaming individuals, and thus creating barriers to intervention.

In response to these critiques of individualistic understandings of HIV risk behavior, vulnerability was proposed as a way to socially, politically and economically contextualize behaviors (Kippax et al. 2013). Vulnerability shifted the focus to factors like unequal opportunities, social exclusion, precarious employment, and gender inequalities, suggesting that it is not individual behavior that makes some populations more susceptible to HIV infection, but structural factors outside of the individual that act as barriers to well-being (Kippax et al. 2013). This concept is also problematic as it is often devoid of any agency, it has the potential to homogenize and victimize groups of people, and it limits the importance of social relations and the potential for collective action (Kippax et al. 2013).

As both risk and vulnerability fail to fully capture the social aspects of HIV and fail to include the possibility of social change though collective action, the concept of social drivers or social enablers of HIV was introduced (Kippax et al. 2013). Social drivers are "the core social processes and arrangements—reflective of social and cultural norms, values, networks, structures, and institutions—that operate around and in concert with individuals' behaviors and practices to influence HIV epidemics in particular settings" (Auerbach, Parkhurst, Caceres, & Keller, 2009). Auerbach et al. go on to argue that social drivers are "interactive phenomena" that are "complex, fluid, non-linear, and contextual, and they interact dynamically with biological, psychological, behavioral, and other social factors." These drivers are dynamic and can confer vulnerability to or protection from HIV transmission; at the same time, individuals and communities can build resilience when they are able to "manage the risks that are present in their

environment" (Auerbach et al. 2011).

In particular, two approaches to the social drivers of HIV, which incorporate both structural and agentic components of risk, inform this dissertation research. First, the risk environment approach emphasizes how experiences of and responses to HIV risk are socially and locally situated, driven by external environmental and social conditions that shape everyday practices and increase harm among people who inject drugs (PWID) (Rhodes, 2009). A key component of the risk environment approach is the role of 'place' in creating the spatial context, whether physical, social, economic or political, where HIV risk occurs (Tempalski & McQuie, 2009). Research on place demonstrates that local characteristics, like geographic residence, social disorder, police tactics, levels of isolation and policies toward drug users, create risk environments associated with HIV infection and injection risk behavior (Bluthenthal, Kral, Erringer, & Edlin, 1999; Bourgois, Lettiere, & Quesada, 1997; Cooper, Moore, Gruskin, & Krieger, 2005; Latkin & Knowlton, 2005; Maas, et al., 2007; Tempalski, 2007). Assessing the local environment becomes particularly important to understanding how environments can both contribute to HIV risk behavior and to the development of community resilience through social networks, which generate social capital, informal support, solidarity and belonging (Duff, 2009; Friedman, et al., 2007; Rhodes, 2009). The risk environment approach highlights the ways in which environmental factors can increase vulnerability, but also how communities have the capacity to cope with risks that arise from social inequalities (Kippax et al. 2013).

Second, the concept of "social risk" (Hirsch, et al., 2010) focuses on the psychological, social, and cultural processes that shape understandings of risk and risk behaviors. Social risk is a particularly useful analytical lens as it "situates behavior in political-economic, social, and cultural contexts that can be acknowledged as changing, power-laden, and often contradictory"

(Hirsch, et al., 2010). In *The Secret*, Hirsch and her coauthors use this framework to argue against biomedical or individual conceptualizations of risk and to make sense of behaviors that may otherwise seem "irrational, unhealthy, or uneducated." Looking specifically at how social risk influences sexual behaviors, they show how people navigate economic, social, and cultural opportunities and constraints that are more salient than the biomedical risk of HIV infection, such that the behaviors that put them "at risk" for HIV make sense in the context in which they live. They demonstrate that there is a process of prioritization of risk that occurs where social risks, like the threat of losing access to resources, often outweigh threats to health. In other words, people engage in practices that are potentially detrimental to their health (or abstain from practices that are health promoting) in order to secure valued social goals. This approach explains behaviors and the choices people make by looking at the meaning behind actions and the social contexts in which people live.

Although this dissertation looks at drug use and drug-related risk behavior as key outcomes, its approach is informed by theories of risk that recognize both the social structures that drive behavior and make populations vulnerable as well as the importance of individual and collective agency in negotiating risk. Following the framework proposed by Auerbach et al. (2011), this dissertation attempts to unpack the social drivers of HIV risk and vulnerability among Malaysian fishermen in two ways: 1) by examining the larger social structures that shape patterns of behavior among fishermen; and 2) by assessing more immediate constraining and enabling structures that influence drug-related risk behaviors and the uptake of harm reduction practices. In particular, this dissertation focuses on how the social organization of occupations can shape patterns of health and risk in ways that support environments conducive to risk behavior, and also how gender and social network interactions among fishermen can amplify or attenuate risk behavior.

Occupational Health and Risk

Morbidity and mortality related to occupational health and safety accounts for a substantial amount of the global disease burden: according the International Labor Organization, 2.3 million individuals die from work-related accidents or diseases every year (about 6000 deaths occur every day), with around 317 million occupational accidents a year and 160 million people with work-related diseases (International Labour Organization). Although a large number of these deaths are related to injuries or exposure to chemical, physical, biological, or other harmful hazards, increasing attention has been paid to the connections between the work environment and health and how psychosocial factors may affect health risk behavior. Psychosocial factors, sometimes called work organization or organizational factors, refer to work conditions and aspects of work environments that may lead to stress and impact health (Hurrell, Levi, Murphy, & Sauter, 2011).

These multilevel factors include the organizational climate or culture, work roles, interpersonal relationships at work, social support, power dynamics, individual attributes, and characteristics of the labor, like variety, meaning, scope, and repetitiveness (Hurrell, et al., 2011). A focus on the psychosocial aspects of work environments in occupational health and safety highlights: "1) that social organizational characteristics of work, and not just physical hazards, lead to illness and injury; 2) that stress-related consequences are related to the social organization of work activity and not just its demands; and 3) that work's social activity affects stress-related risks, not just person-based characteristics" (Karasek, 2011). There are numerous psychosocial models for occupational health, but all indicate how work-related psychosocial factors act as stressors that affect psychological, behavioral, and physical responses, which can lead to illness (Hurrell, et al., 2011; Karasek, 1979; Karasek & Theorell, 1990).

The literature on occupational health and risk points to a need for greater focus on the social structure of work organization for different types of workers in different types of work contexts (Benach & Muntaner, 2007). In particular, much of the literature on occupational health focuses on developed countries, but in economically developing countries, occupational health is often neglected due to competing social, economic and political challenges (Nuwayhid, 2004). Taking a more macro-level approach to understanding occupational health, Nuwayhid (2004) argues that research in developing country contexts should "focus less on the workplace and more on the worker and the worker's social context in which work-place practices are embedded." Similarly, MacDonald et al. (2008) call for an understanding of the larger organizational context within which work is performed, arguing that macro-level characteristics of the economic, political, and social environment are important in shaping workplace hazards and promoting healthier work environments. This dissertation follows these suggestions looking at both the "external-contextual domain" and the "workplace microenvironment" to understand drug use and HIV risk environments for fishermen (Nuwayhid, 2004).

In the context of HIV, occupational health and safety has gained some traction as evidence emerged of HIV epidemics concentrated within specific occupations. Most notably, occupations with higher levels of mobility have been linked to increased risk for HIV; however, the relationship between mobility and HIV is complex (Deane, Parkhurst, & Johnston, 2010; No, 2002; Sopheab, Fylkesnes, Vun, & O'Farrell, 2006; Weine & Kashuba, 2012). The movement of people can form complex networks that contribute to the spread of disease, but also takes people far from their homes and introduces them to new risk environments, all of which can shape behavior and health outcomes (Hsu, 2000). Mobility and HIV studies focus heavily on sexual risk behavior; for instance, a study in Cambodia found that mobility was a strong determinant of

casual sex (Sopheab, Fylkesnes, Vun, & O'Farrell, 2006). However, a number of factors may increase risk for HIV among mobile workers: a review of 97 articles on HIV risk among labor migrants globally found that HIV risk was associated with multilevel determinants, including prolonged and/or frequent absence from family, financial status, difficult working and housing conditions, and low social support (Weine & Kashuba, 2012). Occupations with high HIV prevalence include security forces, truck driving, mining, but also fishing, with increased risk explained by long periods of separation from partners, greater access to sex workers, and by daily exposure to violence or danger that may make the risk of HIV seems less immediate or significant (Campbell, 1997; CARE, 2002; Carswell, Lloyd, & Howells, 1989; Lurie, et al., 2003; Mbugua, et al., 1995; Nyanzi, Nyanzi, Kalina, & Pool, 2004; Orubuloye, Caldwell, & Caldwell, 1993). Among fishermen, most studies on HIV focus on the intersection of mobility and sexual risk behavior (Allison & Seeley, 2004; Seeley & Allison, 2005; Westaway, Seeley, & Allison, 2007).

The literature makes a strong case for the linkages between certain occupations and risk for HIV (Campbell, 1997; Campbell & Williams, 1999; Corno & De Walque, 2012; Dude, et al., 2009; Entz, Ruffolo, Chinveschakitvanich, Soskolne, & van Griensven, 2000; Gysels, Pool, & Bwanika, 2001; Kissling, et al., 2005b; Orubuloye, et al., 1993; Rakwar, et al., 1999; Samnang, et al., 2004); however, the majority of this work focuses on sexual risk behavior and fails to examine how drug use may intersect with the social organization of occupations to drive HIV. This is particularly important because there is ample evidence to suggest that work environments can impact substance use (Green & Johnson, 1990; Muntaner, Anthony, Crum, & Eaton, 1995; Seeman, Seeman, & Budros, 1988; Wiesner, Windle, & Freeman, 2005). Given this gap in the literature on occupational risk and HIV, this dissertation assesses occupational cultures and

workplaces as sites for the production of health vulnerabilities.

Social Networks

Both the risk environment approach (Rhodes, 2009) and the concept of social risk proposed by Hirsch et al. (2010) recognize the fundamentally social nature of risk and the multilevel factors that shape risk behaviors. At the meso level, social networks mediate the relationship between social structures and individual behaviors (Berkman, et al., 2000). According to Pescosolido (1992), "social interaction is the basis of social life, and social networks provide the mechanism (interaction) through which individuals learn about, come to understand, and attempt to handle difficulties." Through interaction in social networks, cultures of information and belief are formed (Pescosolido, 2006), creating patterned relationships among actors that constrain or enable decisions and action (Emirbayer & Goodwin, 1994). Social networks can constrain or enable actors by blocking or encouraging possibilities for action or knowledge acquisition, by constructing identities and goals, and by providing the normative evaluations that guide action (Emirbayer & Goodwin, 1994).

In relation to health, studies have demonstrated a relationship between network influences and health behaviors and outcomes (Centola, 2010; Smith & Christakis, 2008); however, the nature of this relationship is not always straightforward or understood and social networks can provide support as well as discourage particular identities or behaviors. In this dissertation, I utilize Berkman et al.'s (2000) model, which argues that macro processes shape network structures and, in turn, network structures shape health-related social and interpersonal behavior at the behavioral level through specific primary pathways. First, provision of social support – may be emotional, instrumental, appraisal and informational, but not all social relationships are supportive and there is variation in the form and frequency of support that

people are given. Second, social influence – people seek normative guidance from the people around them. Third, social engagement – networks promote social participation, define meaningful social roles and provide a sense of identity and belonging. These social network processes then influence more proximal pathways to health status, including: direct physiological stress responses; psychological states and traits like self-esteem, self-efficacy, and security; health damaging behaviors like high-risk sex or drug use and health promoting behaviors like service utilization, adherence, etc.; and exposure to infectious diseases such as HIV or STIs (Berkman, et al., 2000).

Treating social networks as mediating structures is useful in the understanding of HIV risk as well. Numerous studies demonstrate that type of social network structure and aspects of social relationships can contribute to HIV-related risk behaviors and health outcomes among drug users (Friedman, Curtis, Neaigus, Jose, & Des Jarlais, 1999; Friedman, et al., 1998; Weeks, Clair, Borgatti, Radda, & Schensul, 2002), and another study illustrates how social networks can also promote engagement in protective health behaviors (Kirst, 2009). Informal networks within social groups may shape individual experiences of risk by providing reference points for validating risk perceptions, by providing cultural views and biases, and by creating the potential to amplify or attenuate risk information (Kasperson, et al., 1988). Social networks can further shape whether an individual perceives a risk as real or ignorable, like in situations of sexual activity and drug use, and what they do with potential risks when confronted with them. Health and risk, and the decisions people make in this regard, are not isolated acts, but are driven by social influences that are formed through individuals' interactions with family, friend, work, and community networks. In other words, "decision making itself is a dynamic, interactive process fundamentally intertwined with the structured rhythms of social life" (Pescosolido, 1992). As

such, understanding socially patterned networks of interaction is essential to assessments of HIV risk and health behaviors. This dissertation contributes to research on networks and health by focusing specifically on network relationships within an occupational context and also complements a growing body of research that recognizes the role of informal networks in amplifying or attenuating health-related risk.

Gender and Masculinities

The gendered nature of these social networks also shapes risk as "men's health behaviors are embedded in, and likely influenced by the social context in which they live" (Mahalik, Burns, & Syzdek, 2007). Gender relations play a major role in social organization, and are historically constructed, entrenched in power relations between men and women, and maintained and reproduced by the interaction between practice and social structures (Connell, 1987). Connell's framework introduces the concepts of gender regime and gender order to describe the "state of play" of gender relations within institutions and broader society. Connell identifies three major elements of gender orders and regimes: the division of labor, the structure of power, and the structure of cathexis. Structures of gender relations serve as an overarching element of gender stratification, describing how constraints on social practice operate through the interplay of power and through institutions, with social structures and social practices interacting to both challenge and maintain the existing gender order (Connell, 1987).

These structures not only serve to define the relationships between men and women, but also those among men and their place in the larger social hierarchy. Connell (2005) discusses masculinity as a configuration of gender practice that is "simultaneously a place in gender relations, the practices through which men and women engage that place in gender, and the effects of these practices in bodily experience, personality and culture" (pg. 71). Connell (2005)

argues that there is not just one masculinity, but that there is a dominant masculinity, which "embodies a 'currently accepted' strategy" (pg. 79) of manhood and which is intertwined with social class, ethnicity and race, religion, and sexuality. In this way, masculinities are individual and interpersonal, but also political and structural, intersecting with other forms of social distinction and marginalizing many men in the process.

Health may be a primary site where gender relations and the inequities between men are constituted and constrained. Numerous studies suggest that masculinity is a correlate of health behaviors (Galdas, Cheater, & Marshall, 2005; Mahalik, et al., 2007), with men adopting riskier health behaviors, engaging less in preventive or health-promoting behaviors, having fewer interactions with formal health care systems, and often having higher rates of tobacco and alcohol use than women (Courtenay, 2000). Research also suggests that the approval of male peers, practices of homosociality, and the public display of masculinity is linked to health behaviors and outcomes, like drinking behaviors (Fordham, 1995; Korcuska & Thombs, 2003), sexual risk behaviors (Flood, 2008; Kimmel, 1996), and perhaps drug use behaviors as well (Keane, 2005; Nasir & Rosenthal, 2009; Quintero & Estrada, 1998). In other words, gender shapes social relationships, but is also a key factor in understanding health and HIV risk behavior. In this dissertation, masculinities are treated as a social determinant of health that intersects with other determinants, like occupational, sociocultural, and political economic structures, to shape men's vulnerability to HIV. This dissertation contributes to research on men's health by examining the linkages between masculinities and drug-related risk behavior and how adherence to or departures from notions of manhood can make some men more vulnerable to HIV.

RESEARCH METHODS AND DESIGN

This research describes sociodemographic factors, occupational characteristics, conceptions of gender and masculinity, and fishermen's social network relationships and explores how these factors shape injection-related risk behavior, such as the sharing of needles and syringes, as well as the context in which drug use and HIV transmission occurs. Both qualitative and quantitative data are utilized. The overall goal is to assess the social and structural conditions under which HIV risk is amplified or attenuated.

Study Site and Population

The study was conducted primarily at the Kuantan jetty and the fishing villages that surround it. The jetty is situated on the Kuantan River in Pahang State. It is one of the busiest fishing jetties in the country and the center of the commercial fishing industry on the east coast of Malaysia (see Figure 1.1 and 1.2). The population for this study included both commercial and traditional fishermen on multiple types of vessels, both inshore and deep sea, covering a wide range of fishing methods, including trawling, purse seining, nets and traps, and hook and line. Fishermen were eligible if they were between the ages of 18 and 55 and reported fishing as their primary occupation during the past year. Both drug using and non-drug using fishermen were included in the study. Although Malays constitute the major ethnic group among fishing communities in Kuantan, Chinese and Thai men are also an important part of the local fishing industry; Chinese men are more often boat owners or captains and Malay and Thai men are more commonly employed as crewmembers.

Data Sources and Sampling

The data for this dissertation were collected as part of a larger study, Project WAVES, conducted by the Center of Excellence for Research in AIDS (CERiA) at the University of

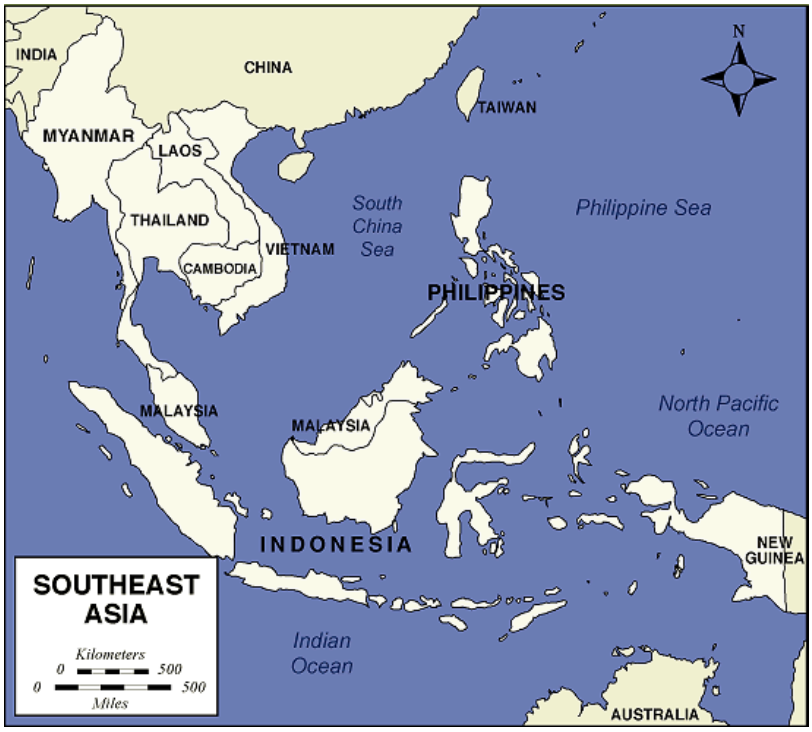


Figure 1.1: Map of Southeast Asia[1]

Figure 1.2: Map of Peninsular Malaysia[2]

[1] Source: http://www.artsmia.org/art-of-asia/history/images/maps/se-asia-large.gif

Malaya (PI: Dr. Adeeba Kamarulzaman) in collaboration with the Social Intervention Group at the School of Social Work at Columbia University (PI: Dr. Nabila El-Bassel). The study was funded by a grant from the University of Malaya and The World Bank. The data for this dissertation include participant observation, 28 in-depth semi-structured interviews with drug-using fishermen and survey data collected using Respondent Driven Sampling with 406 fishermen. Both the qualitative and quantitative instruments focused broadly on drug use, sexual behaviors, and HIV risk.

Analyses utilized both qualitative and quantitative data. A mixed-methods approach was particularly well-suited to the proposed research because of the nature of the research questions, which assessed how social factors, like work environment, networks, and conceptions of masculinity, shaped drug use and related risk behavior. Relying solely on qualitative or quantitative methods would potentially miss the multiple meanings of risk and how these meanings intersect with risk behaviors. The qualitative data were used primarily to provide context for the interpretation of key constructs and to support the quantitative findings. The use of mixed methods is a strength of this research as it allows for the triangulation of data from multiple sources and methods, thus counterbalancing possible deficiencies of a single strategy. This enhanced my ability to interpret findings and played a crucial role in increasing the credibility and validity of the findings.

Qualitative Data Collection

From December 2009 to February 2010, semi-structured in-depth interviews were conducted with 28 fishermen reporting drug use during their last fishing trip or upon returning to shore. They were recruited at the Kuantan fishing port and from two major fishing villages,

[2] **Source:** http://w0.fast-meteo.com/locationmaps/Kuantan.8.gif

Balok and Beserah, just to the north of Kuantan. To be eligible for participation in the qualitative interviews, fishermen had to report using drugs either on their last trip to sea or upon returning to shore.

Table 1.1: In-Depth Interview Sampling Matrix

Geographical Origin	Vessel and Gear Type		
	Traditional	Commercial	
	Traps/Hook/Line	Hook/Line	Trawlers/Purse Seiners
Within Kuantan	5	4	5
Within Malaysia	--	5	5
Foreign Migrant	--	--	4

Fishermen were selected based on the type of fishing vessel they worked on (traditional vs. commercial) and gear used (hook/line vs. trawlers/purse seiners) as well as geographical origin. This selection strategy was based on regional studies of HIV transmission, which found that risk behavior was associated with high mobility and migration patterns (e.g. Sopheab, et al., 2006) and on prior research conducted in Kuantan (Choo et al.), suggesting that commercial and traditional fishermen may inhabit different social spheres and draw upon social (including substance use and sexual) networks that may be mutually exclusive. Furthermore, deep sea fishing boats (denoted by trawler and purse seiner vessels) tend to be larger and capable of going further out and staying longer at sea per trip; these factors may have an impact on risk behavior both when the vessel is at sea and when fishers return to shore. See Table 1.1 for the sampling matrix

In-depth interview participants were recruited with the assistance of two male facilitators, both former drug users, currently employed as needle and syringe exchange outreach workers at a local NGO. The facilitators played an instrumental role in introducing fishermen to the project, arranging interviews, providing transportation to interviews if needed, and building trust among

a community that had little experience with research and numerous fears about the police. This may have introduced bias if outreach workers were more likely to recruit men who utilized syringe/exchange services, thus potentially leaving out men who were not accessing services or who may be engaged in riskier injection practices. Respondents provided written informed consent and the interviews lasted approximately two hours. They were paid 50 Malaysian Ringgit (RM) for participation in the study (50RM =15 USD). Interviews were conducted in Bahasa Melayu or Chinese by trained local interviewers in the project office at the Kuantan fishing jetty. The interviewers were all from Malaysia and included an ethnically Malay woman, a Malay man, an Indian man, and a Chinese man. Interviews were transcribed in Bahasa Melayu or Chinese and then translated into English.

The in-depth interviews with drug-using fishermen covered a range of topics, including their experiences and sexual and drug events at sea, on return to shore, and in their communities. In addition to basic demographic information, the instrument consisted of seven sections: 1) background information about fishing work; 2) drug use background, experiences, and injecting practices; 3) sexual behaviors and condom use practices; 4) masculinity and gender roles; 5) HIV/AIDS knowledge and testing; 6) incarceration and criminal justice; and 7) access to health services and social support. The instrument was developed collaboratively by the author, the PIs, and the research teams in the US and in Malaysia.

Quantitative Data Collection

Surveys were conducted with 406 fishermen between October and December of 2011 using respondent-driven sampling (RDS). Fishermen are a highly mobile population; further, drug users are often "hidden" as they are highly criminalized and stigmatized. These conditions make sampling a challenge as respondents are difficult to reach and, absent an adequate

sampling frame, conventional sampling strategies are prone to biased results due to inadequate or uneven population penetration. RDS is a coupon-based chain-referral method that has shown promise in overcoming some of the obstacles related to sampling hidden populations (Heckathorn, 1997, 2002; Salganik & Heckathorn, 2004). Although RDS has its limitations, it is generally regarded as an economical and time efficient recruitment method (McKnight, et al., 2006; Robinson, Jan, Risser, Becker, & et al., 2006) and has been successful for recruiting injection drug users (Abdul-Quader, Heckathorn, McKnight, Bramson, & al., 2006; Frost, et al., 2006; McKnight, et al., 2006; Robinson, et al., 2006).

In RDS, a small number of initial participants, or "seeds," who represent the characteristics of the population of interest and are socially well-connected, are recruited from the target population. Upon completing the survey, each seed is provided a fixed number of coupons (usually 3-5) to distribute to those in their social network who meet the study inclusion criteria. Coupons are required for screening into the study. Each subsequent participant is then provided the same number of coupons. Data are collected on the social networks of each participant, and anonymous participant identification numbers are created to link recruitment chains throughout the study. New recruits become more independent of index participants with each successive wave of recruitment, and bias is thus progressively weakened, eventually reaching equilibrium.

In this study, 8 initial seeds were selected with the assistance of local facilitators who worked closely with drug-using fishermen and were knowledgeable with regard to the fishing population. Seeds were selected based on their motivation to participate, their social ties within the fishing community, and on their drug-using status. Three initial seeds were drug-using fishermen (determined by self-report) and three were non-drug users; two drug-using seeds were

added due to lack of recruitment by two initial seeds. Each seed was given three recruitment coupons and paid RM50 per successful recruitment. Recruited participants who completed the survey received RM50 in reimbursement for their time, which represents, on average, 80% of their daily wage. After completion of the survey, each participant was given up to 3 coupons to recruit other fishermen into the study. For each successful recruit, the recruiting participant received RM25 as a secondary incentive.

Survey interviews were conducted in Bahasa Melayu using audio computer-assisted self-interview with Questionnaire Development System (QDS) software (Nova Research Company, Maryland, USA). Use of this technology allowed for greater respondent privacy and standardization in interviews. Trained project staff was also available to assist respondents as needed. Participants provided written informed consent indicating that they understood the subject matter of the study and the potential risks involved in participating in the study. Interviews lasted about two hours. The survey instrument consisted of a number of sections, eliciting information on sociodemographics, drug use and injection experiences, sex and condom use experiences, risk perceptions, mobility and employment, social networks, social support, stigma and discrimination, HIV/AIDS knowledge and testing, incarceration, access to health services, and attitudes about gender and masculinity.

Power Analysis

The sample size of N=399 was determined by a power analysis with a design effect of 4 based on estimates of the size of the local fishing population and estimates of HIV prevalence. According to the Fishermen Association of Pahang, as of May 12, 2009, there were 1224 registered fishermen in Kuantan (inclusive of a 50km radius around the town). Of these, 780 fishermen were attached to licensed commercial vessels, with the remaining 444 working on

unlicensed fiberglass boats. These numbers, however, did not include registered fishermen from other Malaysian states, unregistered fishermen with fiberglass boats, and foreign nationals working on fishing vessels (both legally and illegally). Based on the number of vessels at the jetty, a rough estimation of out-of-state fishermen and foreign nationals numbered 650, bringing the total estimated fishermen population to 1874. Unregistered and unlicensed fishers were estimated to be significantly fewer than those registered since registration is required for fuel subsidy. Although officials were reluctant to provide an exact estimate, taking a conservative estimate of unregistered and unlicensed fishermen at 20% of the fishermen population would bring the total number of fishermen in Kuantan to approximately 2500.

Table 1.2: Assumptions and Parameters for Sample Size Calculation

	Fishermen
Estimated size of fishermen population (Malaysia)	50,000
Estimated number of fishermen in Kuantan (~5%)	2500
Estimated PWID (~33%)	825
Expected HIV prevalence (%)	7.28%
Acceptable range (+/- 5%)	2.28 – 12.28%
Calculated sample size required	
At 95% confidence	334
Factoring in design effect of 4	**399**

A preliminary screening conducted by Project WAVES staff in January 2010 among fishermen in and around Kuantan found that approximately 33% of fishermen interviewed reported drug use. HIV prevalence among injectors was estimated to be about 22% based on data from an Integrated Bio-Behavioral Surveillance (IBBS) study in Kuala Lumpur in 2009. From these two estimates, the predicted number of drug using fishermen with HIV was 182, with the expected HIV prevalence among fishermen being 7.28%. Using OpenEpi software (Dean, Sullivan, & Soe, 2009), power analysis concluded that a sample of 399 was needed to show

significant results with a design effect of 4. Table 1.2 displays the assumptions and parameters for the sample size calculation.

Analytic Methods

This research utilizes a mixed-methods approach, which assumes that "there are multiple legitimate approaches to social inquiry … and that multiple approaches can generate more complete and meaningful understandings of complex human phenomena" (Greene, 2007). In the context of complex research questions, mixed methods that combine qualitative and quantitative methodologies can produce greater insight than can be gained by using a single method (Lingard, Albert, & Levinson, 2008). An overview of measures and methods are provided below; however, details for specific analyses and measures are described in greater detail in later chapters.

Measures

Qualitative and quantitative data were used to assess drug use, injection-related risk behaviors, occupational characteristics, multiple aspects of network relationships, and gender and masculinity. Key constructs and associated measures used in the quantitative analysis are briefly described below. Details on the construction of specific measures utilized in this study are discussed in greater detail in future chapters.

Dependent Variables:

- Drug Use Experiences: Multiple measures of drug use are included in the analyses that were constructed from a series of questions on use, frequency of use, and whether the respondent had injected, for 11 commonly used substances. From these questions, I created dichotomous measures of whether the respondent had ever used any substance listed, whether they had used any drugs in the past month, whether they had ever injected any drugs, and whether they had injected in the past month.

- Injection-Related Risk Behaviors: Includes a range of dichotomous measures related to HIV risk behaviors from drug use, including the sharing of needles/syringes in the past month (either using a needle/syringe that had been used by someone else or giving someone else a used needle/syringe), receptive sharing of needles/syringes in past month (using a needle/syringe that had been used by someone else), or engaging in any injection-related risk behavior in the past month (covers sharing of needles/syringes, but also frontloading and backloading, sharing other injection equipment, etc.)
- HIV Serostatus: HIV serostatus was determined by rapid HIV antibody testing using Acon HIV rapid test kits (Acon Laboratories Inc, USA). Any individual who had a preliminary positive or indeterminate test result for HIV was tested again with a second rapid test. After receiving counseling, those individuals testing positive for HIV and not currently receiving HIV treatment were referred to a local HIV clinic.

Independent Variables:

- Occupational Characteristics: Occupational characteristics include vessel type (deep sea or other vessel type), amount of money earned on last fishing trip, and number of nights spent out to sea in the past 3 months. The selection of these variables was informed by research on occupational health that suggests that work environment characteristics may affect health outcomes (Benach & Muntaner, 2007; Hurrell, et al., 2011; Taylor, Repetti, & Seeman, 1997). Specifically, research indicates that organizational context (MacDonald, et al., 2008), income (Benach & Muntaner, 2007), and mobility (CARE, 2002; Deane, et al., 2010; Sopheab, et al., 2006; Weine & Kashuba, 2012) may be important predictors of risk behavior and health. Additional items assessed drug use on the boat, knowledge of drug use by boat captain or crewmembers, use of drugs with

captain or crew, and whether the captain had ever loaned money for drugs or provided drugs for work. These items were included both as measures of drug use in relation to work environment (Muntaner, Anthony, Crum, & Eaton, 1995) and as indicators of power structures and social relationships that may shape health (Benach & Muntaner, 2007; Muntaner, Benach, Hadden, Gimeno, & Benavides, 2006).

- Social Networks: Social network data and information of the nature of social relationships, more broadly, included: 1) descriptive RDS data for linking respondents and assessing homophily and network structure; 2) qualitative measures on friendships and drug use with peers and crewmembers; and 3) survey data on multiple aspects of social networks, social support, social influence, trust, social participation, and social isolation were also included. These measures were informed by Berkman et al.'s (2000) model of networks and health.
- Masculinity: Items assessing conceptions of masculinity stem from three different types: 1) Male Role and Sexual Attitudes – includes measures of ideologies of masculinity (Hirsch, Munoz-Laboy, Nyhus, Yount, & Bauermeister, 2009) and sexual and personal intimacy, pleasure, power, and gender equality (Pulerwitz & Barker, 2008); 2) Community Peer Safer Sex Peer Norms assessed the respondent's perception of gender and sexual norms in his community related to condom use, monogamy, and responsibilities for protecting sexual health. Responses were Likert-type; and 3) the linkages between drug use and masculinity were assessed by a question asking if the respondent agreed that "men who used drugs are not real men."
- Sociodemographics and HIV Knowledge (Controls): Includes ethnicity, marital status, education level, and age. HIV Knowledge was a composite measure based on 12 items on

knowledge of HIV prevention and transmission. Response categories were: 'yes,' 'no,' and 'don't know.' Each item was recoded into a dichotomous variable for correct or incorrect knowledge and a summated scale was generated based on the number of correct responses.

In many cases, the qualitative data mirrored the data collected quantitatively, but served to provide additional information to contextualize quantitative findings.

Analytic Approach

The larger project from which these dissertation data come utilized an exploratory sequential mixed-methods design (Creswell & Clark, 2007). Qualitative data were collected first and used to inform the design and administration of the quantitative instrument. Analytically, data were integrated by connecting the results of the qualitative and quantitative data and by merging data within the discussion section of each chapter (Creswell & Clark, 2007). In other words, results from both phases of data collection (qualitative and quantitative) are reported sequentially, but findings are integrated across data sources in each discussion section.

In mixed-methods research, convergence of data through triangulation is important; however, the "divergence, dissonance and difference that can occur when results are not consonant across methods" should not be ignored (Greene, 2007). The data collected through qualitative interviews (semi-structured in-depth interviews) and survey methods are meant to inform one another; they also serve as concurrent checks on working hypotheses, thus providing an opportunity to establish a high degree of triangulation (Sanjek, 1990; Wolcott, 2001). Methodological triangulation for this study was an important part of data analysis and a careful eye was put to confirming as well as falsifying hypotheses, where needed. The qualitative data were primarily used to help contextualize the quantitative results and also to assess the extent to

which data converged. Specifically, the qualitative data provided deeper insight in the meaning of complicated constructs, like risk, masculinity, and social network relationships, thus informing quantitative findings. To assess the research aims and hypotheses posed by this dissertation, both qualitative and quantitative data were utilized at every step.

The qualitative data analysis utilized directed content analysis (Hsieh & Shannon, 2005). In directed content analysis, the development of an initial coding scheme is guided by theory or relevant research (Hsieh & Shannon, 2005). In this analysis, I first generated a broad list of coding categories based on theory and research to assess key themes of interest, including meanings and experiences of drug use and risk behavior, work environments, social networks, and masculinity. Second, I immersed myself in the data and revised the coding scheme as new themes and sub-themes emerged inductively from the data (Miles & Huberman, 1994). These more detailed major and minor codes were then applied to the data. In addition, I wrote integrative memos on theoretical insights during the coding process. The analysis of the data was theoretically driven, pulling from theories of the social determinants of health, risk, gender, and the political economy.

The following provides an overview of the analytic approach for the quantitative data. Details on specific analyses are included in individual chapters. Preliminary analysis of survey data consisted of descriptive analyses and bivariate tests of association. Descriptive analyses include the overall frequencies as well as measures of central tendency, normality, dispersion, and their standard errors. Descriptive statistics were used to characterize the sample, as well as examine self-reported HIV risk behaviors, perceptions of risk, aspects of social networks, and descriptive statistics of measures related to gender and masculinity. Tests of association, including Chi-square, t-tests, correlation procedures, and bivariate regression, were carried out to

preliminarily identify unadjusted associations among independent and dependent variables. Results from these tests were used to guide the selection of variables needed for multivariate regression. Multivariate regression was used to estimate the association between the dependent and independent variables. All multivariate analyses controlled for a number of possible confounders, including age, marital status, education level, and occupational characteristics, such as type of vessel. All quantitative analysis were conducted using SAS V9.2 (SAS Institute Inc.). The analysis of data included the following components:

1) **Hypothesis 1:** *Occupational characteristics, like working on a deep sea vessel or having a captain that contributes to drug use habits, will be positively associated with injection-related HIV risk behavior.*
    - Quant: The relationship between individual occupational and HIV risk behaviors was assessed to determine which variables to include in multivariate analysis. Multivariate logistic regression was utilized to determine which characteristics amplified risk behavior and which attenuated risk.
    - Qual: The qualitative data were analyzed to provide a description of occupational changes in the Malaysian fishing industry and the context of drug use and risk behavior on fishing boats.
2) **Hypothesis 2:** *Social network characteristics, including social support, social influence, social engagement, and isolation, will be associated with HIV risk behaviors, either amplifying or attenuating risk. Additionally, a larger network of injection drug users will be associated with riskier injection-related behavior.*
    - Quant: The relationship between individual social network items and HIV risk behaviors was assessed to determine which variables to include in multivariate

analysis. Multivariate logistic regression was utilized to determine which aspects of networks - social support, social participation, and social influence - amplified risk behavior and which attenuated risk. Additionally, network structure was described.

- Qual: The qualitative data were analyzed to provide context and meaning to key constructs, like the nature of social relationships, including network composition, social influence, social support, social engagement and access to information and resources.

3) **Hypothesis 3:** *Adherence to traditional notions of masculinity will be positively associated with HIV risk behaviors.*

- Quant: Using multiple measures of gender and masculinity, I used factor analysis to create subscales that were then used in multivariate analysis predicting HIV risk behavior.
- Qual: The qualitative data was analyzed to inform and contextualize key constructs, including individual and cultural understandings of masculinity among fishermen.

The analytic integration of qualitative and quantitative data allowed me to answer different aspects of the research questions and provided an enhanced understanding of the quantitative data, thus increasing confidence in the findings.

HUMAN SUBJECTS

Both the Columbia University and the University of Malaya IRBs approved this research. Study participants provided written informed consent for participation, including consent to audiotape the qualitative in-depth interviews.

Individuals who consented to participate in the survey study also underwent rapid HIV antibody testing using Acon HIV rapid test kits (Acon Laboratories Inc, USA). Any individual

who had a preliminary positive or indeterminate test result for HIV was tested again with a second rapid test. Rapid HIV antibody testing allowed for results and appropriate counseling to be given to participants at the conclusion of the research interview. After receiving counseling, those individuals testing positive for HIV and not currently receiving HIV treatment were referred to an HIV clinic run by the Ministry of Health at the Tengku Ampuan Afzan Hospital in Kuantan or to an infectious diseases clinic at the University Malaya Medical Centre in Kuala Lumpur. Research staff encouraged individuals testing positive for HIV to access care at the treatment facility of their choice and, if the participant agreed, staff immediately scheduled an appointment with a physician at one of the HIV clinics. Waiting time for receiving appointments was not long, so individuals were quickly linked into care.

Every effort was made to ensure the privacy of study participants and the confidentiality of data collected. To ensure confidentiality of data, each participant was given a unique numeric ID that was linked to a code (only accessible by the PI) that could then be used to determine the participant's identifying information. This information was stored separately from research data and was locked in a cabinet accessible only to certain project personnel.

OVERVIEW OF CHAPTERS

This dissertation examines the social drivers of drug use and HIV risk behavior among a population of fishermen in Kuantan, Malaysia. Chapter 2 sets the scene, including a description of historical changes in the Malaysian fishing industry and how fishermen's everyday lives shifted as a result. Macroeconomic shifts in the Malaysian fishing industry involved a push away from small-scale traditional fishing towards large-scale deep-sea commercial fishing. Chapter 2 also describes drug use experiences and risk behavior in this population, showing that drug use is fairly common among fishermen.

Chapter 3 describes how the social and economic organization of fishing supports a risk environments conducive to drug use and HIV risk. Although drug users were marginalized in broader society, they were not as stigmatized in the fishing community. The rise of commercialization meant the rise of the boat captain whose bottom line was profit margins. I find that boat captains played a primary role in driving risk among fishermen who injected drugs: they loaned money to buy drugs and some supplied drugs for the purpose of work, which resulted in unsafe injection practices and more limited access to clean needles/syringes. Occupational characteristics, like vessel type, also played a role in driving drug use and risk, with men working on deep sea commercial vessels being more likely to use and inject drugs.

Fishermen's social network relationships with other crewmembers can mitigate some of some of these risks, however. As discussed in Chapter 4, multidimensional aspects of social network relationships, including social support, trust, participation, and isolation were significantly associated, both positively and negatively, with recent injection and sharing needles/syringes. At the same time, network relationships among fishermen were shaped by the gendered nature of fishing itself. In Chapter 5, I discuss the intersections of masculinity and risk behavior and the ways that adherence to and departure from normative conceptions of what it means to be "a man" were tied to drug-related risk behavior. I also discuss how drug use challenges the achievement of socially valued forms of masculinity for many men, despite their participation in the formal wage market. At the same time, threats to masculinity were associated with increased risk behavior. Chapter 6 provides a discussion of the implications of these findings, including how interventions and policies might address the social conditions that increase vulnerability for some men and instead contribute to the creation of enabling environments where risk can be mitigated.

CHAPTER 2

THE CHANGING LIFE OF THE MALAYSIAN FISHERMAN: FROM TRADITIONAL TO COMMERICAL FISHING AND DRUG USE AND HIV IN KUANTAN

After gaining independence from the British in 1957, Malaysia became one of the most politically stable countries in Southeast Asia, with substantial economic prosperity and no major violent outbreaks since 1969. Under the leadership of a parliamentary democracy, but with increasing authoritarianism, Malaysia has had two major economic and development policies that have defined the country's progression since the 1970s: 1) the New Economic Policy (1970-1990) sought to reduce ethnic tension and increase the standing of ethnic Malays, the *Bumpitera* ("sons of the soil"), through education and state intervention in the business sector to transfer a greater share of the wealth to Malays from the Chinese; and 2) the New Development Policy (1990-2020) focused on the economic and technological development of the country (Hooker, 2003). These policies underscore some of the remaining tensions related to ethnicity and economic change in Malaysia, an Islamic state with an ethnically diverse population, which is undergoing rapid industrialization and urbanization. Despite these policies and significant reductions in poverty levels since the 1970s, disparities in wealth and health remain between ethnic Malay and Chinese populations (Owen, 2005).

One of the industries most affected by these new policies was the fishing industry which, in recent decades, has undergone incredible change, with a push away from small-scale traditional fishing towards large-scale commercial fishing in an effort to both modernize technology and deal with depleting fish stocks (FAO, April 2001). This shift in the organization of fisheries resulted in fewer available jobs and a greater reliance on foreign labor, leading to intense job competition, displaced local labor, diluted earning capacity, and rising concerns about unemployment and poverty among local fishermen who could not compete (Department of Fisheries Malaysia, 2006). Commercialization of the fishing industry also affected the organization of local fishing communities, as commercial fishers tend to go farther and stay longer out to sea. Although they are paid more, the demands of the job are substantial and crewmembers may be subject to strong pressure to produce. These changes in the fishing industry have been going on since the 1960s, but in the past two decades there has been rapid commercialization of fisheries on the East coast of Malaysia (Department of Fisheries Malaysia, 2006).

This descriptive chapter is broken into two parts. In the first part, I provide a historical background on the fishing industry in Malaysia, based on an ethnography by Firth (1966), discussing the shift from traditional forms of fishing to large-scale mechanized commercial fishing. I then discuss the modern Malaysian fishing industry in greater detail. In the second part of this chapter, I draw on literature on fishing in the region as well as my own observations in the field and in-depth interviews, to provide a description of the everyday life of a Malaysian fisherman in Kuantan today. I then discuss HIV and drug use practices among these fishermen. The goal of this chapter is to provide a backdrop to the current economic organization of fishing that contributes to an environment of vulnerability among fishermen in Kuantan and to situate

risk within broader changes in the Malaysian fishing industry and in local fishing communities. The social drivers of drug use and HIV risk will then be discussed in greater detail in subsequent chapters.

I. HISTORICAL BACKGROUND

Life of Traditional Fishermen Before Mechanization of the Industry

One of the few sources on early 20th century fishing in Malaysia, and thus the primary source for the discussion on the history of the fishing industry in Malaysia, is an ethnography of the fishing economy in Kelantan, a largely rural area in Northeast Malaysia, from 1939-1940 with an update in 1963 (Firth, 1966). Firth's work is a good representation of fishing on the eastern coast of Malaysia, where this dissertation research takes place, and was conducted in the state just to the north of Pahang, where Kuantan is located. Fisheries developed on the East coast of Malaysia in similar ways (Butcher, 2004), so the fishing community studied by Firth is historically similar to the population of interest in this dissertation. Despite the historical similarities, Pahang state today is more economically developed than the state of Kelantan (Malaysia Department of Statistics, 2010), and Kuantan has become a hub of the fishing industry on the east coast of Malaysia.

Due to its geographical location in relation to other dominant fishing countries, Malaysia was well-situated to expand and mechanize its fishing industry and the waters around Malaysia were long considered fertile. The country has a long history of fishing enterprises, first with traditional forms and eventually with a mechanized commercial fleet of large fishing vessels. Traditional fishing, sometimes called artisan fishing, is any kind of small-scale subsistence or commercial fishing that relies on catching fish manually using tools like throw or drag nets or line and tackle fishing. Traditional fishing vessels are typically built from designs that predated

boat engines and operate by sails or oars; however, traditional boats sometimes have small outboard engines.

According to the 1931 census, there were over 36,000 Malays employed in fishing, in 1947 that number had increased to 41,000 fishermen and in 1963 there were 36,000 fishermen (Firth, 1966). Over this period, landings of fish jumped from around 87,500 tons in 1938, to 140,000 tons in 1960, and up to 183,600 tons in 1963 (Firth, 1966, pg. 18-19). The importance of the fishing industry in Malaysia, even in the early and mid-20th century cannot be underestimated: in 1960, Malaysia exported 25,000 tons of fresh fish and more than 5,000 tons of dried fish (a value of about $20 million) and imported 8,000 tons of fresh fish and 9,000 tons of dried fish (a value of about $17 million) (Firth, 1966, pg. 20). This trade occurred primarily between Malaysia, Singapore, Thailand, and Sumatra in Indonesia (Firth, 1966, pg. 20).

Firth (1966) describes the *orang ka laut*, "the folk who go to the sea", and the organization of the fishing industry at the local level. Although fishing, for some, was the primary source of income, many engaged in fishing for subsistence or for additional income. The incomes of fishermen varied considerably, however, depending on the region and type of fishing that occurred (Firth, 1966, pg. 22). The distribution of earnings for crew members also varied by type of fishing and net, but in general, part of the takings went to the boat/net and the rest was distributed amongst the crew (Firth, 1966, pg, 250-251). A leader or expert served as head of the crew, a *kepalo*, but the rest of the crew were not simply wage earners as fishing was considered a "shared cooperative enterprise" (Firth, 1966, pg. 104).

The variety of boats used by traditional fishermen on the East coast was extensive, though most boats were quite small (30-50 feet) and narrow (3-7 feet) (Firth, 1966, pg. 42). Firth (1966) notes, that the boats were brightly colored, which is still the case in Malaysia, regardless

of the size of the vessel. The types of equipment and techniques used by fishermen in the waters around Malaysia were also extensive, especially with regard to the types of nets used: seines (hauling-nets, including purse-nets); drift nets; and gill nets and lift nets (ground nets), each coming in several varieties with different size, weight, cord and mesh (Firth, 1966, pg. 14-15). On the Northeast coast, where Firth conducted his research, netting was more developed because of the seasonal monsoon, its few good harbors, and its long stretches of sandy beach, but hand line, rod and line and long line (both baited and unbaited) were also used (pg. 14-15). Catches in Malaysia, then, but also now, include: 1) pelagic fish (feeding near surface), such as wolf-herring, anchovies, and mackerel; 2) demersal fish (feeding at bottom of sea), such as jewfish, sea-bream, sea-perch, and snapper; 3) sharks and rays; 4) shrimp, prawn, and crab; and 5) cuttlefish and squid (Firth, 1966, pg. 18).

In order to garner a good catch and to minimize the dangers inherent in fishing, the organization of the traditional fishing industry was dependent on a set of rules, beliefs, and behaviors (Firth, 1966, pg. 16). Fishing was and is a risky occupation, contingent on the volatility of men and forces of nature: in cooperative fishing one man's failure can affect the whole crew and when handling a large net, for instance, your life may be in the hands of the man next to you. At the same time, weather, as friend or foe, can determine your fate. As such, fishermen developed certain rituals to both protect them and ensure that they were "lucky" (*mujor* or *nasib baik*), that there was "meeting with fish" (*berjumpo samo ikan*), and that they were in a situation of "fish liking a man" (*ikan suko orang itu*) (pg. 123). Fishermen operated on the premise that fish were governed by the "spirits of the sea (*hantu laut*)," and that they were aware of the activities and intentions of fishermen, avoiding them if they were not treated well (Firth, 1966, pg. 122-123). To placate the spirits and the fish, rituals included:

> Avoidance of animal terms while at sea and substitution for them of other more neutral or honorific terms; avoidance of certain days to be "unlucky" when carrying out the more crucial activities such as taking out a new net for the first time; the bedecking of boats with garlands of flowers to please the fish, the sea-spirits and the boat itself; careful treatment of the boat as an object more than timber, endowed to some degree with spiritual guardianship; avoidance (in some areas) of wearing shoes or carrying umbrellas aboard it; and, most important, the performance of ritual over both boat and net, and the offering of food and other substances to the sea-spirits to secure their cooperation (Firth, 1966, pg. 122-123).

The *juru selam*, in control of the net and the actual fishing, and the *bomor*, more of a spiritual leader, were the primary people responsible for the general acts of placation of the sea-spirits, the goal being to mediate the relationship between man and fish so that when fishermen found the fish, or "meet with fish", they were able to get them into the net, or keep them from "running" (Firth, 1966, pg. 122-123). In this regard, the traditional fishermen of Malaysia built ritual into the organization of fishing, as skill alone was not seen as enough to be successful.

In conjunction with the rules and rituals described above, community ties and networks among fishermen served as important aspects of the organization of the traditional fishing industry. In rural areas, like the East coast of Malaysia, Malays lived in *kampongs*, a village including the cluster of buildings and surrounding palm, coconut or fruit trees (Firth, 1966, pg. 4). These *kampongs* were "not administrative or religious units, but a social unit with some degree of solidarity and neighborly feeling" (Firth, 1966, pg. 4). In such a village, many, though not all men would be involved in fishing; yet, the organization of labor on fishing boats was not primarily tied to kinship as many crews were composed entirely of non-kinfolk (Firth 1966, pg. 105-106). That is not to say that brothers and uncles did not work together, but that these kinship ties did not wholly determine the structure of labor. This organization allowed for an interesting fluidity. According to Firth, there was a lot of movement of labor between boats so that when there was a disagreement among crew members - usually due to suspicions about money,

accusations of negligence, and failure of the net to get fish - one of the aggrieved would usually leave the crew (Firth, 1966, pg. 114-115). As Firth notes, the advantage of this fluidity in structure was that people did not need to continue to work together when there was bad blood, which allowed anger to dissipate and bad relationships within the community to be avoided; however, it did make long-term cooperation and planning difficult (Firth, 1966, pg. 114).

Network ties by kinship within *kampongs* and across villages were important as coastal relationships provided extra income and also facilitated the acquisition of different types and quality boats and the spread of improved fishing techniques (Firth, 1966, pg. 70). At the same time, fishermen's broader social ties, stemming from business interactions like selling fish or purchasing supplies, created linkages between *kampongs* and larger society. Although the fishermen were primarily of Malay ethnicity, Chinese also played a role in the fishing industry. The local fish trade, especially for fresh fish, was in the hands of local Malays, but Chinese were involved in the trade of cured and dried fish and also served as middlemen in trade to large-scale fish markets and financed Malay fishermen (Firth, 1966, pg. 8, 21). With the mechanization of the fishing industry, however, the social organization of the fishing industry changed in many ways.

Mechanizing the Fishing Industry

Like other countries in Southeast Asia, the process of mechanizing the fishing industry in Malaysia occurred over a long period of time; however, the most rapid shifts occurred between the 1950s and 1970s. Before the 1950s, motored craft were far and few between, but soon after, outboard motors became widely available and were used to modify existing traditional craft; these were eventually replaced by inboard diesel engines (Butcher, 2004; Firth, 1966). According to Firth (1966, pg. 24-25), the mechanization of the Malaysian fishing industry

stemmed from a number of factors: the need to make fish more available to meet consumer demands, improve its quality, and raise fishermen's incomes, lead to the exploration of new fishing grounds. There were also simultaneous technological shifts to new or improved nets, boats with motors, new types of refrigeration, improved availability of ice, better quality salt, and also improved road systems to facilitate the transport of fish, especially to inland markets. To illustrate the rapid pace of mechanization, in 1947, about 1% of Malaysian fishing boats were mechanized, but by 1965, 55% of all vessels had engines (Butcher, 2004). Among mechanized boats in 1955, 13% of engines were inboard, but this jumped to 44% in 1960 and 60% by 1963 (Firth, 1966, pg. 15). Mechanization, even just outboard motors, increased the speed with which fish could be transported from the sea to the market and extended the areas where fish could be caught as boats could follow schools of fish and go farther out to sea (Butcher, 2004). Inboard engines were also more reliable, powerful and economical, which allowed the fishing industry to expand and develop in new ways (Firth, 1966 pg. 15).

The subsequent rise in trawling and purse seining, though not entirely new concepts in the region, was one of the primary outcomes of mechanization, and had profound effects on both fishermen and the fishing industry in Malaysia as well as in other countries in Southeast Asia. Purse seining, which involves closing the lower part of the net, like a purse, by pulling a rope through lead rings along the bottom of the net, allowed for catches of larger sized fish, like mackerel (Butcher, 2004) (see Figure 2.1). Purse seiners first became motorized rather than sail-powered in 1937, and though the number of motorized boats was quite small, catches with these vessels increased dramatically; notably, these increases were not enough to keep up with the demands of the time (Butcher, 2004).

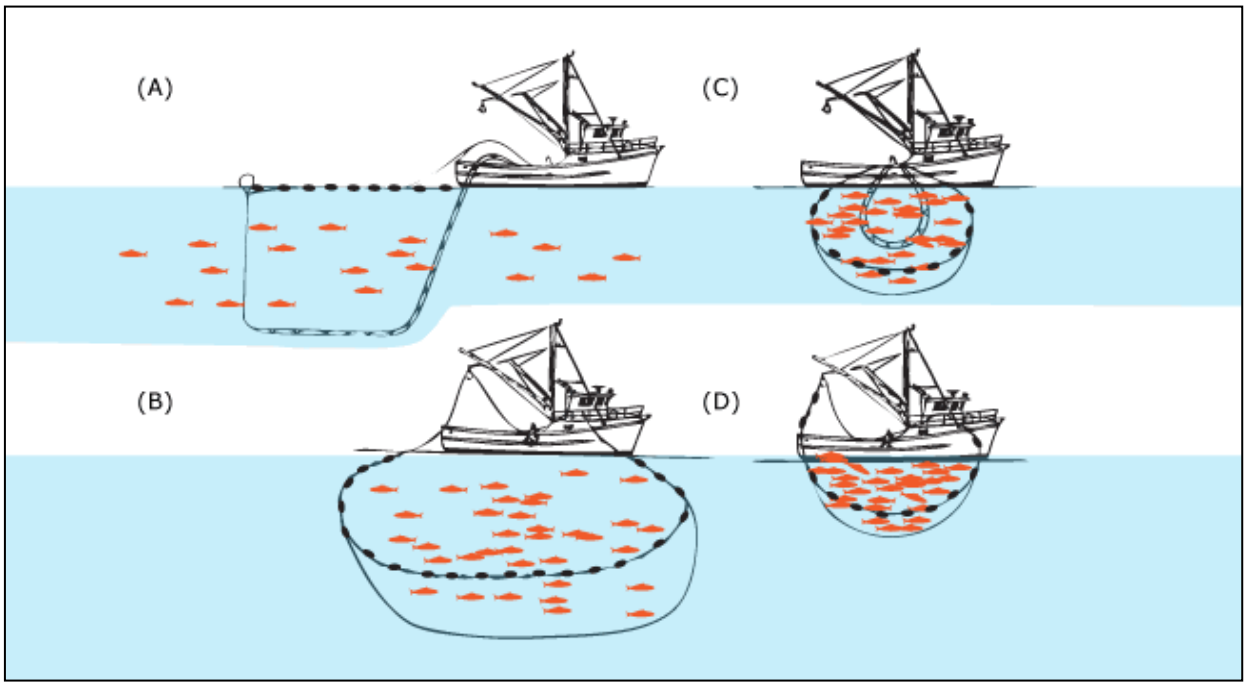


Figure 2.1: Process of Purse Seining[3]

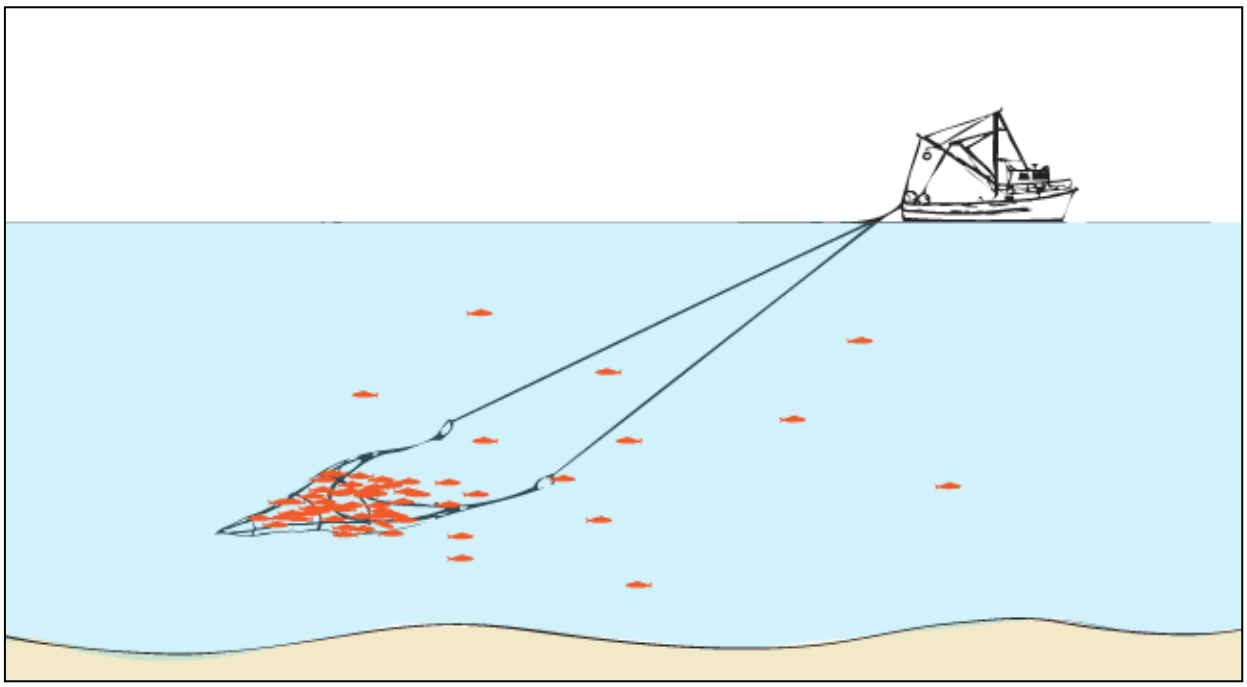


Figure 2.2: Process of Trawling[4]

[3] **Source:** http://www.montereyfish.com/pages/methods/p_seining.html

Trawling has its roots in the late 19th century, but the more modern form of trawling requires a vessel powerful enough to tow a large net through water (see Figure 2.2); thus, its development did not take place until the introduction of steam-powered vessels (Butcher, 2004). The British first introduced Southeast Asia to trawling in the mid 1890s, but Japanese fishermen also operated in the area in the early 20th century (Butcher, 2004). Local fishermen were not entirely unfamiliar with these methods, however, and already used their own traditional system that used fixed nets, or *payang*, to catch fish by weighting nets at the bottom and floating them at the top (Butcher, 2004). Though these nets were not necessarily towed, the concept was similar and allowed for a more fluid introduction of trawling to the region.

The development of mechanized fishing was the result of the innovations and entrepreneurial spirit of fishermen, but governments also had an influence in the fishing industry (Butcher, 2004). In Thailand and Indonesia, for instance, the government facilitated completely unregulated development of trawling from the 1960s to the 1990s and Thailand even gave financial incentives to the fish canning industry in the 1970s (Butcher, 2004). Malaysia followed a different path, with the government rejecting the promotion of trawling as the new direction of the fishing industry in 1958. This did not stop the process of mechanization, though, and trawling grew, accounting for 48% of all landings in Malaysia by 1974 (Butcher, 2004). This rapid expansion of the fishing industry in Malaysia and all over the waters of Southeast Asia came with significant costs to fish stocks and to many local fishermen. Unfortunately, no governments during this period paid much attention to the effect this rapid growth would have, in the near or distant future, on the fisheries and the coastal environment.

In most places, trawling expanded first, and even though fish stocks quickly depleted,

[4] http://www.montereyfish.com/pages/methods/mw_trawling.html

fleets got larger and instead went farther to find fish, creating greater competition within and between Southeast Asia countries. Thailand was a leader in both fish and shrimp trawling, joining with Japanese and German partners to develop their fisheries, first for inshore waters, and once profits declined, expanding their reach into the waters around Vietnam, Malaysia and Indonesia (Butcher, 2004). Incredibly, the number of Thai trawlers operating grew from 99 in 1960, to 2700 in 1966, to 6300 in 1977 (Butcher, 2004). Not surprisingly, the expansion of Thai trawling had a significant impact on the fishing industry in other countries, like Malaysia. Though the Malaysia government was less supportive of the expansion of trawling, it happened nonetheless as fishermen saw the success of the Thai trawl industry.

Inshore trawling on a large-scale in Malaysia began in the early 1960s and, like Thailand, ended up being largely unregulated, which lead to a rapid expansion in the number of vessels and, as a result, declining catch rates as fish stocks were depleted (Butcher, 2004). Definitions of what constitutes depletion vary, but can broadly be defined as "a reduction, through overfishing, in the level of abundance of the exploitable segment of a stock that prevents the realization of the maximum productive capacity" (Van Oosten, 1949). Though regulations did exist prohibiting trawlers from fishing close to shore - "they were not allowed to operate within 12 miles of the coast and in water less than 15 fathoms deep" - these rules were largely ineffective and ignored, which lead to conflicts and even violence between trawl fishermen and traditional fishermen whose livelihoods were being threatened (Butcher, 2004). Clashes between small-scale fishermen on traditional craft and commercial fishermen on larger vessels occurred across the region in the 1960s and 1970s, taking the form of a number of sunken vessels and the death of many fishermen (Butcher, 2004).

Malaysia was one of the countries of Southeast Asia that rapidly increased the size and

sophistication of its fishing fleet, but the East Coast of Malaysia took longer to mechanize its fishing industry than the West coast. Firth (1966, pg. 32) argues that this may be because poorer weather conditions of the East favored local fishing traditions, fishermen had less capital, and because the social organization of fishing communities lent itself to smaller-scale fishing rather than large-scale commercial fishing. Geographical factors also mattered: for at least a month (often more) in December and January the Northeast monsoon blows on the east coast of Malaysia, which blocks fishing activity for small boats (some big boats still go out during monsoon now) (Firth, 1966, pg. 32; Butcher, 2004). This drop in production meant that households needed to save for the monsoon season or supplement their income, though this time was also crucial for repairing boats and nets (Firth, 1966, pg. 32). New forms of fishing, like purse seining, also met resistance among some traditional Malay fishermen because, in general, Malays preferred not to spend long periods of time away from home, which Firth contends, was because men did not know what their wives were doing in their absence (1966, pg. 30). Despite these challenges, the East coast of Malaysia developed its fishing industry and though some traditional or small-scale fishing still occurs, the industry today is largely commercial and relies on trawlers and purse seiners.

Regulating the Sea

Along with the growth and mechanization of the fishing industry in Southeast Asia came problems of overfishing, especially as the industry remained largely unregulated for decades. Eventually, governments took notice and new regulations, at both the international and national level, were put in place to help sustain the fisheries of the region. Although earlier laws existed, it was not until 1963, when inshore trawling had already begun to create conflict between traditional fishermen and their new trawling counterparts, that a comprehensive system of rules

and laws was put into to place to regulate the sea (FAO, April 2001). The Fisheries Act of 1963 had multiple goals: to protect the natural resources the fisheries of inland waters provided; to protect the interests of fishermen, both traditional and non-traditional; to make sure resources were distributed more equitably, ensuring that traditional fishermen remained able to fish in coastal waters; and to reduce conflict among fishermen by increasing the government's oversight (FAO, April 2001). These regulations stayed in place until 1985 when new legislation was introduced.

Changes in international regulations of the sea also affected the fisheries of Southeast Asia. In 1982, the United Nations Convention on the Law of the Sea (UNCLOS) declared national Exclusive Economic Zones (EEZ), which effectively shifted the jurisdiction of much of the international waters (where trawling primarily occurred) to specific countries or regions. These regulations did not preclude fishing in the waters of other countries, but to do so the coastal state had to be unable to exploit the fisheries within its own EEZ (Butcher, 2004). States also sometimes required that foreign catches be unloaded in the coastal state where the catch occurred, that foreign vessels employ local labor, and that fees be paid (Butcher, 2004).

The current regulation of the modern fishing industry in Malaysia rests on principles established by the Fisheries Act of 1985, which incorporated the new EEZ international provisions and provided measures for the monitoring, control and surveillance of fishing vessels (FAO, April 2001). New and enforced regulation, especially with the implementation of a licensing system, went a long way in Malaysia toward reducing competition and conflicts between large and small-scale fisheries around inshore waters. Although earlier rules created some restrictions for larger craft on fishing close to shore, they were neither heeded nor enforced and so trawls, purse seiners, and small-scale fishermen ended up competing for the same

resources in the shallow, nutrient-rich waters closer to shore (Kirkley, Squires, Alam, & Ishak, 2003). These waters were especially good for catching shrimp, a prominent product for export; with small-scale fishermen limited by small craft, engines, and traditional gear, their livelihood was severely threatened by the larger craft that fished in both inshore and offshore waters (Kirkley, et al., 2003). The Fisheries Act of 1985 served to reserve inshore fishing for small-scale fishermen, which was important for the sustainability of the fisheries, but also for social and political reasons: new regulations would allow for traditional fishermen to stay employed, but also for an expansion of the fishing industry to offshore waters that were under exploited (Kirkley, et al., 2003).

Impact of Mechanization on Traditional Fishermen

Modernization of the fishing industry through mechanization was intended to improve the livelihoods of fishermen and to shift a traditional enterprise to a commercial one to increase efficiency and profitability. The outcomes for fishermen, however, were mixed. Mechanization certainly led to increased productivity and greater output per fisherman, but this did not always translate into more income for fishermen because middlemen were in control of the wholesale market and profits did not always trickle down (Butcher, 2004). At the same time, many fishermen were not able to capitalize on the changing nature of fishing in the 1960s and 1970s because the amount of capital involved in fishing was substantial, especially for outboard motor craft and more so when you include the costs of gear and overhead for fuel and repairs (Firth, 1966, pg. 17). Ethnic differences in fishing became more pronounced as high levels of poverty among Malays forced many to remain traditional small-scale fishermen, while the Chinese in Malaysia, who could access capital, became much more likely to be owners of large-scale commercial fishing vessels (Kirkley, et al., 2003). These ethnic differences in economic power

were also seen in other sectors and were a major focus of the New Economic Policy (and later the New Development Plan), which attempted to even the playing field between ethnic Malays and Chinese Malaysians (Kirkley, et al., 2003). Modernization occurred despite these challenges, but the resulting changes in the capital structure of the local fishing industry meant that local Malay fishermen lost some control over the industry and their livelihoods (Firth, 1966, pg. 7).

Fishing was and still remains an important industry in Malaysia, providing a key source of animal protein, employment, and some measure of foreign exchange (Kirkley, et al., 2003), but the gap between small and large-scale fishermen during the process of modernization grew, with small-scale or traditional fishermen failing to make economic gains despite broader growth in the industry. As noted above, the expansion of the fishing industry left fish stocks depleted and traditional fishermen competing with large commercial vessels. The government tried to counteract some of these with programs for upgrading small-scale fishing vessels through subsidies, credits, the development of landing and marketing facilities, and even distribution of boats and engines at nominal prices (Panayotou, 1985). The assistance of government allowed for boats to become larger and motorized, and this helped to some degree, but catches and incomes began to level off as resources become depleted (Panayotou, 1985). Although mechanization did increase coastal fishermen's ability to fish more efficiently and over larger areas, it also brought competition and a scarcity of resources, and thus contributed to the continuation of poverty for many small-scale fishermen (Panayotou, 1985).

Experiences of industry modernization differed between the East and West coast of Malaysia, with the industry on the West coast first to experience rapid expansion and subsequent overfishing. In the 1980s, fishermen overall earned slightly more than the rural average, but earnings of fishermen on the east coast amounted to less than one-third of those on the West

coast and less than half of the rural average, putting their earnings on par with farmers (Fredericks, Nair, & Yahaya, 1985). In response, the government invested more heavily in the development the fisheries of the East coast (Fredericks, et al., 1985); however there were unintended consequences. Due to surplus labor and less overfished waters, boat owners and operators on the East coast were better off than those on the West coast, but this was not the case with crewmembers (Fredericks, et al., 1985). The result was a more dichotomized fishing industry on the East coast, with greater income disparities and more stark distributions of power between owners of trawlers or purse seiners at the top, and laborers and traditional fishermen on the bottom.

The Modern Malaysian Fishing Industry

Mechanization and modernization, as noted above, changed both the industry and the lives of fishermen. Today, Malaysia's 4,810 kilometers of coastline (for map of Malaysia see Figure 2.3) are patrolled by over 36,000 licensed fishing vessels and in 2004 the fishing industry contributed about 1.7% of the country's GDP (FAO, 2004-2012). Of the two components of the Malaysian fishing industry, marine capture fisheries accounted for about 88% of total production in 2007 while the rest came from aquaculture (FAO, 2004-2012). In 2007, total fishery production for the country was over 1.5 million tons, but under guidelines established by the National Agricultural Policy in 1996, targets for 2010 were set at 1.9 million tons, with 900,000 tons from coastal fisheries, 430,000 tons from offshore fishing, and 600,000 tons from aquaculture (FAO, 2004-2012).

Much of the fish caught by commercial vessels in Malaysia is exported (FAO 2004-2012). Exports tend to be the more expensive fish, like tuna and shrimp, and data from 2007 demonstrate that exports go mainly to the United States (24.5%), Singapore (13.2%), Italy

(9.3%), Japan (7.2%), China (6.2%), and Australia (5%) (FAO 2004-2012). Malaysia also imports fish, even though the country, on its own, could meet over 90% of its own demand for fish (FAO 2004-2012). Imports usually consist of cheaper varieties and come mostly from China (21%), Thailand (19.8%), Indonesia (15.1%), and Vietnam (8.6%) (FAO, 2004-2012). In 2010, imports of fish and seafood products totaled US$693 million, while exports totaled US$699 million (*Exporter Guide: Food and Beverage in Malaysia - Market Profile*, January 2012).

Among the 36,000 licensed fishing vessels in Malaysia in 2004, about 36% were small vessels with outboard engines and about 7.5% were non-motorized (FAO, 2004-2012). A total of 18,439 vessels, primarily small coastal craft, were licensed to fish with drift or gill nets and though these make up the greatest number of vessels, they contributed only 10% of total landings (FAO, 2004-2012). Other smaller coastal vessels included 4,731 licensed hook/line vessels and a significant number of other small vessels, many unlicensed, operating in inshore waters with traditional gears, like lift nets, stationary traps, portable traps, bag nets, barrier nets, push nets and scoops for shellfish (FAO, 2004-2012). In 2004, there were 1,025 purse seiners and 6,055 trawlers, accounting for 22% and 56%, respectively, of all catches (FAO, 2004-2012).

This shift in the type of vessels used and the size of the fleets resulted in shifts in production, as well as employment. In 2006, the FAO estimated that there were 111,000 individuals directly employed in the fishery sector (FAO, 2004-2012), about 46% of whom worked on coastal waters and about 35% of whom were in deep-sea fishing (FAO, 2004-2012). Again, despite the smaller number of trawlers and purse seiners, these vessels employed roughly 36% of all fishermen (FAO, 2004-2012). In addition, significant numbers of fishermen worked on unlicensed inshore fishing vessels, with larger vessels often employing greater numbers of unregistered foreign workers whose numbers are not estimated (FAO, 2004-2012). In 2006,

about half of all fishermen were Malay, 31% were immigrant workers and 17% were Chinese (FAO, 2004-2012).

In Malaysia today, boats are categorized by their size, type of net and gear, and by the distance from shore that they fish. In response to overfishing, the Malaysian government developed its own licensing system to determine how close to shore commercial fishing vessels were allowed to operate. The larger boats were required to fish farther from shore to protect inshore waters. This freed up inshore waters for smaller-scale fishermen, who had faced severe competition when larger vessels dominated the inshore waters. Despite regulation, production targets for coastal waters are frequently exceeded, pointing to a chronic problem of overexploitation of marine environments (FAO, 2004-2012).

The number of licenses given for each zone was determined by estimates of the maximum yield of each zone and the optimal number of vessels needed to meet those needs (FAO, 2004-2012). These regulations defined four primary classes of fishing boat license: A, B, C1, and C2, with the C2-class boats being the largest and the only ones capable of deep-sea fishing. As seen in Figure 2.3, the zones represent both the distance from shore where the vessel is allowed to fish and the size of the vessel. Zone A is reserved for traditional and other small fishing vessels and covers the area up to 5 nautical miles from shore. Moving away from the costal waters, vessels are measured in terms of Gross Register Tonnage (GRT), a record of measurement used internationally as a basis for taxes, berthing, docking, and passage through canals, that is indicated as the "total measured cubic content of the permanently enclosed spaces of a vessel, with some allowances or deductions for exempt spaces such as living quarters" (FAO, 2004-2012). This translates into 1 GRT = 100 cubic feet = 2.83 cubic meters.

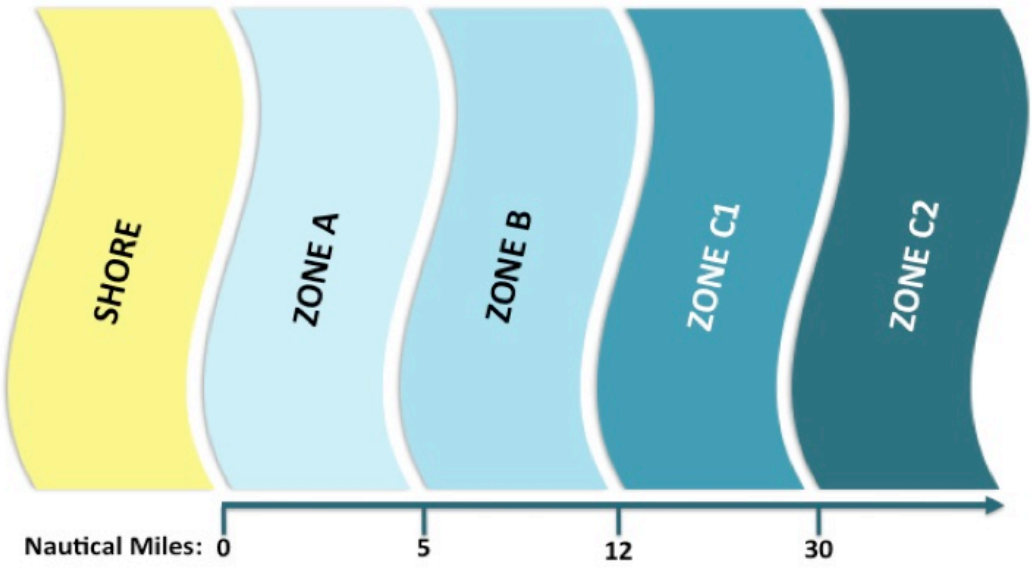


Figure 2.3: Malaysian Fishing Boat Licensing System

Commercial fishing vessels are divided across Zones B, C1, and C2. Zone B covers the area 5-12 nautical miles from shore and includes smaller trawlers and purse seiners under 40 GRT or under 400 cubic feet. A Zone C1 license allows fishing in the waters 12-30 nautical miles from shore and includes trawlers and purse seiners up to 70 GRT. Offshore or deep-sea fishing falls under the purview of Zone C2, which includes the fishing grounds more than 30 nautical miles from shore and is where you will find the largest fishing vessels, both trawlers and purse seiners, with a GRT of greater than 70. Although there are substantially fewer vessels in the C2 range, only 833 vessels with a 70+GRT out of over 36,000 in 2004, these vessels provide large catches and employ large crews (FAO, 2004-2012). There remains a large number of smaller fishing craft that are used commercially, but do not fit within the licensing classification system.

The further development of the Malaysian fishing industry hinges on the expansion of these offshore fisheries, especially in the South China Sea off the East coast, but challenges stem from the considerable capital investment needed to start an offshore enterprise. Most coastal

fishermen remain unable to generate such capital or to get a line of credit to do so and lack either the training or will to make the jump from inshore to offshore fishing (FAO, 2004-2012). Changes in the fishing industry that occurred as a result of the modernization of the fleet also changed the relationship between man and sea and created a new mode of life, but what exactly does this look like? How did fishermen's daily work and life change? To understand Malaysian fishermen today, including drug use practices, the next section utilizes qualitative and quantitative data to describe fishermen's experiences in Kuantan.

II. DAILY WORK, LIFE, AND DRUG USE AMONG FISHERMEN IN KUANTAN

The description of the daily life of Malaysian fishermen is pulled from 28 in-depth qualitative interviews. The data were compiled to provide an overall narrative, based on what fishermen reported, of the daily life for fishermen on different types of fishing vessels, the work that takes place, and the social interactions among crewmembers. Qualitative data also provided basic information on drug use habits. Survey data was used to describe demographic and occupational characteristics, HIV knowledge, drug use experiences, injection-related HIV risk behavior, and HIV serostatus. Statistical analyses were intended to be descriptive only. Univariate statistics are shown for the total sample as well as for men who have ever injected drugs compared to non-injectors. Significant differences between PWID and non-injectors were determined using bivariate logistic regression.

Measures

Demographic and Occupational Characteristics included the respondent's age, marital status (currently married vs. not currently married), and education level (completed secondary or more vs. less than secondary school). Occupational characteristics included whether the respondent worked on a deep sea vessel or an inshore vessel (License Class C1/C2 vs. Class A/B

or a traditional vessel). I also assessed amount of money earned on last fishing trip and number of nights spent out to sea in the past 3 months.

HIV Serostatus was determined by rapid HIV antibody testing using Acon HIV rapid test kits (Acon Laboratories Inc, USA). Any individual who had a preliminary positive or indeterminate test result for HIV was tested again with a second rapid test. After receiving counseling, those individuals testing positive for HIV and not currently receiving HIV treatment were referred to a local HIV clinic.

Drug Use Experiences were assessed in a number of ways**.** Ever drug use ('no' or 'yes') was assessed by a question asking the respondent if they had ever used drugs. Recent drug use (past 30 days), ever injection drug use, and recent injection drug use (past 30 days) were constructed from a series of questions covering a number of substances (subutex/suboxone; buprenorphine; Ketamine; *pil kuda* (amphetamine); heroin; ice/syabu/crystal meth; methadone; ecstasy; dormicum/benzodiazapene; glue; marijuana), which asked each respondent whether they had ever used the drug, the number of days they had used the drug in the past month, whether they had ever injected the drug, and the number of days they had injected the drug in the past month. If the respondent reported injecting ANY drug they were coded as '1' for "ever injection drug use"; if they had never reported any of the substances listed they were coded '0'. Recent drug and recent injection drug use followed a similar method and respondents were coded as a '1' if they reported using (or injecting for "recent injection") ANY substance 1 or more times in the past month and '0' if they had not used (or injected) any substance in the past month. I also include the number of times injecting drugs in the past month.

HIV Risk Behaviors included measures of unsafe injection practices, needle/syringe sharing, and access to clean needles/syringes. Unsafe injection practices in the past month was a

dichotomous measure based on the Risk Behavior Assessment, which asks a series of eight questions on injection-related risk, covering receptive and non-receptive needle/syringe sharing, front and backloading, sharing equipment, sharing drugs from a common container, or adding blood to the drug solution before injecting (Dowling-Guyer, et al., 1994). The respondent was coded as '1' if they had engaged in any of these behaviors one or more times in the past month, indicating unsafe injection practices, and '0' if they reported zero times for all behaviors.

Two additional measures of injection-related risk behavior were created to assess needle/syringe sharing in the past month. Receptive sharing was based on two questions assessing the number of times in the past month the respondent had: 1) injected using a needle that they knew had been used by somebody else; or 2) injected using a syringe that they knew had been used by somebody else. If the respondent had engaged in either of these two behaviors one or more times in the past month, they were coded as '1' indicating that they had engaged in receptive needle/syringe sharing. If they reported zero times for both behaviors, they were coded as '0' indicating no recent receptive sharing. The other measure indicated whether ANY needle/syringe sharing occurred in the past month and included receptive sharing (as described above), or giving a used needle/syringe to someone else to use. Access to clean needles/syringes was a dichotomous measure assessing whether or not the respondent reported being able to access clean needles/syringes when they needed them.

HIV Knowledge was a composite measure based on 14 items on knowledge of HIV prevention and transmission. Response categories for individual items were: 'yes,' 'no,' and 'don't know.' Individual items included:

- Sexually transmitted infections always show signs
- Condoms protect people from transmitting or becoming infected with HIV
- It is okay to start sex without a condom, as long as it is put on before the man ejaculates
- Careful cleansing after sex will help protect you from the virus that causes AIDS

- People living with HIV can become infected with a different strain of the virus
- New antiretroviral medications can now cure the AIDS virus
- If a person's viral load is undetectable, they cannot transmit HIV
- Having unprotected anal intercourse increases a person's change of getting sexually transmitted infections
- While injecting, you won't get HIV if you cleanse a syringe/needle with alcohol
- Having sex with someone who has HIV is the only way of becoming infected with HIV
- If a person has a sexually transmitted infection, they are at greater risk of becoming infected with HIV
- It is safe to use condoms with oil-based lubricants
- You can transmit HIV by sharing plates, cups, or utensils
- You can get HIV from mosquitoes

Each item was recoded into a dichotomous variable for correct or incorrect knowledge ('don't know' was scored as incorrect) and a summated scale was generated based on the number of correct responses.

RESULTS

The Life of Fishermen in Malaysia: Findings from In-Depth Interviews

When I first visited the fishing areas of Kuantan in 2009, I did not see the world that Firth (1966) saw in the 1940s, nor did I see the world to which he returned in the early 1960s. At the main jetty, I saw no traditional vessels like that described by Firth, only large commercial fishing vessels, like trawlers and purse seiners. Not all was lost from the fishing industries early period, however. Similar to Firth's observations, the boats continue to be painted in a multitude of bright colors and though not visible at the main jetty, small vessels still have a presence in Malaysia's fishing industry.

The size of the boat and its class of license, can indicate things like engine size and type of gear, but also indicates how much time crews spend out to sea and what life is like for crew on the boat. The smallest craft are fiberglass boats with an outboard motor, sometimes licensed and sometimes not, that usually hold only two men. They leave shore early in the morning, spend the day at sea fishing with small drift or gill nets or traps in inshore waters, and return the same day,

"*leaving no opportunity to miss family*," as one fisherman said. These fishermen come home at night; while their catches are smaller, there are fewer crewmembers with whom to split profits and the overhead needed for the repair of boats and nets is much smaller. The lives of these fishermen, at least while at sea, resembles that described by Firth (1966), using traditional methods of fishing handed down over generations.

A small-scale fisherman's day begins around dawn when he checks the nets to make sure there are no tears, inspects the engine and the rest of the boat, fills up with petrol and then makes his way out to sea with the boat captain/owner. It takes about 30 minutes to motor out to proper fishing grounds and upon arrival they drop anchor and cast the net or nets and set buoys, if needed. Depending on the type of net, it may be left to soak in the water for 30 minutes or up to 2 hours before being pulled up. They bring water, bread, and usually some prepared food, like fried rice, magi noodles, or satay with them to last the day and while they wait for the nets to fill, they smoke cigarettes, relax, and sometimes chat about whether there will be fish that day. It can get hot out there without anything to shade them, but as one fisherman said, he is now "*weather-proof*" after years at sea. It can also get boring and at times, it can be quite scary when there is wind and the waves are big.

Once the nets are ready, the fisherman pulls it up with the help the other crewmember and the process of sorting the fish begins. Depending on the catch, this can take hours, as they have to discard the unwanted and small fish and throw them back. In the course of a day, the net may be cast two or three times, with the time at sea being determined by how many nets they set, how full they are, and how many fish they have caught. If they are "*lucky*" and the fish are "*bountiful,"* they can fill the barrel used for storing the fish and start their journey back to shore early. As one fisherman put it, their luck "*all depends [on] Him, if he wants to give it*." In

another 30 minutes, they are back to shore, but unlike larger boats, they tend not to unload their catch at the main jetty, instead returning to smaller ports. Once on shore, they sort the fish, if they have not done so already, put them in plastic bags, and the boss deals with the weighing and selling of the fish, while the fisherman cleans the boat. All in all, the fisherman's workday may last 5 to 7 hours, he will work about 20 days of the month, and because of the small size of the boat and the monsoon weather, will go out to sea about 8 months of the year.

Mid-size craft (A and B licensed boats) have the option to go out to sea for longer, with trips of 3 to 5 days at a time with a crew of at least 3, but oftentimes more; the skipper is needed to steer the boat while other crewmembers deal with casting and hauling nets. These slightly larger vesels can go to sea year-round, including during the December monsoon season, when they only go out once or twice a week because fish are less plentiful. They too may only work around 20 days each month, but like most Malaysian vessels, they do not go out on Fridays as that is a day for prayer, or *Salat Al Jumu'ah*, though not all boats follow this custom and not all fishermen pray.

Early days are a part of every fisherman's life and crewmembers on mid-sized vessels often start their day around 4am, returning to shore around 6pm or later. It takes about 3 to 4 hours to reach the fishing grounds, depending on the zone in which they are licensed to fish. Once there, the net(s) or traps are set and then they wait. It is only after the first net of the day is cast that they have much time to rest. On these larger vessels, they can cook rather than bring food that has already been prepared, so meals tend to consist of rice, curry, and fish cooked in soy sauce, though simple meals like noodles are often eaten. While they wait for the nets or traps to set, they rest when they can and take time to eat, but after they pull that first catch, they are

Image 2.1: Boats at the Kuantan Fishing Jetty (C2-class boat in front)

Image 2.2: A-class Boat in a Local Fishing Village

tasked with sorting and storing the fish. They may set nets or traps 2 to 4 times in a day before making the journey back to shore where they park for the night. At the main jetty, the work of unloading the fish begins before dawn, where the wait can last for an hour or more as larger boats unload first. After loading ice and refueling, they either go out again or are off for the day.

Larger offshore vessels can go out to sea for weeks and require bigger crews. Clearly, vessels engaged in deep sea fishing can and must spend longer amounts of time out to sea. It takes longer to get to and from fishing grounds due to restrictions on how close to shore they can fish, and they are able to use bigger nets, make greater hauls, and store more fish before they need to return to shore to make their sales. On the largest boats, it can take around 7 hours or up to 2 to 3 days to reach fishing grounds so boats go out to sea for anywhere from 10 to 25 days, coming back to land for only 2 to 3 days at a time to rest and make preparations for the next trip. Crews on these large boats range from 5 to as many as 30 on the largest purse seiners. The time away from shore is significant for these men and life on board is different as well. As one fisherman on a trawler said, "*Whenever I'm at sea, the boat, it's my house*." The largest vessels fish year-round, even during December, though they too fear the monsoon and do not all go out when the weather is at its worst.

Like smaller vessels, the largest boats head out to sea after men do a systematic check of the nets, engine, equipment, supplies of food and water, and of the vessel itself. Ensuring that the boat is in order is paramount, for once at sea these vessels and the crews are on their own and must be able to survive for weeks on the water. The largest commercial fishing vessels frequently have refrigerated seawater systems for storing and keeping fish fresh while out to sea, unlike most traditional fishermen who still rely on ice to keep their catch fresh (FAO, 2004-2012). Such a system allows for better preservation of fish, certainly, but also requires upkeep,

which is a key part of the fishermen's job while heading out to sea. During the voyage to fishing grounds, fishermen clean the storage compartment with water, which includes getting inside the refrigerated compartment to scrub it with their hands and brushes. Once it is clean, they allow it to dry out for hours before filling it with the salt water that will hold their catch. When the prep work is done, they sleep, eat, and take turns at the helm when the captain needs rest.

Depending on the boat and the captain, good fishing grounds are found by sonar, by information provided by other boats, by knowledge of prime spots from other fishing trips or years, or from instinct resulting from years of experience. On a trawler in a given day they may drop the net 3 or more times and let it set, with the bulk of the labor coming when they have to pull in the trawl net onto the boat. Purse seining requires a different tactic as the net must be set and left to soak for a period of time so that schools of fish have time to enter the area. In the past, nets were pulled manually, but now on these large commercial vessels, machines aid in the hauling of such large and heavy nets. Still, the crew are in charge of machining and pulling ropes, machining the net, mending ropes, and ensuring that the precious catch makes it safely onto the deck of the boat, into containers, and back to shore. The distribution of duties depends on the work abilities, experience, and seniority of the crewmembers. This whole process of setting the net or traps and pulling it in takes time and care. Once done, there is still the matter of sorting and storing the fish by type, which can take hours. According to fishermen, this entire fishing process depends on luck: one purse seiner fisherman said, "*We leave it to God to get luck. We don't get good luck…it's like that*." Many fishermen, even on these modernized commercial vessels that rely on sonar and advanced technology to find fish, still follow the Malaysian custom of avoiding the use of foul language when trying to catch fish so as not to scare them away.

Image 2.3: Water Drums and Sleeping Alcove (top) on Fishing Boat

While out to sea, boats tend to carry big drums of water (see Image 2.3), some for bathing and others for drinking, which must be used carefully because they cannot run the risk of running out of water while away from shore. They usually bathe at night to clean up after they work and the main meal is often rice-based and features simple dishes like noodles or curries. Crewmembers take turns cooking and doing the dishes, and during down times, they chat, listen to the radio, read, and sleep. Some fishermen will use pole and line to catch their own fish or jig for squid for to sell on shore. They sleep on mattresses placed directly on the wood planks of the boat in small sleeping alcoves built on the second level, above the main deck where the work occurs. The quarters are close and the mattresses small.

Although safety is a concern on all fishing boats, the largest vessels face additional concerns as they go farther out to sea, spend more time away from shore, and go out during the

dangerous monsoon season. During the day, a nearby boat could be considered a threat to fish stocks, but on nights when they are not fishing, crews like to be able to see the lights of other boats, in case something happens. One trawler fisherman noted that the nights are long and scary when you are unable to see the lights of other fishing vessels through the blackness of the ocean sky. He also said that some boats keep life jackets under lock and key so that when a boat capsizes, fishermen do not have time to get life jackets and people go under. On his boat, he sleeps with a life jacket as a pillow to feel safe. The danger involved with fishing cannot be underestimated for these men's lives are constantly on the line. In this regard, fishing is not a solo enterprise: it is at the whim of nature and the skills, ability, and focus of your captain and crew. Worry and the danger associated with fishing may fill the minds of some men, but fishermen also note that the prevailing emotion is not fear, but boredom. Being at sea and the rhythms of daily life can be quite monotonous and for many, this means a lot of time spent thinking about family problems or other worries and thinking about getting back to shore. For some, it gets harder as they near the end of the trip.

During the return to shore men look forward to family, friends, and money. As they return, fishermen must pack up and clean and once they are to the shore the boats queue up to unload the fish. On the jetty, there are bins everywhere that will be used to pack the fish and ship it elsewhere. In front of each boat that unloads, there is a counter, usually a woman, who logs information on the catch. This is the closest that women really come to the fishing boats as it is seen by many to be bad luck to have a woman on board. This is not unique to Malaysia as lore about bad omens related to women and the sea are rife throughout the maritime world (Firth, 1966; Yahaya, 1994). Although one owner of a small fiberglass boat said he would be willing to take me on board, others said that having a woman on the boat was not possible and definitely

not possible if the woman was menstruating. Women are more present in manufacturing jobs related to the fishing industry, like canning.

Once unloaded, the captain is responsible for selling the catch, with fish either auctioned off to wholesalers or sold to a specific wholesaler with whom the captain has an established relationship based on a credit system (FAO, 2004-2012). Once unloaded, the fish move on to wet markets or supermarkets in urban centers and the men who caught them clean everything, fill up the drums of water, refuel and moor the boat. If the boat is going back to sea soon, the crew takes what rest they can, with some going home and many staying on the boat. The end of the work is a time of promise for many reasons: once the work is over fishermen have time to rest and go out or see friends and family, but it is also the time when fishermen get paid.

Wages vary in amount and consistency and can be based on days worked, nets pulled, or fish caught; in the end they are determined by the boss. Many smaller and medium-sized boats operate on a traditional system called *system pangu*, which allocates a portion of earnings to the owner and/or captain, a portion to crewmembers, and a portion to the boat itself. In this system, the boat automatically gets a chunk for repairs, the engine, equipment, fuel, and food before dividing the rest for income. The fisherman's income depends entirely on the catch and, depending on the size of the boat and the season, can vary tremendously from 10RM on the worst days to upwards of 200RM on the best. Wages are paid daily on boats that do not spend the night out to sea or at the end of the trip for larger boats. Overall, fishermen on small fiberglass boats or A or B license boats earn anywhere from 800RM to 2000RM a month for about 8 months a year.[5] On trawlers and purse seiners, fishermen are usually paid by trawl or by day, which creates greater consistency in pay but not necessarily higher wages, especially when

[5] In 2012, the government set a minimum wage of 900RM/month, which was about 50% of the national mean wage (Source: http://www.hrmars.com/admin/pics/1132.pdf)

Image 2.4: Fish, Crabs and Cuttlefish for Sale at Village Fishing Market

considering the time they spend out to sea. Wages range from about 10RM to 20RM per trawl, with most men making about 60RM per day. Although many men live on the boat during breaks on shore and spend time going to and from fishing grounds, they are only paid for the days they work. Some captains give bonuses if they had a particularly good catch, but in general, fishermen on larger boats make around 800 RM to 1500RM a month, depending on how many days they are out to sea. These fishermen, however, can choose to work year-round, because the monsoon does not interfere with fishing.

Money in the pocket means opportunity for many fishermen; after all the work is done, they are free to enjoy some downtime. Some men go home to their families and some hang out with friends. Some meet up with others at a shop for a tea or another drink and some get dressed up to go out in the town. For most, this is a time of relaxation. For some, it is a time to buy drugs, drink alcohol, or visit prostitutes. Time at sea and time at shore are two very different things and an important aspect of understanding risk behavior and consequences. This distinction, and the relationships that develop at sea and on shore, will be discussed in greater detail in the next section and in subsequent chapters.

Drug Use and Fishing

In many respects, the lives of drug-using fishermen resembled those of any other Malaysian fishermen: they leave the shore at the same time, they set and haul nets, they sort fish, they chat and cook and eat, they long for shore, and unload fish. The difference lies in what underlies these experiences. Fishermen who used drugs also worried about whether the catch would be good enough to provide resources to get drugs, whether they would have to borrow money and how much if the catch was bad, how they would avoid the police, and maybe, how they would avoid getting HIV. Some men bring a stash while out to sea, but if they work on a

large commercial vessel and go out for weeks at time, it is unlikely their stash will last the trip. Experiencing symptoms of withdrawal is common, though some men relied on methadone, if they could get it.[6] A fisherman who uses drugs faced all the same risks inherent in the occupation of fishing - the danger, the boredom, and the loneliness - but he also faced a host of other risks.

In this sample, drug use was quite common among fishermen (Table 2.1). Almost 46% of the sample reported having ever used drugs and about 37% of survey respondents reported that they had ever injected drugs, with most of those men having done so in the past month (34%). The most commonly injected drugs were heroin, *pil kuda* (an amphetamine type stimulant), and buprenorphine. PWID reported injecting an average of 15.75 times in the past month (SD=15.80). In the in-depth interviews, PWID reported injecting 3 to 5 times per day, if money allowed, and some reported sharing needles/syringes with crewmembers and friends. Heroin was also the most frequently used drug and was preferred, but buprenorphine, *pil kuda*, methamphetamine, methadone, benzodiazepines, marijuana, glue, and ecstasy, were also used.

There were few differences between PWID and non-PWID in terms of demographic characteristics; however, there were significant occupational differences (shown in Table 2.2). The average age of respondents was almost 38 years old, with about 36% reporting that they were currently married. About 30% had completed at least secondary school. PWID were significantly more likely than non-injectors to be unmarried, but were similar in age and education level. The majority of men in the sample worked on inshore vessels (72.4%) as opposed to deep sea vessels (27.6%). On average, men spent 7 days out to sea in the past 3

[6] Almost 40% of fishermen who used drugs that were interviewed in survey reported having ever received any treatment for drug use. About 29% had ever been prescribed opioid substitution therapy (OST), including methadone, buprenorphine, or suboxone, for drug treatment. A quarter of men who had used drugs reporting that were prescribed OST in the past 3 months. The qualitative data indicates that men sometimes purchased these drugs off the street as well and use it for when they are at sea for long periods of time.

Table 2.1: HIV Serostatus and Drug Use Experiences

DRUG USE EXPERIENCES	
Has ever Used Drugs (n=398)	**% (n)**
No	54.20 (214)
Yes	45.80 (181)
Drug Use in Past Month (n=398)	**% (n)**
No	57.00 (227)
Yes	43.00 (171)
Injection Drug Use Ever (n=398)	**% (n)**
No	62.60 (249)
Yes	37.40 (149)
Injection Drug Use Past Month (n=398)	**% (n)**
No	65.80 (262)
Yes	34.20 (136)
No. Times Injecting Drugs in Past 30 Days (n=136)	**% (n)**
Mean (SD) Median (range)	15.75 (15.80) 14.00 (1-100)
HIV SEROSTATUS	
HIV Serostatus (n=398)	**% (n)**
Negative	88.40 (352)
Positive	11.60 (46)
HIV Serostatus Among Ever Injectors (n=149)	**% (n)**
Negative	74.50 (111)
Positive	25.50 (38)

months, but this varied quite a bit (SD=12.59). Men earned an average of 337RM on their last fishing trip, but this ranged from 2RM to 3000RM; approximately 70% of the sample reported an income at or below the poverty line (not shown).

Occupational characteristics varied by injection drug use status: PWID spent more nights out to sea in the past 3 months (mean=11.29, SD=14.73) relative to non-injectors (mean=4.48, SD=10.32), and made more money on their last fishing trip, around RM471 (SD=316.75) compared to an average of about RM257 (SD=371.61) for non-injectors. On average, PWID were also significantly more likely to work on a deep sea, rather than an inshore, vessel: about one-half (52%) of PWID worked on deep-sea vessels compared to almost 13% of non-injectors. HIV knowledge was relatively low with an average score of 4.5 (SD=2.91), which means that

only 32% of responses were correct. Men who had ever injected drugs also had significantly higher levels of HIV knowledge relative to non-injectors, an average score of 5.91 (SD=2.58) relative to 3.72 (SD=2.78).

Table 2.2: Sociodemographic Characteristics, Occupational Characteristics, and HIV Knowledge for Total Sample, PWID and Non-Injectors

	Total Sample (n=398)	**Non-Injector (n=249)**	**Ever PWID (n=149)**	**Sig.**
DEMOGRAPHICS				
Age				***p*-value**
Mean (SD) Median (Range)	37.76 (12.33) 35.00 (19-78)	37.78 (14.33) 34.00 (19-78)	37.73 (7.98) 37.00 (21-60)	0.976
Current Marital Status	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Single/Separated/Divorced/Widowed	63.60 (253)	57.00 (142)	74.50 (111)	0.001
Married	36.40 (145)	43.00 (107)	25.50 (38)	
Education Level	**% (n)**	**% (n)**	**% (n)**	
Some Secondary or Less	68.80 (274)	67.10 (167)	71.80 (107)	0.323
Completed Secondary or More	31.20 (124)	32.90 (82)	28.20 (42)	
OCCUPATIONAL CHARACTERISTICS				
Number of nights spent out to sea in past 3 months				***p*-value**
Mean (SD) Median (Range)	7.05 (12.59) 3.00 (0-90)	4.48 (10.32) 2.00 (0-67)	11.29 (14.73) 7.00 (0-90)	0.000
Money earned on last fishing trip (RM)				***p*-value**
Mean (SD) Median (Range)	337.48 (366.48) 200.00 (2-3000)	256.87 (371.61) 120.00 (2-3000)	470.55 (316.75) 500.00 (20-1500)	0.000
Type of Fishing Vessel	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Inshore Vessel	72.40 (286)	87.40 (215)	47.70 (71)	0.000
Deep Sea Vessel	27.60 (109)	12.60 (31)	52.30 (78)	
HIV KNOWLEDGE				
HIV Knowledge Composite Score				***p*-value**
Mean (SD) Median (Range)	4.54 (2.91) 5.00 (0-13)	3.72 (2.78) 4.00 (0-13)	5.91 (2.58) 6.00 (0-11)	0.000

Despite higher levels of knowledge of HIV transmission, 25.5% of PWID tested positive for HIV (see Table 2.1), compared to only 3.2% of non-injectors (not shown in table). Fishermen engaged in a range of injection-related HIV risk behaviors (see Table 2.3). Forty- three percent of PWID had engaged in one or more unsafe injection practices in the month prior to interview. Fixing drugs and then splitting the drug solution with another person (31.5%), frontloading (25.5%), and sharing drug equipment, like cookers, filters, and rinse water (23.50%) were the

Table 2.3: HIV Risk Behaviors

UNSAFE INJECTION PRACTICES IN PAST MONTH	
Unsafe injection practices (one or more times) in past month (n=149)	**% (n)**
Has injected with used needle	17.40 (26)
Has injected with used syringe	19.50 (29)
Has backloaded syringe with drugs from someone else's syringe	18.80 (28)
Has used cooker/filter/rinse water used by someone else	23.50 (35)
Has fixed drugs and split drug solution with another person	31.50 (47)
Has pulled drugs from common cooker (frontloading)	25.50 (38)
Has added blood to drug solution before injecting	8.10 (12)
Has given used needle/syringe to someone else	19.50 (29)
Composite: ANY unsafe injecting practice in past month (n=149)	**% (n)**
No	57.00 (85)
Yes	43.00 (64)
Any sharing of needles/syringes (receptive or non-receptive) in past month (n=149)	**% (n)**
No	72.50 (108)
Yes	27.50 (41)
Receptive sharing of needle/syringe in past month (n=149)	**% (n)**
No	77.90 (116)
Yes	22.10 (33)
ACCESS TO CLEAN NEEDLES	
Can obtain new, unused needles and syringes when needed (n=149)	**% (n)**
No	8.70 (13)
Yes	91.30 (136)

most common unsafe injection practices. Reporting of needle/syringe sharing in the past month was 27.5% for ANY sharing, either receptive or non-receptive, and about 22% for receptive sharing. Most (91.3%) respondents said that they could access clean needles/syringes when needed: 86% of PWID said that they had ever visited a needle/syringe exchange program or used a needle/syringe exchange program to get clean needles/syringes (not in table). In the qualitative data, men also reported getting needles/syringes from friends or other drug users, from port doctors who will inject drugs for a fee, or just buy them from a dealer or on the street.

Sexual risk behavior was not the focus of this analysis and is not reported in the table, but previous (unpublished) analyses indicate that the majority of fishermen reported that they

were not sexually active, only 23% reported sexual activity the past 3 months, and that injection drug use was the primary predictor of HIV serostatus.[7]

DISCUSSION

The life of the fisherman in Malaysia has changed over time as the industry has mechanized and as the country has developed. The work itself, with its communal and subsistence nature, while still intact for some, is no longer the predominant force in the fishing industry. This changed the wage structure and the organization of the fishing industry and fishing communities. The rapid pace of commercialization displaced local labor, increased foreign labor, increased competition, and challenged traditional forms of fishing (Choo, 2011). The result was unemployment and poverty for many, particularly Malay fishermen, who were pushed out as commercialization favored those who had enough wealth to mechanize their vessels, primarily Chinese men. This created a sharp divide in the fishing industry between traditional fishermen, commercial fishermen who served as crewmembers on deep sea vessels, and the select few who could afford to own large commercial vessels. Resources, in the form of fish stocks, were also challenged and landings have decreased, especially for small-scale fishermen, and trash fish increasingly make up catches, threatening the economic viability of the fisheries (Choo, 2011).

All of this translates into a different experience for the modern-day fisherman. Although fishing pays reasonably well relative to other menial occupations and pulls some young men into the profession, many young men do not want to do this kind of labor or take the risks involved with fishing. Fishermen do not hold very high status in society, unless you are a captain or a boat owner, and most young men would prefer to be employed in a more consistent occupation that

[7] The fairly low level of sexual activity may be partly tied to the greater likelihood of PWID being unmarried. As discussed more fully in Chapter 5, men who use drugs are seen as less desirable marriage partners, which could explain why PWID are less likely to be married. In such a situations, men may be more likely to purchase sex from a sex worker, but in our qualitative interviews, at least some men indicated that with tight resources, the purchase of drugs was prioritized over the purchase of sex.

holds the promise of status and security, like working for the government. Further, many men do not want to be away from family and the shore for weeks at a time. Although the pay has the possibility to be decent, the potential costs are great.

Fishing is one of the most dangerous occupations in the world (Drudi, 1998) and the threat of death is a daily experience for most. The increased commercialization of fishing in Malaysia may also make being a fisherman more dangerous than it once was as vessels now go farther out to sea and for longer periods of time. This places strain on relationships and communities, who must deal with the coming and going of their sons, brothers, and husbands. The nature of the occupation of fishing may also make fishermen more vulnerable to health risks, to engage in risky behavior, to need to cope, and to have more limited access to health care (Entz, Prachuabmoh, van Griensven, & Soskolne, 2001; K. Ford & Chamratrithirong, 2008; Kissling, et al., 2005b).

The data suggest that drug use, and injecting in particular, is common in fishing communities on the East coast of Malaysia, and heroin has found a home. HIV knowledge was relatively low and 43% of PWID had engaged in one or more unsafe injection practice in the past month. HIV was a real threat for these fishermen, with a quarter of PWID testing positive for HIV. Given these shifts in the organization of labor within the fishing industry, and the high rates of drug use and HIV in this community, the results indicate that occupational context may be an important predictor of fishermen's health that warrants more attention. The literature on occupational health and risk points to a need for a greater focus on the social structure of work organization for different types of workers in different types of work contexts (Benach & Muntaner, 2007). The literature also calls for an understanding of the larger organizational context within which work is performed, arguing that macro-level characteristics of the

economic, political, and social environment are important in shaping workplace hazards and promoting healthier work environments. (MacDonald, et al., 2008). This chapter looked at both the "external-contextual domain" and the "workplace microenvironment" (Nuwayhid, 2004) related to fishing in Malaysia to provide an understanding of the context within which risk behavior occurs (Cockerham, 2005; Rhodes, 1995, 1997). The findings highlight both the prevalence of drug use and risk behavior in this community, but also a need for a deeper understanding of the ways in which characteristics of the occupation of fishing may be shaping health outcomes.

CONCLUSION

The Malaysian fishing industry has undergone substantial changes that have had an impact on fishermen's lives. Drug use is prevalent, but we know little about how characteristics related to the work of fishing may impact health. It is possible that drug use in fishing communities in Malaysia may be a response to rapid social change, a way to cope with the everyday dangers of life as a fisherman (to deal with boredom, loneliness, to provide pleasure), or a tool for work, but we know little about the connections between work environments and drug-related risk behaviors. The next chapter explores how these occupational shifts have shaped the organization of the fishing industry in ways that support environments conducive to drug use and risk behavior. By contextualizing drug use and risk behavior within the occupational structure of fishing, I highlight social drivers of HIV within this population.

CHAPTER 3

SAFE HAVENS AND ROUGH WATERS: WHEN A WORK ENVIRONMENT IS ALSO A RISK ENVIRONMENT

As discussed in the previous chapter, the advent of commercialization in the fishing industry changed the daily lives of men in these communities, the work itself, and the relationships among fishermen. In particular, commercialization resulted in the use of larger vessels that go farther from shore and stay out to sea for longer periods of time. As the fishing industry commercialized, however, some men were in a better social and economic position to take advantage of changes within the industry. The shift from outboard to inboard motors and then to large deep sea vessels required substantial capital, which was not as frequently accessible to traditional Malay fishermen who were the bulk of the fishing industry prior to mechanization (Kirkley, et al., 2003). Ethnically Chinese men, having greater economic resources, were more often able to afford the costs of a large vessel that would allow for competition in the commercial fishing market, both then and in contemporary Malaysia (Firth, 1966; Kirkley, et al., 2003). These industry shifts also meant changes in control over the means of production and how the fishing industry operates. Today, large commercial vessels are manned by professional captains who operate with profit motives that may be in direct opposition to the health and welfare of the men who work on these boats as crewmembers. As the industry changed, so too did the life and work of its fishermen.

In this chapter, I assess how local environmental and occupational factors support drug use and HIV risk behavior. I utilize qualitative and survey data to examine the intersection of work place characteristics and social relationships among fishermen in Kuantan. Specifically, I investigate how relationships with crewmembers and captains and occupational characteristics associated with fishing intersect to shape unsafe injection practices and access to clean needles/syringes. The overall goal is to provide insight into how the organization of the fishing industry may contribute to an environment of vulnerability through an assessment of the social context of drug use, social network relationships, and risk behavior.

BACKGROUND

The 'risk environment' framework posits that environmental factors, like social, economic, policy, and physical context, interact at different levels of influence (micro, macro) to increase the chances of harm occurring (Rhodes, 2002). "Place" is particularly important because it is an "assemblage of personal networks and environmental characteristics which work together to enhance or impede the experience of health and well-being" (Frohlich, Corin, & Potvin, 2001). Although fishermen's high mobility is often cited as a key factor driving HIV transmission (Entz, Prachuabmoh, van Griensven, & Soskolne, 2001; Kissling, et al., 2005b), less attention has been paid to the places where fishermen interact and drug use occurs, like boats, and how occupational characteristics may shape interactions among fishermen to create a unique risk environment.

In the context of HIV, occupational health and safety has gained some traction as evidence emerged of HIV epidemics concentrated within specific occupations. For instance, studies show that truck drivers are at high risk of HIV transmission (Dude, et al., 2009; Gysels, et al., 2001; Orubuloye, et al., 1993; Ratner & Allison, 2012). In India, STI and HIV risk

behaviors among truckers was associated with time away from home, urban residence, income and unmarried status (Dude, et al., 2009), while a study in East Africa showed that unprotected sex with a sex worker was a primary predictor of HIV status (Rakwar, et al., 1999). Similarly, a study with truck drivers in Nigeria demonstrated that occupational demands resulted in a network of multiple sex partners (Orubuloye, Caldwell, & Caldwell, 1993). Looking deeper at occupational context and risk behavior, a study of truck drivers in Brazil demonstrated that men who perceived the environment as very or moderately permissive were more likely to report having sex with a sex worker and had a greater number of commercial sex partners; at the same time, the odds of having sex with a sex worker decreased for each week the driver slept at home (Lippman, et al., 2007). These findings suggest that both physical and psychosocial factors associated with trucking affect whether risk behavior, in the form of sex with casual or commercial partners, occurred (Lippman, et al., 2007). Further, multilevel worksite strains associated with trucking, like long work hours, fatigue, shift work, and other occupational stressors can lead to a range of morbidities, including risky substance use and sexual practices (Apostolopoulos, Sonmez, & Shattell, 2010).

Mineworkers have also received attention as a "high-risk" occupation: in South Africa, HIV prevalence among mineworkers was estimated at 20-28.5% in 2000 (Williams, Gilgen, Campbell, Taljaard, & MacPhail, 2000), and study on migrants to South African mines from Swaziland and Lesotho showed that these men were 15% more likely to be HIV positive (Corno & De Walque, 2012). Work as a miner entails spending long periods of time away from the household of origin and increased exposure to sex workers or casual partners (Corno & De Walque, 2012); however, as Campbell and Williams (1999) note, the social context in which mineworkers live are also important determinants of sexual health. Campbell and Williams

(1999) argue that economic factors make mining one of the few employment options available for many men.

According to Campbell and Williams (1999), in this context, illness, death, and injury are part of everyday life and so people may be less motivated to worry about HIV, which is a less immediate concern. Sex and alcohol may be key ways that men cope or unwind. They also indicate that working and living conditions leave men with limited power to address work injustices and lead to low levels of perceived self-efficacy, which can extend to a sense of lack of control over one's health and well-being (Campbell & Williams, 1999). Finally, gender dynamics, which are exacerbated in the mining context, may increase HIV risk for mineworkers because "masculine identities serve as an important coping mechanism whereby miners deal with the stresses and dangers of their working lives" (Campbell, 1997). Similarly, in Vietnam, male mineworkers indicated that sex was a form of relaxation and reward for their risk and hard work, as it strengthened identity and social networks and helped miners to affirm manhood, group membership, and masculinity (Van Tuan, 2010). Given the threat of accidents from work in their daily lives, the long-term risk of HIV was similarly deemed to be less of a worry (Van Tuan, 2010). Combined, these social and occupational factors affect the likelihood of unsafe sex, STIs and HIV among mineworkers (Campbell & Williams, 1999).

Fishing has also been identified as a "high-risk" occupation, with most studies focusing on the intersection of mobility and sexual risk behavior (Allison & Seeley, 2004; Seeley & Allison, 2005; Westaway, et al., 2007). For example, in Thailand and Cambodia, HIV prevalence is around 15-16% among fishermen (Entz, Ruffolo, Chinveschakitvanich, Soskolne, & van Griensven, 2000; Samnang, et al., 2004), and in low and middle income countries in Africa, Asia and Latin America, Kissling et al. (2005) found that HIV prevalence rates were 4 to 14 times

higher than the national average for adults. In these and other studies, risky sexual behavior was the primary route of HIV transmission (Appleton, 2000; Entz, et al., 2000; Karukuza & Bob, 2005; Kissling, et al., 2005b; Samnang, et al., 2004; Tanzarn & Bishop-Sambrook, 2003). Similar to the other occupations discussed, fishing often involves spending extended periods of time away from family and community or may involve seasonal migration for work. Also, like the discussion of mining, HIV prevalence among fishermen may be linked to a range of social and occupational factors, like economics, work conditions, and gender, though these factors warrant greater research. For instance, Kher (2008) suggests that poverty and the economic and social marginalization of fishing communities may put them at greater risk for HIV, especially given that the livelihoods of fishermen are uncertain, dependent on seasonal fluctuations and also threatened by depleting fish stocks (Appleton, 2000; Barratt, 2007). At the same time, fishing may allow for mobility and freedom from social structures in the home community for young unmarried men, in particular, and provide some disposable income that can be spent on commercial sex or alcohol (Allison, Ellis, & Freeman, 2005; Allison & Seeley, 2004; Karukuza & Bob, 2005).

There is also some research to suggest that working conditions may lead to increased risk for HIV among fishermen: like mining, fishing is a dangerous occupation that entails substantial physical risk, which can lead to increased risk-taking in terms of sexual behavior, alcohol consumption, or drug use as a means of coping with the dangers of the occupation (Allison & Seeley, 2004; Barratt, 2007; Seeley & Allison, 2005). In the context of such a high-risk occupation, the threat of HIV may be minimized or a culture of low risk perception or risk denial may develop (Allison & Seeley, 2004). Also like mining, researchers suggest that the culture of risk associated with such a dangerous occupation may promote "hyper-masculinity" in terms of

risky sex and alcohol use (Allison & Seeley, 2004; Barratt, 2007). Peer pressure may increase the purchase of sex (Voeten, Egesah, Ondiege, Varkevisser, & Habbema, 2002) or lead to an increased risk of unprotected sex (Allison & Seeley, 2004).

The research presented here makes a strong case for the linkages between certain occupations and risk for HIV, but there are a number of gaps in the literature. First, the majority of this work focuses on sexual risk behavior and fails to understand how drug use may intersect with occupational health to drive HIV. This is particularly important because there is ample evidence to suggest that work environments can impact substance use (Green & Johnson, 1990; Muntaner, et al., 1995; Traweger, Kinzl, B, & Fiala, 2004; Wiesner, et al., 2005). In particular, research shows that low autonomy or general feelings of powerlessness or alienation related to work may be important predictors of substance use (Seeman, Seeman, & Budros, 1988). All of this suggests that there is a need for greater research on the intersection between occupational context and drug use as it relates to HIV, which is the focus of this chapter.

Second, research also highlights how local social networks are instrumental in navigating the structural constraints that drive HIV risk behavior and increase harm among PWID (Duff, 2009). The occupational health literature suggests that the effect of work environment characteristics on health can be moderated by individual and contextual factors (Hurrell, et al., 2011), including social support, which can directly or indirectly protect health by reducing feelings of alienation, by increasing the sharing of information, or by reducing stress (Muntaner, et al., 2006). Social networks can also contribute to HIV-related risk behaviors and health outcomes among drug users (R. Curtis, et al., 1995; Friedman, et al., 1999; Friedman, et al., 1997; S. R. Friedman, et al., 1998; Koram, et al., 2011; Neaigus, et al., 1996; Suh, Mandell, Latkin, & Kim, 1997; Weeks, et al., 2002). In this chapter, I include measures of social networks

in the analyses to better understand the linkages between occupational characteristics and fishermen's risk environments.

METHODS

Measures

Unsafe injection practices in the past month and access to clean needles/syringes were the primary outcomes of interest (described in greater detail in Chapter 2). Multivariate analyses were conducted for PWID only (0=No, 1=Yes). Having engaged in one or more unsafe injection practices in the past month and access to clean needles/syringes were both dichotomous measures (0=No, 1=Yes).

The predictors included measures of social networks and occupational characteristics of fishing. Measures of social network structure and composition included self-reported network size of fishermen, which is based on the core RDS question that asks, "How many people do you know personally (you know their name, you know who they are and they know you, and you have seen them in the last 6 months) who are fishermen (work at least 6 months of the year as fishermen)?" The proportion of the personal network of fishermen who were PWID, was based on a follow-up question, which asked, "To the best of your knowledge, how many of the fishermen you know inject drugs?" Number of close friends was assessed separately by asking respondents how many close friends they had who also worked as fishermen. Measures of occupational characteristics included: whether the respondent worked on a deep-sea vessel (a deep sea vessel is considered a vessel with a class C2 or C1 license, as described in Chapter 2); amount of money earned on last fishing trip; and number of nights spent out to sea in the past 3 months, which earlier analyses demonstrated was associated with HIV serostatus among fishermen in the sample.

I also included measures on the intersection between networks, place, and drug use. These included a series of dichotomous measures assessing ('yes' or 'no') if: the respondent had ever used drugs on the boat during a fishing trip; the boat crewmembers knew about their drug use; the boat captain knew about their drug use; the respondent had used drugs with crewmembers while on the boat; the respondent had used drugs with the captain while on the boat; the captain had loaned money to the respondent to buy drugs; and if the captain had ever provided drugs to help with work.

Data Analysis

The qualitative data allowed me to illuminate what 'place' meant in the context of the Malaysian fishing industry, to contextualize the quantitative results, and to assess the extent to which data converged. Data were coded thematically and analyzed by the author to inform key research questions on the linkages between place, networks and HIV risk. I utilized a focused coding approach to generate themes and organize the data. Data analysis was theoretically driven and informed by theories of the social determinants of health and risk environments.

I present differences in network characteristics for the total sample and also compare ever PWID to non-injectors (Table 3.1). Significant differences between PWID and non-PWID were determined by bivariate logistic regression. Univariate statistics for occupational and risk characteristics for PWID are also presented. All predictors were assessed for multicollinearity before being entered into multivariate logistic models. Sample characteristics are presented in Chapter 2.

Model selection was informed by Akaike information criteria (AIC), which combines estimation and model selection (Akaike, 1974). I compared AIC values to a minimum AIC or 'best' model using the formula $\Delta_i = AIC_i - AIC_{min}$; models having $\Delta_i \leq 2$ demonstrate substantial

support while models with $4 \leq \Delta_i \leq 7$ have less support (Burnham & Anderson, 2004). AIC was utilized because it allowed me to compare multiple models in an exploratory way and helped me identify and avoid overfitted models, while not as heavily penalizing extra variables, like Bayes Information Criterion does (Kuha, 2004). All predictor variables were included in multivariate analysis and AIC was computed for all possible subsets of these independent variables. I evaluated all models with $\Delta_i \leq 4$ to assess independent variable patterns; the best model for each outcome was selected by assessing AIC value and parameter estimates. The final model for access to syringes had the best (lowest) AIC. For unsafe injection practices, the final model was selected because it was within $\Delta_i \leq 2$ in AIC, which still demonstrates substantial support, but also had stronger parameter estimates. Both models controlled for age, marital status ('single, divorced, widowed, separated' or 'currently married'), and education level ('less than secondary complete' or 'secondary or more complete').

RESULTS

Place and Risk Behavior among Fishermen: Findings from In-Depth Interviews

The qualitative data revealed a connection between place, networks and drug use. In the 28 in-depth interviews with drug-using fishermen, most of the men interviewed reported that they injected drugs. Many men reported that they brought a drug supply with them when they went out to sea, but they also reported they could usually only afford to bring enough drugs for a day or two. Before going to sea, fishermen often asked their captain for a loan so they could purchase drugs and then this money was deducted from their salary at the end of the trip. Some fishermen used methadone to help them through the rest of the trip when drug supplies ran out, though it is not clear from the data how they get it or when they use it. Other men said that they only used drugs right before they left and then immediately when they returned to shore.

Drug choice depended on preference, the availability of drugs and financial resources to purchase them, and on context; specifically, the physical and social spaces where drug use occurred shaped patterns of drug use. Heroin use was tied to work and men reported that they used heroin to "make them strong," "hard-working," and "energetic." A 19-year-old said that without drugs he was unable to work: "*If I yearn for it, I couldn't do any work. After taking drug, then only can I work*." Another man (age 36), when speaking about why he likes heroin said: "*when I took heroin, I became active, like I could think very quickly...I could get anything done...I'll become aggresive, hardworking, easy to speak up. It's like that*."

Heroin was reported to aid with the "hard labor" of fishing, which would be "slow" or more difficult without the help of drugs. A 22-year-old, when asked if fishing work was different when he has taken heroin, said: "*My body feels lighter, it feels good to do work. Yes, hardworking...if I don't take it, I will feel lethargic, lazy. Even lazy to get up*." Another man, 32 years old, also spoke about work on the boat and heroin use: "*We work fast, errr, if it's raining or it's windy, anything, we don't mind. But if we haven't taken the stuff, when we get wet in the rain, we will feel cold, but after taking the stuff, come what may*." Men who used drugs at sea found ways to work with the rhythms of fishing so that injection did not disrupt the flow of labor: according to a 48-year-old, "*if I want to take it, I do it before work or after work. Say the skipper has already set to bring the fish up at 11 o'clock, we'll get up at 10, then take drugs.*" At the same time, other drug-using fishermen indicated that they avoided using drugs while out to sea because of the dangers associated with fishing and the fear of falling overboard. It is unclear from the data if anything underlies these differences.

Drug use, though highly stigmatized in Malaysian society, was not hidden from crewmembers. In the interviews, almost all reported that other crewmembers, both drug users

and non-drug users, were aware of their drug habits and either 'don't mind' or 'say nothing.' According to a 40-year-old fisherman, his crewmembers "*know [about his drug use]…When I use, I don't do it in hiding. I use in front of them.*" Other men reported that even though crewmembers were aware of their drug use, they were discreet when injecting or using drugs. One man, aged 22, said that he "*sit[s] on the boat near the engine [so other crewmembers] won't see me*." Another man, age 45, had different concerns. He pointed out that he avoids being seen taking drugs to protect his supply: "*If they saw it, sure they'd ask for it, agree? They'd also want some, so if they see that I take drug and I don't share with them, they'll say what a stingy friend. They'd say all kinds of things*." Boat captains, or skippers, were also aware of drug use on boats and some were users themselves. When talking about sharing drugs on boats and the role of skippers, a 34-year-old fisherman said, "*If the skipper is a drug buddy, then everyone is a drug buddy too*." Skippers knew about drug use because fishermen told them and because fishermen got loans to buy drugs before going out to sea. In at least one case, it was reported that the boat captain was the one who was selling drugs to crewmembers.

The frequent use of drugs on boats, when supported by networks of crewmembers and sometimes boat captains, appears to have supported a culture of drug use tied to the occupation of fishing and the boats where work occurs. The overwhelming sentiment of fishermen interviewed was that as long as they did their work, the boat captain ignored drug use. A 41-year-old fisherman noted that, "*the skipper, he doesn't bother. He goes to the sea, he gives money, he...he doesn't bother. He says nothing. He only wants us to work.*" Another fisherman, 45 years old, said about the skipper: "*He doesn't care much, as long as you can work. Don't be lazy and not finish the work given by him*." Beyond this, fishermen reported that some boat captains actually prefer to hire drug users. According to a 32-year-old fisherman, "*these skippers,*

sometimes they like it more when the crew members use because it makes us work faster." Another fisherman, 36 years old, indicated something similar, saying: "*he'll watch us when we work, how I work. Like, like, even if I'm an addict, but I'm ok with my work, there's no problem...the skipper likes it*." When asked why, he said:

> *Because when an addict works, he beats the normal people. Two normal persons equal an addict, that's the amount of hard work put in*'. He goes on to say, '*addicts do their work seriously when it's time to work. But if there're no drugs, they can't work. That's the only problem*.

This sentiment may explain why some men reported that captains provided drugs to crew for the purpose of work.

Although in-depth interviews with captains were not conducted, skippers' preference for hiring drug-using crew was corroborated during an informal interview with a retired boat captain and former head of a village fishing association. He indicated that boat captains say they do not approve of drug use, but that they actually prefer to hire drug users because they are less afraid and will go out to sea during monsoon season when the sea is dangerous. Overall, crewmembers and boat captains did not seem to care about drug use, providing PWID a place where they could both earn money and use drugs without facing recrimination.

Place, Networks, and Risk: Quantitative Results

The quantitative analyses echoed the findings of the qualitative data and further suggested that the occupational culture of drug use and the social relationships among fishermen, crewmembers and captains may be driving HIV risk. As seen in Table 3.1, both PWID and non-injectors had an average of 2 close friends (SD=4.03, SD=4.67, respectively). PWID had an average network size of 23.81 (SD=46.74) people, while non-injectors had a network size of 34.71. The proportion of a respondent's personal network who injected drugs was significantly

Table 3.1: Network Characteristics for Total Sample, PWID, and Non-Injectors

NETWORK CHARACTERISTICS				
Size of fishermen network	**Total Sample (n=398)**	**Non-Injector (n=249)**	**Ever PWID (n=149)**	***p-value***
Mean (SD) Median (Range)	30.63 (56.87) 9.00 (0-400)	34.71 (61.87) 10.00 (0-400)	23.81 (46.74) 8.00 (1-300)	0.071
Number of Close Friends who are Fishermen				***p-value***
Mean (SD) Median (Range)	2.64 (4.29) 2.00 (0-40)	2.83 (4.03) 2.00 (0-25)	2.33 (4.67) 1.00 (0-40)	0.270
Proportion of network who inject drugs				***p-value***
Mean (SD) Median (Range)	0.35 (0.39) 0.20 (0-1)	0.19 (0.29) 0.00 (0-1)	0.59 (0.33) 0.55 (0-1)	0.000

greater for PWID: 0.59 for PWID compared to 0.19 for non-injectors. Although not part of this analysis, almost 25% of PWID tested positive for HIV.

As discussed in Chapter 2, occupational characteristics varied significantly by injection drug use status: PWID spent more nights out to sea in the past 3 months (mean=11.29, SD=14.73) relative to non-injectors (mean=4.48, SD=10.32); made more money on their last fishing trip, around RM471 (SD=316.75) compared to an average of about RM257 (SD=371.61) for non-injectors; and, on average, worked on a greater number of boats in the last year, 1.15 (SD=1.55) compared to 0.69 (SD=1.02). PWID were also significantly more likely to work on a deep-sea vessel rather than an inshore vessel: about one-half (52%) of PWID worked on deep-sea vessels compared to about 14% of non-injectors.

Drug use on boats and with crewmembers was common, creating a unique risk environment (see Table 3.2). The large majority (83%) of PWID reported that boat crewmembers knew about their drug use and about four-fifths (78%) said the boat captain was aware of drug use. Drug use occurred on the boat during a fishing trip for about 75% of PWID:

almost 69% had used drugs with other crewmembers on the boat and 4.7% had used drugs with the boat captain. Moreover, 16% of respondents reported that the captain of the boat had

Table 3.2: Estimated Prevalence of Risk Environment Characteristics among PWID

RISK ENVIRONMENT CHARACTERISTICS	
Has ever used drugs while on the boat during a fishing trip	**% (n)**
No	24.80 (37)
Yes	75.20 (112)
Crewmembers on the boat knows respondent uses drugs	
No	16.80 (25)
Yes	83.20 (124)
Captain of boat know respondent uses drugs	
No	22.10 (33)
Yes	77.90 (116)
Has ever used drugs with other crewmembers while on the boat	
No	31.50 (47)
Yes	68.50 (102)
Has used drugs with the captain while on the boat	
No	95.30 (142)
Yes	4.70 (7)
The captain of the boat has ever loaned money to buy drugs	
No	43.00 (64)
Yes	57.00 (85)
The captain of the boat has ever provided drugs to help with work	
No	83.90 (125)
Yes	16.10 (24)

provided them with drugs to help them work and 57% said that the captain of the boat had ever loaned them money to buy drugs. Almost 43% reported engaging in one or more unsafe injection practice in the past month and the large majority of PWID (91.3%) said they could obtain new, unused needles and syringes when they needed them (see Table 2.3).

Network and occupational environment characteristics were significantly associated with unsafe injection practices in the past month (see Table 3.3). The proportion of PWID in one's personal network was associated with unsafe injection practices (OR=3.52, CI=1.05-11.70); however, network size of close friends was not a significant predictor. If the boat captain had

knowledge of the respondent's drug use, they were 2.4 times more likely (CI=0.86-6.64) to have engaged in unsafe injection practices, though this relationship was only marginally significant

Table 3.3: Logistic Regression Results for Relationship between Occupational and Network Characteristics, Unsafe injection Practices, and Access to Clean Needles/Syringes

ANY UNSAFE INJECTION PRACTICE IN PAST 30 DAYS (n=149)	**Odds Ratio**	**95% CI**
Age	0.966	0.921-1.013
Marital Status	0.816	0.353-1.885
Education Level	0.978	0.434-2.206
Nights out to sea in past 3 months	1.018	0.993-1.045
Number of boats worked in past 3 months	1.198	0.920-1.558
Number of Close Friends who are Fishermen	0.970	0.893-1.055
Network Composition: proportion network who inject drugs	3.510**	1.053-11.700
Boat captain knows about drug use	2.389*	0.859-6.643
Captain has provided drugs to help with work	2.777**	1.018-7.576
CAN ACCESS CLEAN NEEDLES/SYRINGES WHEN NEEDED (n=149)	**Odds Ratio**	**95% CI**
Age	1.095*	0.996-1.204
Marital Status	1.264	0.235-6.804
Education Level	2.350	0.417-13.236
Size of fishermen network	0.987***	0.977-0.996
Network Composition: proportion network who inject drugs	4.743	0.561-40.122
Boat crewmembers know about drug use	7.234**	1.430-36.604
Has used drugs with captain while on boat	0.182	0.021-1.560
Captain has provided drugs to help with work	0.134**	0.025-0.720

* p<.10, ** p<.05, *** p<.01, **** p<.001

(*p*-value=0.095). Respondents were 2.8 times more likely (CI=1.02-7.58) to engage in unsafe injection practices when the captain had provided drugs to help with work. Network and risk environment factors also predicted access to clean needles/syringes. PWID with larger overall networks were slightly less likely to have access to needles/syringes (OR=0.99, CI=0.98-0.996), while respondents whose crewmembers knew about their drug use were 7.234 time more likely (CI=1.43-36.60) to be able to access clean injection equipment. Respondents were significantly

less likely to be able to access clean equipment if their boat captain had provided drugs to help them work (OR=0.13, CI=0.03-0.72).

DISCUSSION

The findings of this research indicate that social and occupational characteristics combined to support a unique risk environment conducive to drug-related risk behavior and specific to fishing (Latkin, Mandell, Vlahov, Oziemkowska, & Celentano, 1996; Singer, et al., 2000). Nuwayhid (2004) notes that research on occupational health should focus to a much greater extent on the worker and the worker's social context in order to understand how work environments shape health. Following suit, this chapter found that drug-related risk behavior was tied to power dynamics between boat captains and crewmembers and to an occupational culture that supported drug use. In terms of our understanding of the social organization of HIV vulnerability, this research points to the importance of occupational context, but highlights a range of factors tied to drug use that have yet to be addressed in the literature on "high-risk" occupations.

With 37% of the sample reporting injection drug use and almost 26% of PWID testing positive for HIV (see Chapter 2), these results support research suggesting that fishing is a "high-risk" occupation (Allison & Seeley, 2004; Seeley & Allison, 2005; Westaway, et al., 2007); yet, most studies on occupations and HIV focus on mobility as a key driver of risk behavior (Deane, et al., 2010; Sopheab, et al., 2006; Weine & Kashuba, 2012). In this population, however, mobility did not appear to be an important determinant of behavior: number of nights spent out to sea in the past three months did not predict injection-related risk behavior or access to clean needles/syringes. So when we remove mobility from the equation, how do these findings inform research on occupational health and workplaces as sites for HIV vulnerability?

Unlike previous studies, the focus here is on drug-related risk behavior rather than sexual behavior. Drug use was quite common among fishermen and though a connection between seafaring and substance use, especially alcohol and cannabis, has been found throughout the world (Carruthers, Boots, & Midford, 2002; Evans, Tait, Harvey, & Newbury, 2005; Kissling, et al., 2005b; Seeley, et al., 2012; Tumwesigye, et al., 2012), in this study heroin was the most frequently used drug in this community. Boats, as both a physical and social space, played a key role in the drug scene of PWID fishermen and there was a strong connection between heroin use and the labor of fishing. The majority of PWID interviewed said they had used drugs on their fishing boat while out to sea and, in the qualitative interviews, numerous fishermen said heroin was integral to their ability to work as it made them strong, energetic and hardworking. This would suggest that occupational spaces (in this case boats and jetties), and not just places where PWID live or interact, may be important sites for the production of HIV risk (Tempalski & McQuie, 2009). This warrants more research, however.

The qualitative and quantitative data indicated that most crewmembers and captains were aware of drug use on boats and some were also involved in drug use. On the one hand, the social relationships among crewmembers drove risk: having a larger proportion of PWID in their network was associated with a greater likelihood of unsafe injection practices. This is consistent with the literature on PWID network size and risk behavior (Latkin, et al., 1996; Mandell, Kim, Latkin, & Suh, 1999), and may be the result of social pressure, norms of sharing, greater opportunities for drug equipment sharing, decreased control over injections, or increased drug availability (R. Curtis, et al., 1995; Friedman, et al., 2000; Friedman, et al., 1997; Hawkins, Latkin, Mandel, & Oziemkowska, 1999; Latkin, et al., 1996). This may also explain why PWID with larger networks of drug users were less likely to report being able to access clean

needles/syringes. On the other hand, crewmembers' knowledge of the respondent's drug use increased the likelihood of having access to clean needles/syringes, indicating that PWID networks may also be playing a protective role, perhaps by elevating levels of social trust and capital (Kirst, 2009). More detailed information on how network characteristics operate in this population and the mechanisms through which they may be driving or reducing injection-related risk practices are discussed in the next chapter.

Research on occupational health focuses heavily on the relationship between work environments and job strain (Karasek, 1979; Karasek & Theorell, 1990), arguing that jobs characterized by high levels of demand and low levels of autonomy result in a range of poorer health outcomes (Bonde, 2008; Eller, et al., 2009; Karasek & Theorell, 1990; Landsbergis, Schnall, Deitz, Friedman, & Pickering, 1992; Lerner, Levine, Malspeis, & D'Agostino, 1994; Nieuwenhuijsen, Bruinvels, & Frings-Dresen, 2010; Taylor, et al., 1997). This includes risk behavior, with heavy alcohol consumption having one of the strongest relationships with work stress (Siegrist & Rodel, 2006). Previous work on "high-risk" occupations and HIV would certainly support this: for instance, Campbell and Williams (1999) argue that miners have limited power to address work injustices, lower levels of perceived self-efficacy, and use sex and alcohol to cope. But what does self-efficacy or job strain look like in a work environment where drugs are actually supplied by your employer?

Importantly, in this research boat captains were found to play a primary role in driving HIV risk behavior and limiting opportunities to reduce harm among fishermen who inject drugs: they loaned crewmembers money to buy drugs and supplied drugs for the purpose of work, which was associated with unsafe injection practices and more limited access to clean needles/syringes. Given the relative power position between captains and crew, PWID may have

had limited ability to refuse to share needles/syringes or equipment, or to refuse drugs at all, indicating that social influence tied to authority may be of great importance to drug-related risk behavior for these fishermen (French & Raven, 1959; Pettigrew, 1972; Raven, 1965). These power structures may also be responsible for the lower access to clean needle/syringes, but it is unclear from the data whether boat captains who provided drugs on boats failed to provide clean equipment or if men who worked on these boats had more limited access for other reasons. Given the findings of this study, it is crucial to more deeply investigate these dynamics for fishermen in this community, but perhaps also for workers in other occupations where drug use is prevalent.

Although I was unable to ascertain this from the data, it may also be the case that the precarious nature of employment as a fisherman may shape drug-related risk behavior and health outcomes (Taylor, Repetti, & Seeman, 1997). Precarious employment, which describes flexible, contingent, non-standard, and temporary work contracts (Hadden, Muntaner, Benach, Gimeno, & Benavides, 2007), often makes workers more vulnerable (Benach & Muntaner, 2007). These factors are certainly relevant to fishermen who work seasonally, who have variable levels of pay contingent on the catch, and who hop from boat to boat. Kher (2008) suggests that poverty and the economic and social marginalization of fishing communities may put them at greater risk for HIV, especially given that the livelihoods of fishermen are uncertain and dependent on seasonal fluctuations and also threatened by depleting fish stocks (Appleton, 2000; Barratt, 2007).

These factors can translate into lower levels of protection and greater powerlessness in the workplace (Benach & Muntaner, 2007). Relative to permanent or secure workers (full-time, year-round), the lack of stability and security associated with jobs like fishing has been linked to adverse health effects as workers experience greater material and social deprivation, work in

strenuous and tiring positions, have less autonomy, and face uncertainty in terms of future work, income, and schedules (Aronsson, 1999; Benach & Muntaner, 2007; Benavides, et al., 2006; Kivimaki, et al., 2003). Indeed, low autonomy or general feelings of powerlessness or alienation related to work can be important predictors of substance use (Seeman, et al., 1988). Future research needs to focus on the extent to which these factors might shape fishermen's drug use, injection-related risk behavior, and also their ability to negotiate risk on boats in situations where captains provide drugs.

The qualitative and quantitative data also revealed an overwhelming acceptance of drug use within the fishing community and on boats, especially. The passive acceptance by non-drug using crewmembers and the sometimes active encouragement of drug use by captains contributed to an occupational culture of drug use that operated on the principle that if you are able to work, then drug use was not a problem. The data do not allow me to determine whether occupational context simply supported drug use or whether it also attracted drug users into the occupation; however, it does indicate that fishing provided access to drugs, cash, and the formal wage economy, while also providing an environment where PWID experienced less stigma and greater acceptance. Although the occupation of fishing was a safe harbor for many PWID, it also placed many men at greater risk for HIV transmission by shaping social networks, increasing opportunities for unsafe injection, and limiting opportunities for risk reduction.

In terms of our understanding of the social drivers of HIV, these findings point to the role of work environments and the organization of the fishing industry as a key social structure that is shaping patterns of health and behavior among fishermen. In particular, the power dynamics within this occupational context between captains and crew, and the ways in which this affects risk behavior, provides evidence of more immediate constraining structures that influence drug-

related risk behaviors and prevents the uptake of harm reduction practices. As Douglas and Wildvasky (1983) note in their theorization of risk, levels of the acceptability and unacceptability of risk are political and moral matters, which are socially constructed by institutions, cultural values and ways of life. In this context, the institutional practices and culture of fishing serve to define the risk environment in which fishermen operate and health is produced. Future research needs to focus more extensively on occupational context and HIV in this and other communities where drug use is common.

CONCLUSION

Understanding the social and structural factors that facilitate risk environments is a first step towards creating 'enabling environments' where risk for HIV infection is reduced (Rhodes, 2002). Officially, drug use was not condoned in the fishing industry or in its communities, but it was pervasive nonetheless. The results indicate that boats were a key place where risk behavior occurred and that occupational and network factors intersected to support a risk environment and drive HIV risk behavior. Of particular note, boat captains played an important role in driving injection-related risk behavior among fishermen. This chapter highlights the ways in which the occupational and social context facilitated drug use among fishermen. The next chapter builds off of these findings and more deeply explores the relationships among crewmembers and the ways that aspects of social networks can affect health.

CHAPTER 4

CASTING A WIDE NET(WORK): ASPECTS OF SOCIAL NETWORKS, DRUG USE, AND HIV AMONG FISHERMEN

The relationship between social networks and health is a growing area of research as network connections can provide a means for social support, for establishing and enforcing collective norms, and for encouraging risk and/or protective health beliefs and behaviors (Szreter & Woolcock, 2004). The social connections between people, the structure of these relations, and the location of individual actors all have "important behavioral, perceptual and attitudinal consequences both for individual units and for the system as a whole" (Emirbayer & Goodwin, 1994). Social networks can mediate the relationship between social structures and individual behaviors and operate through multiple pathways: 1) provision of social support; 2) social influence; and 3) social engagement and attachment (Berkman, et al., 2000).

As discussed in the previous chapter, broader social and economic change shaped local environments, the organization of the fishing occupation, and power structures within them, in ways that influenced HIV risk behavior. The presence of risk environments conducive to drug use within the occupation of fishing also shaped the contours of social network relationships within fishing communities. Building on the discussion of risk environments, I combine these insights with Berkman et al.'s (2000) comprehensive model of the effects of social networks on health to assess multiple aspects of social relationships among drug-using fishermen in Malaysia

and how these shaped drug use and HIV risk.

In this chapter, I draw on qualitative, network, and survey data to examine drug use, HIV risk, and social networks among fishermen in Kuantan. First, I assess characteristics of fishermen's networks and recruitment patterns by drug use, risk behavior, and HIV status, including the quantity and quality of these relationships among fishermen across key characteristics. In doing so, I am able to provide basic information on salient clustering agents within this population of fishermen and provide useful knowledge on the network characteristics of fishermen with respect to drug use and related HIV risk. Second, I more deeply investigate the nature of the relationships in fishermen's networks, exploring the association between multiple aspects of social relationships among fishermen and drug use, risk behavior, and HIV serostatus. Specifically, I assess levels of perceived social support, social trust, social engagement, and social isolation, using both qualitative and quantitative data to determine how these aspects of social networks influence drug use and HIV risk behaviors. The overall goal of these analyses is to provide important insight into HIV transmission and risk throughout the population by elucidating the social context of drug use, network structures, and risk navigation opportunities.

BACKGROUND

The linkage between social networks and health is a growing area of research and warrants particular attention when attempting to understand the social drivers of risk and why fishermen may be at greater risk for HIV. Social connections between people are inscribed with both meaning and power, serving as a means for social support, for establishing and enforcing collective norms, and for encouraging risk and/or protective health behaviors (Szreter & Woolcock, 2004). Social networks can block or encourage possibilities for action or knowledge acquisition, by constructing identities and goals, and by providing the normative evaluations that

guide action (Emirbayer & Goodwin, 1994). In terms of risk, informal networks within social groups validate risk perceptions by providing cultural views and biases and creating the potential to amplify or attenuate risk information (Kasperson, et al., 1988). Networks shape whether an individual perceives a risk as real or ignorable, as in situations of drug use, and what he or she does with potential risk when confronted with it. In these ways, health and risk are not isolated acts, but are driven by social influences that are formed through individuals' interactions with family, friend, work, and community networks.

In terms of injection drug use, numerous studies demonstrate that the social context of drug use, including social networks, is associated with risk behavior, including needle/syringe sharing (Feldman & Biernacki, 1988; Latkin, et al., 1996; Singer, et al., 2000). As discussed in previous chapters, the occupation of fishing facilitates a risk environment conducive to drug use, so how might social networks operate within this context to shape risk behavior? First, studies demonstrate that types of social network structure can contribute to HIV-related risk behaviors and health outcomes among drug users (R. Curtis, et al., 1995; Friedman, et al., 1999; S. Friedman, et al., 1998; Friedman, et al., 2000; Koram, et al., 2011; Neaigus, et al., 1996; Suh, et al., 1997; Weeks, et al., 2002). Studies indicate that larger PWID network size and density are associated with more frequent needle-sharing (Latkin, et al., 1996; Mandell, et al., 1999); PWID who are more centrally located in their network (and those more peripheral if they act as bridges) are more likely to engage in high-risk behaviors and more likely to transmit HIV (Brunham, 1997; R Curtis, et al., 1995; Friedman, et al., 1997; Rothenberg, et al., 1998). Higher network turnover is also associated with increased injection-related risk behavior (Costenbader, Astone, & Latkin, 2006). The strength or weakness of social ties can also predict injecting partners and needle-sharing practices (Hunter, Donoghoe, Stimson, Rhodes, & Chalmers, 1995; R. Power,

Hunter, Jones, & Donoghoe, 1994; Valente & Vlahov, 2001). Given the dependence on RDS data in this study, I am only able to look at total network size and PWID network size as indicators of network structure.

Social support, which may be emotional, instrumental, appraisal, and informational, can provide a basis for intimacy and attachment to a person, and also to a community (Berkman et al., 2000). For PWID, social support can be instrumental in the likelihood of engaging in risk behavior. For instance, support from non-drug using friends or family can aid social integration or discourage drug use (Stein, Charuvastra, & Anderson, 2002). Other drug users are also influential. On the one hand, social support can promote protective behavior in terms of decreased sharing or using clean needles (Frey, et al., 1995; Zapka, Stoddard, & McCusker, 1993). On the other hand, injection-related risk behavior is more common among close and supportive injecting partners (Friedman, et al., 1999; Latkin, Sherman, & Knowlton, 2003; Valente & Vlahov, 2001) and sharing may be a sign of social bonding or intimacy (Suh, et al., 1997). These close ties can increase access to emotional and instrumental support resources (Hall & Wellman, 1985), so risky behavior can also result from a need to preserve supportive relationships. Social support is important, in part, because injection environments that are more supportive can produce stronger social ties that are able to propagate norms of sharing (or not sharing) more effectively through these networks (Marsden, 1990; Stein, et al., 2002).

The role of social trust in health is closely tied to social support and influence within networks. Social trust can encourage risk behavior, but can also lead to protective behaviors, such as in the case of overdose safety and the prevention of victimization, for instance (Kirst, 2009). Sharing drug equipment with only those you trust to be HIV negative and know well is sometimes employed as a safety tactic (Kirst, 2009); however, research suggests that trust and

emotional bonding can trump knowledge about an injection partner's positive HIV status when making decisions about risky behavior (Barnard, 1993). Social trust operates more generally to shape health by promoting participation in social networks and by reducing stress (Abbott & Freeth, 2008). Although the data do not allow for an assessment of trust within networks of drug users, specifically, I analyze perceived trustworthiness of other fishermen to better understand how generalized trust in occupational networks shapes risk behavior. I also assess trust in police to gauge the extent to which the risk environment may affect health.

Networks also have an impact on health by promoting social participation and social engagement, which provides meaningful social roles and a sense of belonging (Berkman et al., 2000). Membership in social organizations has been found to discourage risky health behaviors, like sexual risk behavior (Crosby, Holtgrave, DiClemente, Wingood, & Gayle, 2003), smoking and binge drinking (Bolin, Lindgren, Lindstrom, & Nystedt, 2003), and to encourage protective behaviors, like safer sex practices (Crosby, et al., 2003). In HIV research, engagement in religious institutions has been a primary way in which social participation has been explored: a recent review of research on the relationship between religion and sexual HIV risk behavior found that increased religiosity was associated with lower levels of sexual HIV risk through the mechanisms of normative control, social influence and social organization (Shaw & El-Bassel, in press). There has been less work, however, on the connections between religion and drug-involved populations. The inverse of social engagement—social isolation or exclusion—tends to be detrimental to health, exacerbating stress, which can lead to addictive health-damaging behavior (J. Siegrist, 2000), and promoting higher risk injection behaviors as coping mechanisms (Metsch, et al., 1998). This chapter assesses both social participation and isolation as social drivers of injection-related risk behavior.

As these studies demonstrate, the relationship between networks and risk behavior is complex; however, socially patterned networks of interaction are an essential component of understanding both drug-related HIV risk and protective health behaviors. In this chapter, I explore occupational network structure and multiple aspects of network relationships to better understand the social factors that shape injection-related risk behavior, but also what factors help men to protect their health.

METHODS

This analysis pulls from both qualitative and quantitative data. A mixed-methods approach allowed for the assessment of the multiple layers of meaning related to risk and how social factors, like networks, shape these risk experiences and behaviors. The qualitative data was used to provide context for the interpretation of key constructs and to support the quantitative findings. The structure of the fishermen's occupational network (based on RDS data) is also described.

Measures

A number of outcomes related to drug use, as well injection-related HIV risk and HIV serostatus, were assessed in this analysis, including whether the respondent had ever used drugs, recent drug use (in the past 30 days), ever injection drug use, and recent injection drug use. A measure of unsafe injection practices was also assessed, as was HIV serostatus. The creation of all outcome measures is discussed more thoroughly in Chapter 2. Although all dependent variables were assessed in the RDS analysis and bivariate models, not all outcomes are reported in the multivariate models. The primary dependent variables of interest for the final logistic regressions were recent injection drug use, sharing of a needle or syringe in the past 30 days, and HIV serostatus.

Predictors include multiple measures of social networks and other aspects of social relationships, including social support, social trust, social participation, and social isolation. Measures of social networks include the self-reported network size of fishermen, the proportion of their network of fishermen who they knew to use drugs, and the number of close friends they have. Social support included 4 items, with questions assessing the number of people the respondent knew they could rely on: 1) to borrow money; 2) if they had a problem with their health; 3) if they needed to talk when they felt upset, angry, or lonely; and 4) to get advice about personal problems. All social support measures were dichotomized to 'none' or '1 or more.' Social trust, which was coded as 'none/a little/don't know' or 'some/a lot,' was assessed by 2 questions asking the respondent how much trust they had in coworkers and in police.

Social participation included 6 measures assessing whether the respondent was a member of a mosque or other religious institution ('no/don't know' or 'yes'); whether they participated in religious organizations or activities other than attending services ('no/don't know' or 'yes'); whether they participation in other local organizations, like neighborhood associations, unions, sports clubs or political groups ('no/don't know' or 'yes'); how much impact they thought people like them could have in making their community a better place to live ('no impact/small impact/don't know' or 'moderate impact/big impact'); how much they felt that the people running their community cared about what happened to them ('not at all/a little/don't know' or 'some/a lot'); and how much they felt that people in their community shared the same values ('not at all/a little/don't know' or 'some/a lot'). Finally, social isolation assessed how often the respondent felt lonely ('never/some of the time' or 'a lot of the time/all the time') and how often they talked to or visited immediate neighbors ('several times a month or less' or 'several times a week or more'); visited relatives ('once a month or less' or several times a month or more'); and

socialized with coworkers outside of work ('several times a month or less' or 'several times a week or more').

All multivariate models also controlled for the respondent's age, current marital status ('single/divorced/widowed/separated' or 'currently married'), whether the fishing vessel they worked on was an inshore or deep sea vessel, and the number of nights the respondent spent out to sea in the 30 days prior to interview.

Data Analysis

The qualitative data were primarily used to help explain the quantitative results and also to assess the extent to which data converged, giving deeper insight into the meaning of complicated constructs, like risk and multidimensional aspects of social networks. Data was coded thematically and analyzed to inform key research questions related to risk and social networks. The analysis of the data was theoretically driven, pulling from theories of the social determinants of health, risk, and political economy.

According to Wejnert (2010), RDS is a viable method of both sampling and analyzing social networks with survey data: it can identify global network structure and clusters based on respondent characteristics through analyses of homophily (the preference for connection with one's own group) and affiliation (preference toward any group), and it can compare tie characteristics. Such an analysis is well suited to assessing the spread of disease or information through a network, which is important for developing appropriate public health responses (Wejnert, 2010). In this analysis, RDS data are used to assess tie characteristics by assessing node characteristics through estimates of average group degree and structural network characteristics through homophily and affiliation analysis (Wejnert, 2010). Estimates of average group degree, calculated using the RDS degree estimator developed by Salganik and Heckathorn

(2004), focused on comparisons between drug-using and non-drug using fishermen, sharing of needles, as well as HIV positive status. Network structure in RDS data were analyzed using RDS Analysis Tool version 5.6.

Analyses were designed to be exploratory and descriptive and, as such, included a large number of independent variables. I conducted preliminary analysis of the data to assess variable distributions, means and standard deviations, and bivariate analysis to determine the relationship between aspects of social networks and drug use, HIV risk behavior, and HIV serostatus. To identify possible independent variables associated with key outcomes, I conducted a series of bivariate logistic regressions: all variables that had an association at the $p<0.10$ level were considered for inclusion in the final analysis. Using the eligible variables within each domain of the aspects of social networks assessed – social networks, social support, social trust, social participation and social isolation – I then used logistic regression to identify which variables continued to have an association at the $p<0.10$ level. Then I assessed these for multicollinearity. If two variables were highly related, I chose the measure with the largest relationship to the outcome. Through this process I eliminated a number of independent variables and the control variable education, which was not significantly associated with any of the dependent variables (all $p> 0.10$).

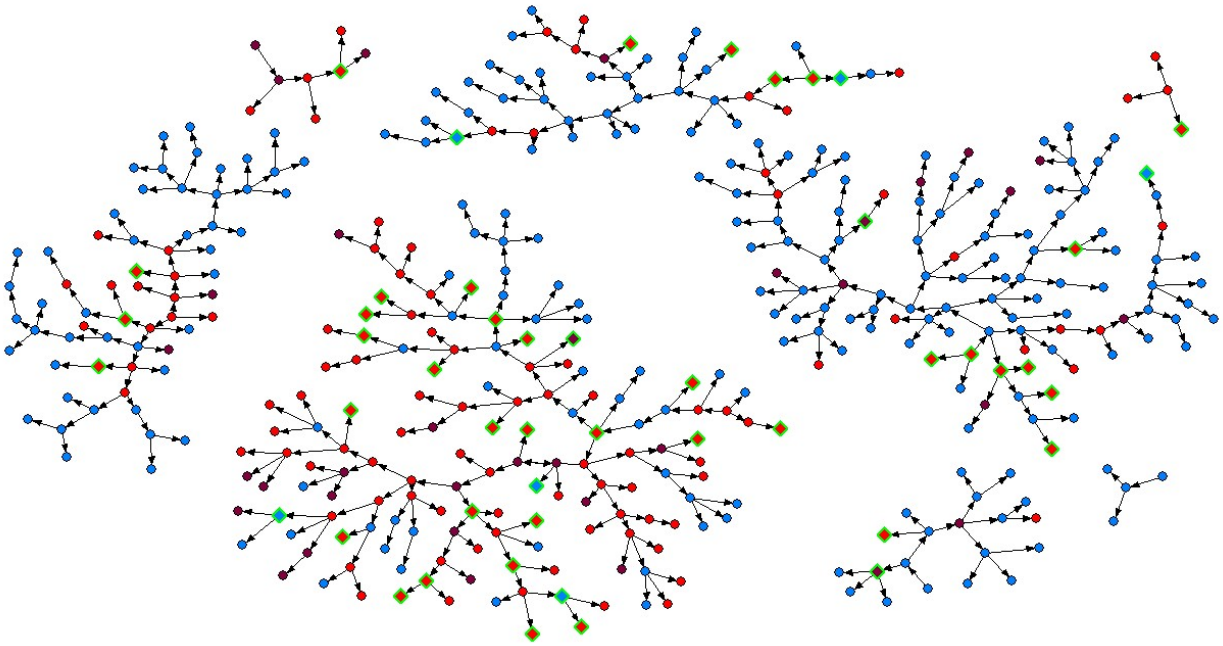
With logistic regression, I assessed the relationship between these multiple aspects of social networks and injection drug use in the past 30 days, injection-related risk behavior, and HIV serostatus. The final models presented included all eligible variables from the individual domains that had an association at the $p<0.10$ level and controlled for age, marital status, type of vessel and number of nights out to sea in the past month.

RESULTS

RDS Social Network Analysis Results

A total of 406 fishermen (including 8 seeds) were recruited, with the longest chain in the sample having over 15 recruitment waves, well in advance of the 5 waves needed to achieve equilibrium. The sample was composed of 8 isolated recruitment chains, including two large chains that made up almost 64% of the data.

Figure 4.1: Recruitment Chains by All Productive Seeds in the Sample Assessing Drug Use in Past 30 Days (purple), Injection Drug Use in Past 30 days (red) and HIV Serostatus (green rim=HIV positive)



A graph of recruitment chains collected in the sample is presented in Figure 4.1. There was visible clustering around drug use status, such that fishermen who had used drugs in the past 30 days (purple nodes) or had injected drugs (red nodes) tended to be more closely tied to other drug users and less closely tied to non-drug users (blue nodes). The visualization of the recruitment chains also suggests more limited clustering by HIV status (green rimmed nodes).

The relationships visualized in Figure 1 are more fully presented in Table 4.1, which shows the recruitment matrix and a brief analysis of some social network characteristics by drug use, risk, and HIV status. Each row represents the status of the recruiter and the columns represent who they recruited. For example, respondents who had recently used drugs (past 30 days) recruited a total of 71 non-drug users. In this study, I observed relatively large numbers of recruitments from each group to their own group, but I observed no exclusive recruitment (i.e., no zero cells). Drug users, both PWID and non-injectors, disproportionately recruited each other, as evidenced

Table 4.1: **RDS Network Characteristics by Drug Use, Injection Risk Behavior and HIV Serostatus**

	Recruitment Values (Transition Probabilities)*			**Adjusted/ Unadjusted Net Size**	**Homophily/ Affiliation**
Drug Use Ever	**No**	**Yes**	**Total**		
No	141 (0.72)	54 (0.28)	195	7.14/37.34	0.344/-0.344
Yes	71 (0.37)	120 (0.63)	191	7.28/25.29	0.357/-0.357
Drug Use Past 30 Days	**No**	**Yes**	**Total**		
No	160 (0.74)	56 (0.26)	216	7.29/36.84	0.368/-0.368
Yes	71 (0.39)	111 (0.61)	182	6.97/24.31	0.339/-0.339
Injection Drug Use Ever	**No**	**Yes**	**Total**		
No	171 (0.74)	61 (0.26)	232	7.18/34.13	0.291/-0.291
Yes	72 (0.46)	84 (0.54)	156	6.93/25.70	0.266/-0.266
Injection Drug Use past 30 Days	**No**	**Yes**	**Total**		
No	186 (0.76)	59 (0.24)	245	7.34/35.33	0.296/-0.296
Yes	76 (0.50)	77 (0.50)	153	6.84/24.35	0.245/-0.245
Shared a Needle or Syringe in Past 30 Days	**No**	**Yes**	**Total**		
No	320 (0.91)	31 (0.09)	351	7.01/31.98	-0.006/0.006
Yes	37 (0.79)	10 (0.21)	47	8.70/27.19	0.142/-0.142
HIV Status	**Negative**	**Positive**	**Total**		
Negative	316 (0.89)	40 (0.11)	356	7.17/32.70	0.048/-0.048
Positive	36 (0.86)	6 (0.14)	42	7.03/22.48	0.028/-0.028

*Rows are recruiters and columns are recruits

by a high homophily score of 0.357 for ever drug use and 0.339 for respondents who used drugs in the past 30 days, which was significantly different than what would be expected under random mixing (Wejnert, 2010). That is, persons who used or injected drugs, ever or recently, tended to

preferentially seek out and associate with other persons who used or injected drugs. Furthermore, for both PWID and drug users who did not report injecting (ever or in past 30 days), the preference for forming and maintaining social ties with other drug-using individuals came at the expense of forming ties with non-drug users and non-injectors, as evidenced by the negative affiliation values. Homophily among drug users was quite high, signifying that people who used and injected drugs were more densely connected to each other, but they were not completely isolated within the larger network of fishermen, as shown in the recruitment patterns in Figure 4.1. As seen in the figure, although there were many instances where drug users recruited one another, forming clusters, there were also cases where drug users recruited and were recruited by non-drug using fishermen.

Only a small proportion of the total sample had shared a needle or syringe in the past 30 days, but the analysis suggests that there was also some clustering by risk behavior such that respondents who shared equipment had a slight preference for other PWID who had shared needles or syringes and slight aversion to those who reported no sharing, either because they did not use drugs, did not inject, or just had not shared equipment in the past 30 days (homophily=0.142, affiliation=-0.142). Importantly, for both respondents who tested positive for HIV and for those who tested negative, homophily was near zero (0.028 and 0.048, respectively), signifying that fishermen frequently intermixed with other fishermen regardless of HIV status.

Another finding was that drug users, on average, maintained slightly smaller personal network sizes than their non-drug using counterparts (see Table 2.2): 6.97 for recent drug users (past 30 days) compared to 7.29 for non-drug users; 6.93 for ever-injectors relative to 7.18 for non-injectors; and 6.84 for recent injectors (past 30 days) compared to 7.34 for non-injectors (network size adjusted). This pattern did not hold for ever drug use. Individuals testing positive

for HIV also had slightly smaller personal network sizes (7.03) relative to individuals testing negative for HIV (7.17).

Table 4.2: Descriptive Statistics for Aspects of Social Networks

SOCIAL SUPPORT	
If you needed to borrow money, how many people can you rely on for support?	
None	28.40 (112)
One or more	71.60 (283)
If you had a problem with your health, how many people can you rely on for support?	
None	23.50 (93)
One or more	76.50 (302)
When you feel upset, angry or lonely, how many people can you rely on for support?	
None	23.00 (91)
One or more	77.00 (304)
When you need advice about personal problems, how many people can you rely on for support?	
None	21.00 (83)
One or more	79.00 (312)
SOCIAL TRUST	
How much do you trust people you work with?	
Not at all/A little/Don't know	68.40 (270)
Some/A lot	31.60 (125)
How much do you trust the police?	
Not at all/A little/Don't know	78.00 (308)
Some/A lot	22.00 (87)
SOCIAL PARTICIPATION	
Is a member of a local mosque, church or other religious or spiritual community	
No/Don't know	72.40 (286)
Yes	27.60 (109)
Participates in religious organizations or activities other than attending services	
No/Don't know	66.10 (261)
Yes	33.90 (134)
Participates in other local organizations (neighborhood associations, unions, sports clubs, political groups)	
No/Don't know	69.90 (276)
Yes	30.10 (119)
Overall, how much of an impact do you think people like you can have in making your community a better place to live?	
None/Small/Don't know	78.50 (310)
Moderate/Big	21.50 (85)
How much do you feel that the people running your community care about what happens to you?	
Not at all/A little/Don't know	66.80 (264)
Some/A lot	33.20 (131)

How much do you feel that people in your community share the same values as you?	
Not at all/A little/Don't know	70.60 (279)
Some/A lot	29.40 (116)
SOCIAL ISOLATION	
How often do you feel lonely?	
Never/Sometimes/Don't Know	88.40 (349)
A lot/All the time	11.60 (46)
How often do you talk to or visit with immediate neighbors? (n=334)	
Several times a month or less	45.80 (153)
Several times a week or more	54.20 (181)
How often do you socialize with coworkers outside of work? (n=346)	
Several times a month or less	37.60 (130)
Several times a week or more	62.40 (216)
How often do you visit relatives?	
Once a month or less	56.10 (194)
Several times a month or more	43.90 (152)

Aspects of Social Networks, Drug Use, and Risk Behavior

Fishermen reported that they knew, on average, 30.63 fishermen (median=9.00), but the number of close friends reported was much smaller with a mean of 4.38 (median=3) (shown in Table 3.1). About 41% (median=0.35) of the fishermen's networks were drug users and 34% (median=0.20) were PWID. In terms of social support, 72% had one or more people they could borrow money from, 77% had one or more people they could rely on if they had a health problem, 77% had one or more people they could rely on when they were upset or angry, and 79% had one or more people they could turn to for advice. At the same time, 21% to about 28% did not have *anyone* to rely on in these circumstances. Trust levels were lower and only 32% of respondents had some/a lot of trust in their coworkers and 22% had trust in the police.

Only about 28% of respondents reported that they were a member of a local mosque, 33.90% participated in religious organizations or activities other than attending services, and 30.10% said that they participated in other local organizations. Overall, respondents reported that

Table 4.3: Results of Logistic Regression Models

INJECTED DRUGS IN PAST MONTH (n=389)	**Odds Ratio**	**(95% CI)**
Age	1.01	(0.98, 1.04)
Marital Status	0.47**	(0.26, 0.87)
Deep Sea Vessel	3.32***	(1.86, 5.93)
Days Out to Sea in Last Month	1.01	(0.99, 1.04)
Social Network: Proportion of Network who Use Drugs	16.94***	(7.73, 37.14)
Social Trust: Level of Trust in Police	0.52*	(0.24, 1.12)
Social Participation: Member of a Mosque	0.52**	(0.27, 1.00)
Social Participation: Feels people like them can have an impact in their community	0.54*	(0.26, 1.11)
HIV POSITIVE SEROSTATUS (n=398)	**Odds Ratio**	**(95% CI)**
Age	1.01	(0.98, 1.04)
Marital Status	0.60	(0.29, 1.28)
Deep Sea Vessel	1.38	(0.69, 2.77)
Days Out to Sea in Last Month	1.01	(0.99, 1.03)
Social Network: Proportion of Network who Use Drugs	3.61**	(1.41, 9.23)
Social Trust: Level of Trust in Police	0.49	(0.16, 1.468
SHARED A NEEDLE OR SYRINGE IN PAST MONTH (n=136)	**Odds Ratio**	**(95% CI)**
Age	1.02	(0.96, 1.07)
Marital Status	0.52	(0.19, 1.46)
Deep Sea Vessel	0.43*	(0.18, 1.04)
Days Out to Sea in Last Month	1.02	(1.00, 1.05)
Social Network: Proportion of Network who Use Drugs	0.81	(0.19, 3.42)
Social Support: Can rely on 1+n person if they have a health problem	0.59	(0.24, 1.43)
Social Participation: Feels people in community share the same values	0.28**	(0.09, 0.88)
Social Isolation: Feels lonely a lot or all of the time	3.16**	(1.10, 9.11)

CI = Confidence interval; *$p < 0.10$; **$p < 0.05$; ***$p < 0.005$

they had minimal impact on their community, with only 22% reporting a moderate or big impact. Similarly, only 33% said that they felt the people running the community cared about them and 29% said people in the community shared the same values. Almost 12% of the sample reported that they felt lonely a lot or all the time. About 54% reported that they visited with immediate neighbors several times a week or more, and 62% socialized with coworkers outside of work several times a week or more. Visits with relatives, other than those they lived with, occurred

less frequently: 44% saw their relatives several times a month or more, while the rest saw relatives once a month or less.

After conducting bivariate and domain-specific multivariate analyses (not shown) to determine which variables from each aspect of social networks to include in a final model, I conducted logistic regression models with all eligible variables for each dependent variable. The results of the final models are presented in Table 4.3. Multiple aspects of social networks were associated with injection drug use in the past 30 days, needle/syringe sharing in the past 30 days, and with HIV serostatus. Network composition, as indicated by the proportion of personal network who used drugs, had the strongest association with recent injection drug use (AOR=16.94). Respondents who were members of a mosque were significantly less likely, though only marginally so, to inject recently (AOR=0.54) as were respondents who reported higher levels of trust in the police (AOR=0.52) and respondents who felt that people like them could have an impact in the community to make it a better place (AOR=0.54). Respondents who were married were less likely to have injected recently (AOR=0.47), but fishermen working on deep sea vessels were significantly more likely to have injected in the past 30 days (AOR=3.32).

Among recent injectors, sharing needles or syringes was significantly associated with measures from the domains of both social participation and social isolation. Fishermen who felt that people in their community shared the same values as them were less likely to have shared needles or syringes (AOR=0.28), while fishermen who reported higher levels of loneliness were much more likely to have engaged in injection-related HIV risk behavior (AOR=3.16). The only aspect of social networks significantly associated with HIV serostatus was network composition. Having a larger proportion of drug users in one's social network was associated with 3.61 greater likelihood of testing positive for HIV.

Complex Role of Social Networks in Drug Use and HIV Risk: Results from Qualitative Data

The qualitative analyses also suggest that multiple aspects of social networks shape risk perceptions and behaviors among drug-using fishermen, but provide a more nuanced perspective on the ways in which aspects of networks can amplify or attenuate risk. Three primary themes emerged from the qualitative data related to the role of social networks in health and risk: social influence, social support, and social participation.

Although I was unable to assess social influence in the quantitative analyses, I found that peers played a large role in how fishermen perceived and managed risk. As Berkman et al. (2000) note, people obtain normative guidance from those around them and shared norms around health behaviors can be powerful sources of social influence. Many fishermen indicated that they initially started using drugs or moved from chasing (smoking) heroin to injecting because of friends and peer influence. For instance, in this quote from a 30-year-old fisherman about the first time he used drugs:

> *My friends. Try it out first, it's fun, just try, have a go, it'll make all the stress whatsoever go away...Ha, like that. I followed because of my friends, so I saw how my friends took drug. After that, I saw how my uncle took drug, so I followed suit. I was influenced by them.*

In this example, peers played an important role in initiation into drug use. However, not all forms of social influence were negative, and peers played an important role in providing normative guidance for protective behaviors as well. A 22-year-old fisherman said:

> *My friend advised me. He said not to share syringes...he said, dangerous sharing syringes, easily contract disease. He said, ah, HIV could be contracted. At that time, I didn't think of HIV, didn't inject. After I started injecting…we've got to be careful with safety...hygiene has to be taken care of.*

As seen in this quote, friends played an important role in providing advice on not sharing syringes.

Social support can come in many forms and vary in terms of frequency; it may be emotional, instrumental, appraisal, or informational (Berkman, et al., 2000). These social relationships are also sources of intimacy and attachment both to other people and to a community (Berkman, et al., 2000). I found that drug users in this study relied primarily on other drug users for information and emotional needs. A 27-year-old fisherman said about the emotional support he receives from friends: "*Sometimes one needs to release tension so when we share, the tension is reduced."* When asked who he talks with, he said: "*Usually with close friends. Not with my family members. I have never expressed nor share with my family...Hmmm usually among drug addicts, we usually look for our own circle."* Fishermen reported that friends and fellow drug users were much more likely to be sources of emotional support than family because they understood what it was like to be a drug user and therefore were not as judgmental. They were also sources of information, for better or worse, as sometimes the information they provided was incorrect and a number of myths about how to clean equipment were propagated among fishermen: many reported that they heard that air could kill germs so they would blow on syringes to "clean" them.

Friends were not as often reported as sources of other kinds of support. When it came to needing financial support, family was the primary source. In talking about the lack of economic support he receives from friends, a 40-year-old fisherman said: "*Friends are there only when we are well off. When they know that we have a hard life, they won't even look at us. They look at us… from far away they will run. Can't depend on friends."* Because they were users, however, some families eventually stopped giving. Skippers provided another important source of financial support.

In the sense that "networks define and reinforce meaningful social roles and provide a

sense of value and belonging," they are important to a sense of social participation or engagement (Berkman, et al., 2000). Participation in broader society and community can also provide a "sense of identity and opportunities for companionship and sociability" (Berkman, et al., 2000), which can impact stress and health outcomes and how easily people can navigate risk. A 30-year-old fisherman provided an example of the social marginalization that people who use drugs face: "*It's bleak. I take drug, others...others despise me. The society, ha, others despise me. It's as if I have been imprisoned, like this, they won't accept me if I want to work for the government...don't you agree?"* This fisherman wanted to leave the fishing industry and find more stable work with the government, but his history as a drug user and having been imprisoned impeded that, excluding him from broader society and the life he wanted. At the same time, while broader society shunned drug users, drug-using fishermen turned to other drug users for meaningful relationships and a sense of value and belonging. Talking about the sense of community that drug users have, a 27-year-old fisherman said: "*As a drug addict myself, it doesn't matter where I am, we sort of have some connection with those who are similar like us. It's just among us.*"

In many ways, the qualitative findings are consistent with the quantitative results, providing greater validation of the results; however, they also provide a deeper look at how various aspects of social networks operate in the lives of people who use drugs and play a role in amplifying and attenuating drug use and HIV risk behaviors.

DISCUSSION

To understand HIV risk more fully from a social perspective, this research examined multiple dimensions of networks as key social determinants of health that drive drug use and HIV risk behaviors. The results suggest that aspects of social networks, including social support,

social trust, social participation, and social isolation may be driving both risky and protective behaviors.

The RDS analysis of network structure indicated that both PWID and non-injectors tended to preferentially seek out and associate with other persons who used or injected drugs and that the preference for forming and maintaining social ties with other drug-using individuals often came at the expense of forming ties with non-drug users and non-injectors. Although there was no evidence of clustering by HIV status, there was some evidence that respondents who reported injection-related HIV risk behavior had a slight preference for other PWID who had shared needles or syringes. In the regression models, however, network composition was the primary predictor of recent injection drug use and HIV serostatus: the greater the proportion of drug users in one's network, the greater likelihood of injecting drugs in the past 30 days and of testing positive for HIV. Many studies demonstrate that larger PWID networks result in greater social pressure and more opportunities to share needles (Latkin, et al., 1996; Neaigus, et al., 1994); however, in this particular analysis, I did not find a significant association between needle/syringe sharing and size of PWID network. It is unclear from the data why this is, but it is possible that other aspects of networks included in the models, which are discussed below, moderated some of the negative effects of drug network composition on risk behavior.

Overall, the qualitative and quantitative findings demonstrate that levels of social support were quite low among drug using fishermen. Based on the qualitative analyses, even for those who had some form of social support, feelings of depression and isolation were common among men and many reported using drugs as a way to alleviate some of these negative feelings. This is consistent with literature suggesting that social exclusion can negatively affect health (Metsch, et al., 1998; Siegrist, 2000) and literature that points to drug use as a coping mechanism (Metsch, et

al., 1998). I also found that social support in the form of having one or more people to rely on if a health problem arises was negatively associated with sharing a needle/syringe. In this context, social support showed some protective effect. Considering that networks are an important source of information (Kasperson, et al., 1988), it may be the case that respondents who can rely on others for support with health-related issues are also receiving risk reduction information that they can then use to protect themselves from injection-related risk (Frey, et al., 1995; Metsch, et al., 1998; R. Power, et al., 1994; Zapka, et al., 1993). At the same time, I found no significant relationship between social support and recent injection drug use or HIV. Other studies also show the complex role of social support: Suh et al. (1997) found that social support was a risk factor for needle/syringe sharing in large networks, but that in small networks, needle sharing only occurred if they lacked social support. The authors argue that this may be due to the connection between needle-sharing and social bonding, which was a theme that emerged from the qualitative data.

Social participation also played a role in drug use, needle sharing and HIV risk. Greater integration into the community, exemplified by membership in a mosque and feeling like they had an impact on their community, was associated with a decreased likelihood of recent injection use. As discussed, increased religiosity has been linked to decreased HIV sexual risk behavior (Shaw & El-Bassel, in press), but here we see a connection between religious participation and drug-related risk behavior. Although less attention has been paid to religiosity and drug use, one study in Chicago looking at the connections between participation in Christianity, Islam, or Judaism, found the opposite: subjects with stronger religiosity were more likely to share injection equipment (Hasnain, Sinacore, Mensah, & Levy, 2005). Future research needs to explore the connections between religion and HIV prevention among drug-using fishermen in this

population, as well as drug-involved populations, more broadly. Social connectedness, more broadly (feeling that others shared the same values), was also protective, which would suggest that social participation and inclusion of drug users is an important strategy for reducing harm (Metsch, et al., 1998; M. Siegrist & Cvetkovich, 2000). This is not surprising given the marginalization of drug users in most contexts.

Drug-using fishermen talked a lot about the social exclusion they felt in the village, but this only served to tighten relationships and networks among PWID, which can lead to increases in risky practices. As others have demonstrated, sharing of needles can be a form of close social bonding (Suh, et al., 1997), and in the context of social isolation and loneliness, these relationships may become that much more influential. The qualitative data, in part, supports this interpretation: the social influence of drug-using peers, for some fishermen and some of the time, decreased the perceived risk involved in drug taking or sharing needles. At other times, it provided a way to manage risk by providing norms of protecting one's health and not sharing (Frey, et al., 1995; Zapka, et al., 1993).

When considering these results in tandem with the findings of the RDS network analysis, I find that drug-using fishermen associate to a much greater extent with other drug users, in part, because they fail to feel a sense of belonging in the community. This marginalization stems from stigma against drug users, but also the highly punitive environment in which drug users subsist. Malaysia has some of the harshest drug policies in the world. Despite the government's public commitment to harm reduction, drug use is highly criminalized and the government has set a goal of a "drug-free Malaysia" by 2015, which includes "forced drug testing at roadblocks, factories, and schools, registration of offenders, flogging and/or imprisonment of those convicted of possession of illicit substances, and prolonged compulsory institutionalization of those with a

history of illicit drug use" (IHRD, 2008). Not surprisingly, levels of social trust for PWID were generally low, but higher levels of trust in the police were protective and associated with a decreased likelihood of recent injection drug use. Given these findings, addressing stigma against drug users through both police practices and through greater integration in the broader community could have the potential to reduce harm among PWID.

In this study, occupational and drug-using networks overlapped within a particular risk environment context. As discussed in the previous chapter, the fishing industry was steeped in a culture of drug use, but the results presented here also indicate that these networks provided a sense of community for those who needed it. In the context of this risk environment and in the absence of social inclusion, the relationships within networks of drug users were the primary source of normative guidance related to health and risk. Social network relationships operated in ways that were both protective and harmful, but highlight the ways in which engagement in or abstention from HIV risk behavior may be motivated by the need to preserve social relationships rather than by concerns around health (Hirsch, et al., 2010). From this perspective, our understanding of the connections between social networks and risk, in general and with regard to PWID, is complicated by its intersection with the occupational context. Overall, these findings demonstrate that network relationships serve as immediate constraining and enabling structures that influence men's ability to protect their health. Future research needs to explore how aspects of social networks, such as support, participation, trust and isolation, operate within work environments to shape drug use and injection-related risk behavior.

CONCLUSION

In this Malaysian fishing community, the experience of drug users was intricately tied to their social relationships and networks in a way that, when combined with broader social

structures, created a specific local risk environment. Fishermen who used drugs interacted more with other drug users and looked to them for advice, support, information, intimacy, attachment and community. This sense of community was incredibly important for support and shared identity, but because it was also a direct result of social marginalization, there were real costs in terms of health and risk. For some fishermen, these relationships translated into a false sense of safety, with sharing needles/syringes deemed less risky for close friends or coworkers. Overall, the results point to the multidimensional role that social networks play in shaping risk and health and suggest, like theories of risk environment and networks posit, that these networks are an essential part of both reducing harms, through the fostering of protective behaviors, and creating risk through the potential negative effects of social influence and marginalization. In the next chapter, I talk about the male-dominated nature of the fishing industry and how masculinity shapes risk behavior.

CHAPTER 5

MASCULINITY AND DRUG-RELATED RISK BEHAVIOR: THE MAKING OF THE (FISHER)MAN

It is theorized that health is a "means for demonstrating … masculinities," such that the very practice of being a man can result in beliefs and behaviors that undermine health and drive risk (Courtenay, 2000). Gender is a primary way in which relationships are organized and gender is widely acknowledged as a social determinant of health; however, there is a dearth of research on masculinities and men's health in Southeast Asia, and in relation to drug use, in particular. Thus, examining risk behavior in the context of fishermen's everyday gendered lives and social interactions provides a useful lens through which to understand both HIV risk and how social structures shape health behaviors. Gender and masculinities intersect with other social determinants, like occupational, sociocultural and political economic structures, to shape health and risk.

In this chapter, I focus specifically on the contestation and negotiation of masculinity, which as Ong and Peletz (1995) note, is a "dialectical relationship informed by everyday social process and the broader realities of political economy and historical change" (pg. 10). In this Malaysian context, the organization of labor within the fishing industry in terms of gender, ethnicity and social class, shapes the social interactions of fishermen and their everyday lives in ways that affect health. Specifically, men's position in the social hierarchy relative to other men

shapes what masculinity looks like and drives social vulnerability in ways that may affect health. Given these factors, the relationships between and differences in health *among* men are of primary interest in this context. In this chapter, I discuss how the marginalization of drug users makes them more likely to engage in injection-related risk behavior that can lead to HIV. In particular, I focus on the social construction of masculinity and the linkages to health, asking: 1) what does it mean to be a man and a drug user in Malaysian fishing communities? and 2) how do conceptions of masculinity shape drug-related HIV risk behavior? I argue that the pursuit of manhood intersects with drug use in ways that affect risk behavior and health.

BACKGROUND

According to Connell (1987), social structures and social practices interact to both challenge and maintain the existing gender order, but this extends beyond relationships between women and men to the relationships *between* men. Connell (2005) describes masculinity as a configuration of gender practice that is "simultaneously a place in gender relations, the practices through which men and women engage that place in gender, and the effects of these practices in bodily experience, personality and culture" (pg. 71). In Connell's (2005) framework, there are multiple categories of masculinities that are hierarchically organized and tied to structures of domination. The dominant or "hegemonic" masculinity, which "embodies a 'currently accepted' strategy" of manhood, defines relationships between men and women and among men (Connell, 2005). Hegemonic masculinity represents the dominant cultural ideal of manhood and provides a frame or model that men use to judge how successful they are at achieving manhood, but ultimately serves to maintain patriarchal structures.

Hegemonic masculinity is closely tied to cultural dominance, but it is also fluid and can be contested: gender interacts with other social structures, like class and race/ethnicity, to create

"marginalized masculinities" built on the domination or subordination of different classes or races of men (Connell 2005, pg. 80-81). These categories of masculinity regulate men's lives, serving as "configurations of practice generated in particular situations in a changing structure of relationships" (Connell 2005, pg. 81). However, masculinities are constructed and negotiated, not just at the structural level, but also in men's everyday lives, and understood and experienced through daily practice (Coles, 2009; Lusher & Robins, 2009; Pringle, 2005). The construction of masculinities, then, is both situational and performative (Gutmann, 2006), with men constructing their gendered selves in relation to their positions within hierarchies of class and ethnicity.

This lived experience of "being a man" is illustrated in scholarship on masculinity that focuses on the social construction of gender, examining how men negotiate masculinity in their daily lives. For instance, Butler's (1990) work on "performativity" argues that gender is performative and created through a "set of repeated acts within a highly regulatory frame." Using Butler's framework, Evans (2005) notes that "not only must gender be done, but it must be seen to be done, again and again" because "how well one performs tasks and the actual performance of those tasks determines one's place in a masculine hierarchy." In this sense, masculinity is fluid, but rests on social acts of manhood that change over space and time. West and Zimmerman (West & Zimmerman, 1987), in their discussion of "doing gender," also argue that gender is not a fixed identity, but rather is accomplished through individual acts that are recreated in everyday social behaviors. It is the combination of the structural aspects of gender proposed by Connell and the everyday practice and routine of gender performance that inform this research on drug use and men's health.

When assessing the relationship between gender and health, these theories point to the need to understand how larger social structures work to construct masculinities and shape

individual actions and experiences related to health and risk. As Courtenay (2000) notes, "the construction of health and gender do not occur in isolation from other forms of social action that demonstrate differences among men [and] health practices may be used simultaneously to enact multiple social constructions." Courtenay also argues that "masculinities are defined against positive health beliefs and behaviors" because the social practices that undermine men's health, like embracing risk or ignoring health needs, are "often signifiers of masculinity and instruments that men use in the negotiation of social power and status." Focusing solely on the ways that masculinities are in opposition to healthier behaviors, however, neglects to identify the ways in which the relationships between men can also promote protective behaviors, as demonstrated in the last chapter on social support between fishermen.

There is ample evidence to suggest that gender is associated with health behaviors and outcomes (Galdas, et al., 2005; Mahalik, et al., 2007), but much of the research on men's health focuses on differences in health-related help-seeking behavior, arguing that culturally dominant forms of masculinity are a primary reason for men's risky behaviors and poor health. This body of literature argues that men are not permitted to be as expressive in their illness behavior (Robertson, 1994), that weakness and a need for help do not conform to socially appropriate male roles (Courtenay, 2000), and thus, that "traditional masculine behavior" explains delays in men's help-seeking (Galdas, et al., 2005). This treatment of "men's risky behavior" takes risk and health out of context, however. As I already discussed, in terms of drug use, risk behavior among fishermen is tied to their work environment and to social network relationships in intricate ways.

In the context of HIV, there is a large body of research focused on masculinity and sexual risk behavior, both among men who have sex with women and men who have sex with men.

Research on fishermen and HIV also focuses predominately on sexual risk behavior (Appleton, 2000; Entz, et al., 2000; Karukuza & Bob, 2005; Kissling, et al., 2005a; Samnang, et al., 2004; Tanzarn & Bishop-Sambrook, 2003). One argument for why fishermen are at greater risk for HIV is that the nature of fishing as a high-risk occupation can contribute to a culture of risk denial or risk confrontation, which extends to risk taking in the social or sexual arena, either as a way to cope with the stresses of the job or as an expression of exaggerated or oppositional masculinity (Kissling, et al., 2005a). Masculinity in this context often includes the expectation of multiple sexual partners and alcohol use (Kissling, et al., 2005a). Indeed, studies suggest that when fishermen return to shore, alcohol use is common, as is engaging in sex either with sex workers or casual partners (Entz, et al., 2001; K. Ford & Chamratrithirong, 2008). However, this research fails to adequately assess drug use among fishermen and how masculinity shapes risk apart from sexual behavior.

Research on drug use and masculinity is more limited, but has focused on the linkages between "aggressive masculinity" or "machismo" and higher risk for drug use (Kulis, Marsiglia, Lingard, Nieri, & Nagoshi, 2008) or higher levels of "masculine gender role stress" and more severe drug dependence (Lash, Copenhaver, & Eisler, 1998). Similarly, research has shown that young men who adhere to more rigid views of masculinity, including male dominance over women, are more likely to abuse drugs (Pulerwitz & Barker, 2008). These associations are sometimes explained by highlighting the linkages between being a "real man" and engaging in risk-taking behavior (Mane & Aggleton, 2001) and that drug or alcohol use as risk-taking behavior reinforces male bonding (Fordham, 1995; VanLandingham, Suprasert, Sittitrai, Vaddhanaphuti, & Grandjean, 1993). Alcohol and drug use can also enhance social status and

drug use and dealing can serve as a means to constructing a powerful masculine identity (Collinson, 1996).

In these ways, risk-taking is treated as part of the construction and negotiation of masculinity. In particular, research suggests that engagement in the drug-related informal economy is an assertion of an oppositional identity; unfortunately, this often becomes the basis for further marginalization (Anderson, 2013; Bourgois, 1995). This work talks about drug use as a form of resistance against hegemonic masculinity: Connell (2005) and Messerschmidt (2000) describe the oppositional masculinity of marginalized young men as "protest masculinity," which reworks themes of hegemonic masculinity in the context of poverty. In this context, dominance within the marginalized group is demonstrated through the overemphasis of masculine behaviors, such as risk taking. This dissertation extends this work, to discuss how masculinities are constructed through drug use in this particular occupational context.

In contributing to this literature, I discuss what it means to "be a man" in the context of fishermen in Kuantan, and argue that the achievement of masculinity has real effects on their health. Similar to previous work on masculinity and drug use, I argue that drug use marginalizes men, but that it is also occupationally sanctioned in a way that threatens men's health. This research advances our understanding of the social drivers of men's health and risk behavior, while also highlighting the ways in which gender operates within larger social contexts to create social vulnerabilities. I also contribute to a small, but growing body of research on men and masculinities in Southeast Asia (M. Ford & Lyons, 2012), which is discussed more below.

Masculinities in Context: Men and Masculinities in Malaysia

In Malaysia, and many other parts of Islamic Southeast Asia, gender and the differences and similarities between women and men are often discussed in terms of *akal*, which denotes

"reason" ("rationality" or "intelligence"), and *nasfu*, which translates into "passion" (Peletz, 1995). Although *akal* distinguishes man from animal and is a "gift from God," *nasfu* is associated with "desire," "animality," and "lust" (Peletz, 1995, pg. 88-90). Men are believed to have greater "reason," while "passion" is more entrenched in women.[8] As described by Peletz (1995, pg. 88-90), *nasfu* has a negative connotation because it indicates a lack of restraint, or weakness:

> Restraint and control of the inner self are strongly marked moral virtues, the attainment of which brings prestige. Conversely, the absence of restraint indicates a lack of virtue and gives rise to stigma. "Reason" is then central to moral evaluation and to creating hierarchies of prestige (Peletz, 1995, pg. 93).

Peletz (1995, pg. 91) notes that Malays see "reason" and "passion" as in constant struggle within individuals and that "'good behavior' (*budi baik)* is evidence of the preponderance, however temporary or qualified, of 'reason' over 'passion,' just as 'bad behavior' (*budi jahat*) reflects the dominances, however short-lived or partial, of 'passion' over 'reason.'" The concepts of *akal* and *nasfu* may also suggest an understanding of masculinity that is somewhat distinct from that in much of the Western world, in the sense that to "exert force, to make explicit commands, or to engage in direct activity – in other words to exert 'power' in the Western sense – reveals instead an absence of effective power" (Errington, 1990).

In Southeast Asia, the construction of gender is also closely tied to postcolonial development characteristics in the region, including "uneven capitalist development ... depeasantization, labor migration, the growth of consumer culture, the rise of newly affluent middle classes, the relative strength and legitimacy of the state in the region, and the prevalence of overt state policies of ideological control" (Ong & Peletz, 1995). Global economic

[8] Although "reason" and "passion" are discussed here in the context of Islam and Southeast Asia, similar configurations have been identified in other regions of the world; for instance, in Wardlow's work in Papa New Guinea (see *Wayward Women: Sexuality and Agency in a New Guinea Society*).

restructuring has shifted the organization of labor in Southeast Asia, affecting the working lives of men, the cultural meanings attached to masculinities and what it means to be "a man," and gender relations, more broadly (M. Ford & Lyons, 2012). Malaysia is no different: as discussed in greater detail in Chapter 2, the fishing industry has undergone substantial commercialization, which had an impact on the control over the means of production and both gender and ethnic relations. On the one hand, the concentration of economic power among ethnically Chinese Malays as boat owners and captains left many Malay fishermen with less power and lower in the social and economic hierarchy of the fishing industry. At the same time, commercialization resulted in an increase in deep sea fishing, which means that many fishermen stay out at sea and away from home longer, increasing conditions of gender segregation in the fishing industry.

Globally, fishing is an occupation with a well-defined gendered division of labor. One study on fishermen suggests that "gender structures fisheries work and its cultural meanings for men," delineating men's work and male spaces, providing its symbolic meaning and thus, contextualizing risk and safety in very specific gendered ways (Power, 2008). Although ships and the sea tend to belong to men, women more often work on shore or in shallow waters. The exact delineation of these spaces varies cross-culturally and historically, but there is a long history of gender segregation in the fishing industry and other seafaring occupations, as evidenced by commonly held lore related to women as bad luck on boats (Firth, 1966; Yahaya, 1994). That is not to say, however, that women are not involved in the fishing industry.

The roles of women in Malaysian fisheries have been in transition as the industry has become more commercialized. Women's participation in small-scale fisheries consist of a range of activities, including fishing in shallow waters or from shore, which may be either for subsistence or for local markets; work in fisheries-related activities like unloading, sorting,

gutting, and net mending; home-based production of fishing products; and, to some extent, fish trading and marketing in local markets (Yahaya, 1994). The commercialization of the fishing industry has resulted in the rise of industrial fish/prawn processing plants, where women are involved in the cleaning, drying, curing and packing of fish crackers, fermented fish or sauce, fish balls, shrimp paste, and dried fish products (Yahaya, 1994). However, the scale of women's contributions to the fishing industry, which have more often been in small-scale fisheries, has been eroded as the industry has become more commercialized (Yahaya, 1994). As a result, fishermen's social interactions are increasingly limited to other men as time on boats increases and women's participation in fisheries decreases. Given the current organization of the occupation of fishing, I assess how masculinity may drive risk behavior among drug using fishermen.

METHODS

Measures

Items assessing masculine ideology stem from three different types of measures: 1) Personal Attitudes towards Gender Roles and Relations; 2) Community Sex Peer Norms; and 3) Masculinity and Drug Use. Exploratory principal-axis factor analysis with Varimax rotation was used to identify potential subscales. Qualitative data was incorporated to explore meanings related to what it means to be "a man" and drug use.

Personal attitudes towards gender roles and relations included 7 items on sexual and personal ideas of intimacy, pleasure, power, and gender equality (pulled from Hirsch et al. 2009 and Pulerwitz and Barker's 2008 GEM scale). Response options included 'strongly agree,' 'agree,' 'disagree,' or 'strongly disagree.' Subscales were selected using factor analysis. Factor analysis produced two main factors, one on sex and gender relations and one focusing on the

performance of masculinity. These factors had an Eigenvalue of 2.611 and 1.071, respectively, explaining 52.51% of variance, cumulatively. Factor 1, on sex and gender relations consisted of 3 items and had a Cronbach's alpha score of 0.671, which is acceptable, while Factor 2, on the performance of masculinity, included 2 items and had a Cronbach's alpha score of 0.561, which is low. Higher scores on the subscales indicated more normative masculine attitudes.

- *Sex and Gender Relations Subscale (3 items):* 1) Men need sex more than women do; 2) It's important for me that a woman be a virgin when she marries; and 3) A man should have the final word about decisions in his home.
- *Performance of Masculinity Subscale (2 items):* 1) If someone insults me, I will defend my reputation, with force if I have to; and 2) It disgusts me when I see a man acting like a woman.
- *Items excluded during factor analysis:* 1) A guy will lose respect if he talks about his problems; 2) I don't think a man should have to do housework.

Community Safer Sex Peer Norms included 7 items assessing perceptions of community gender and sexual norms related to condom use and responsibilities for protecting sexual health. A number of items were reverse coded before creating dichotomous measures. Items were dichotomized into the following categories: 'strongly agree/agree' (or 'strongly disagree/ disagree' in reverse coding) vs. 'neutral/disagree/strongly disagree' (or 'neutral/agree/strongly agree' in reverse coding) to isolate more strongly expressed views. Final items for the composite scale were selected using factor analysis. Factor analysis produced one main factor, which focused on sexual attitudes in the community, with an Eigenvalue of 2.388 that explains 34.111% of variance. This factor, which consisted of the summed score of 5 items, had a

Cronbach's alpha score of 0.619. A higher value indicated that the respondent perceived that men in his community had more normatively masculine sexual attitudes and behaviors.

- *Community Safer Sex Peer Norm Subscale (5 items):* 1) In general, most men in my community use condoms during sex (reverse coded); 2) Most married men in my community have sex outside of marriage; 3) Most men in my community use condoms when they have sex with other sexual partners or their girlfriend (reverse coded); 4) Most men in my community use a condom when they have sex with a sex worker (reverse coded); and 5) Most men in my community take responsibility for protecting their sexual partners from HIV and STIs (reverse coded).
- *Items excluded during factor analysis:* 1) Most men in my community think it is okay to have more than one wife; 2) Most men in my community have sex with sex workers.

Masculinity and Drug Use was measured by one item assessing the respondent's attitude towards drug use and masculinity, based on the respondent's level of agreement with the following statement: "Men who use drugs are not real men." Responses were recoded into a dichotomous measure indicating 'strongly agree/agree' vs. 'disagree/strongly disagree.'

Qualitative data were pulled from questions asking about views on gender, masculinity, and sex as well as descriptions of drug use. Specific questions about gender and masculinity include:

- *Gender, Masculinity, and Sex:* 1) What is the difference between boys and men? How do boys learn to be men?; 2) How do young men and boys learn about sex and relationships?; and 3) What are the different things that men and women should do in marriages or relationships?

- *Drug Use*: includes questions about drug use contexts, the effect of drug use on personal lives, and stigma.

Data Analysis

Descriptive statistics on all original items and composite measures were conducted as were bivariate logistic regressions on masculinity predictors and a range of injection-related risk behaviors (not shown). The primary outcomes of interest were engaging in ANY injection risk behavior and having engaged in receptive needle or syringe sharing one or more times in past 30 days (defined in Chapter 2). Multivariate models controlled for age, marital status, education level, whether the respondent worked on a deep sea vessel, and HIV knowledge. Composite measures determined in factor analysis were entered simultaneously into multivariate models.

RESULTS

What does it mean to be "a man"? Results from In-Depth Interviews

Based on 28 in-depth interviews with fishermen who used drugs, I explored the process of learning to "be a man," what it means to be a good man and how that is tied to marriage, and also how drug use challenged men's ability to the fulfill social expectations related to how to be a good man.

The process of learning to "be a man" was closely tied with male homosociality and was dependent on imitating and learning from older males (family, friends) and from male peers. For many, older men were an important source of information. For instance, a 42 year-old Malay man describing how he learned about what it means to be man said:

> *I mixed with many older people. I asked about knowledge. I learned a lot about family problems. I asked the elder folks, old people...not very old, something like my age now. They're like my elder brothers, correct? I chatted with them. From there I learned bit by bit. I've learned from them*.

The behaviors gleaned from older men varied. For some, they learned about the socially desirable aspects of the transition to adulthood. According to a 34 year-old Malay fisherman, boys "*learn by looking, from what dad and mom say, [the] things to do, things not to do*." This man goes on to say that he saw "*people who are married...looks nice. Want to feel that thing, we also want to feel that thing*." Another man (Malay, 40 years old) said he looked to his older brother as a role model: "*My brother. Looked at him. So nice, easy life, he had a wife [and] kids*." In these circumstances, older males were a source of information and inspiration about the social expectations of manhood.

But men also learned about sex, drugs, and crime from older males. For instance, a 35 year-old Chinese man described the process of interacting with older males in the following way:

> *When I was young, the company I mixed with, all of them were much older. I was only 13 then. The people I mixed with, all of them were in their 20s, 30s and 40s....I was listening to what they said so I could learn many things. Because I didn't go to school. You know...those days, there're lots of 'lou toh chai'...'Lou toh chap pin' too. Their gift of the gab, just imagine. They could turn black into white. [They were] conmen. If they wanted to cheat you they would, no matter what. How impressive. We wanted to learn it, so we wanted to mix with them, listen to them. If they shared with us, we'd learn from them. Later we'd use the tricks, added a little here and there, used the tricks on the girls. See whether it worked. If the girls fell for it, it means the trick worked. If they didn't fall for it, meaning it didn't work.*

Once he reached his teens, this man joined the Triad, a Chinese organized crime syndicate, became a drug pusher, and ran into extensive trouble with the law, taking his cues from the men around him.

Older men were influential to the process of becoming a man because they served as role models. A 30 year-old Malay man explaining how adult men played an important role for young boys, said that older men were like "*an idol. Because we, the young boy...we will follow their talk, their rules. We talk, we think they will listen*." He goes on to say that boys "*follow what is in front. For example, if in front of them...in front of them is an adult, he will follow what the adult*

does. The adult drinks, takes things [drugs], sex, he will perhaps do it too. If he is aware, he sees his father injecting, he will be involved in it too." He adds that not every boy falls prey to this, depending on their circumstances, but notes that peers play a role in shaping behavior and ideals of manhood as well.

As discussed in Chapter 4, interactions with male peers were an important part of how boys learned about drug use, but they also learn about sex and gender relations from their male peers. A 32 year-old Malay man said:

> *In my opinion, [a young man]…learns from following his friends. But most teenagers now, they follow more the bad things rather than the good things now. Because I see them, like, when they use drugs, they go levels by levels. If they [don't] die at one level [of drug use], they will move on to the next level. There are always new levels. Ha, now the whole village is abuzz, ha. A teenage boy, age 15, 16 years old, already using drugs in this village.*

As illustrated in Chapter 4, drug use initiation is often a social activity between male peers and an expression of male homosociality. In terms of sex, most men interviewed said they first discussed sex with male peers and for many, their first exposure came in the form of watching pornography with friends. First sexual experiences, if they had ever been sexually active, were also often in the presence of male peers, either with a prostitute or with a *bhosia*, which is the term used for a local "loose girl."

Pressure from male peers to have sex, with a prostitute for instance, was also sometimes an issue for men, even in adulthood. For example, a 30 year-old Malay man who was unmarried and had never had sex said that though sex was a private matter that he does not discuss with his friends, they did ask him questions and invited him to the brothel, on occasion. His refusal had the potential to result in teasing from his friends:

> *Yes, they ridiculed me, making fun of me...They made fun of me, don't you have balls? Like that. I just let them be. As I live in this world, I think for myself. Why would I want*

> *to commit sin, adultery? I don't pray and all that, [but] why would I want to add on to my sins*?

This sentiment, that male peers put pressure on them to have sex, was echoed by other, though not all, men. Men mentioned the "*big egos*" of some men that lead to embarrassment for men who refused to engage in sex, especially when they were made fun of for not having "*enough energy*." Though many men indicated that their friends just "*tease*" and they did not face pressure at all, simply saying no when they were uninterested in joining their friends in sexual escapades. Although there is certainly more than can be discussed in terms of respondent's early sexual experiences, it is not the focus of this analysis, so is not included here. Collectively, boys' interactions with and imitations of older males and peers laid the groundwork for their understanding of manhood, including what it means to be "a man."

When asked to discuss what characteristics make a "good man," fishermen mentioned things like being hardworking, trustworthy, respectful, honest, having financial stability, and praying. However, most respondents, regardless of their marital status, spoke about manhood in relation to being a husband and the head of family, so being able to take care of your family, wife and children, were also important markers of successful masculinity. This was illustrated by a 40 year-old Malay man who said that to be a good man, he must "*know himself...but generally, what makes a man like a man, [is to] become a good husband.*" Taking care of the household was seen as a "responsibility" of men. According to a 42 year old Malay fisherman:

> *The responsibility is heavy...you must work to earn a living, take good care of your family. You need to be responsible for your children's food. If they get sick, fever, the burden...yes, he's the head of the family. Agree? He's responsible for everything. Like, the children, food and drink and everything. Must be comfortable. There should be enough food. Like, I want to go to the sea for 10 days, I need to plan - 10kg of rice is not enough. I'll buy another 5kg. I'll be worried. I need to take care of them*.

The ability to provide material contributions to their family was highly important to men, both in terms of how their family and community viewed them, but also how they viewed themselves.

In addition to the provision of material needs, like money for food and shelter, many men discussed the need to be there emotionally for their wife, girlfriend and/or children. Specifically, some men mentioned having shared honesty and respect with a female partner and the need to "*be sensitive to [their]...feelings.*" Prayer was also repeatedly mentioned as an important part of being a good husband, or alternatively, being a good wife.

Drug Use and Masculinity: Results from In-Depth Interviews

Descriptions of the social expectations of men and ideals of masculinity were fairly consistent across respondents, but being a drug user presented numerous challenges to the accomplishment of appropriate, or rather what was deemed socially respectable, manhood. Some respondents made distinct contrasts about their life before and after drugs, indicating that that their pathway to manhood was disrupted by their introduction to drug use. For instance, a 22 year-old Malay fisherman, said that as a child he "*didn't know anything yet, hmm, teenagers are freer. After getting involved in drugs - not free*." When he was then asked whether he preferred life as a child or an adult, he said that he preferred "*the time before being involved in drugs. After getting involved [with drugs]...I become like what I am now*." He explained that once he started using drugs he "*lost everything,*" he broke up with his girlfriend because "*all the sweet memories were gone,*" and he was no longer able to "*trust her.*" For this young man, drugs altered his path to the adulthood he imagined for himself and stood in the way of his ability to maintain a relationship. Drug use had left him feeling like he lost his freedom and things that were important to him; yet, he said he was unable to stop using drugs.

For many respondents, being a drug user stood in direct opposition to "*being a good man*." In particular, men indicated that the use of drugs created a tension related to the societal expectations of manhood. A 19 year-old Malay fisherman said that in society's view, the characteristics that a man must have are that he is "*good in praying, doesn't take drugs, [and is] good to the society*." In turn, quitting drugs was the goal for becoming a better man, but this was not always something that men felt was within their reach. As a 50 year-old Chinese man noted, a man must "*tak[e] care of the household, quit taking drugs. We know that, but...it's not that we don't know about it, but we can't do it*." Similarly, a 25 year-old Malay man, saw quitting drugs as a important part of being a good husband and father: "*like me, an addict. When I'm married...we need, we have to be more responsible. To stop [drug], [but] I'm not sure when. This is a big responsibility, like being responsible for my kids at school. It's a heavy responsibility."* Other men voiced similar concerns about their abilities to take care of their family because imprisonment due to drug use meant long stretches where they were no longer able to contribute to the well being of their family.

Two married men, however, discussed the ways in which they saw themselves as successful men, despite their drug use. A 36 year-old Malay man, for instance, said that he was a good husband because his wife believed he was a good husband. When describing the characteristics that are essential to being a good husband, he echoed the sentiments of most other men in terms of not using drugs and being more responsible: "*He has to be a good person. Not doing anything bad. They have to be a good husband. For example, don't take drugs, whatever. You have to be on time when you go to work. If it is time for prayers, you pray. Pray. Be more responsible*." Yet, when asked if he thought he was a bad husband given that he said that not taking drugs was important to being a good partner, he responded: "*I don't know...haha. That*

depends on my wife. She has the impression that I'm good. So, I'm good. If not, no." Another man (Malay, 36) said that though he wanted to stop using drugs, it was too difficult; however, thinking about his wife's and children's future helped him to limit his daily intake of drugs and not run from the responsibility of caring for them, despite the challenges. In other words, these men were taking care of their families and thus felt like they were working to be good men and husbands, despite societal impressions of drug users.

Drug use further challenged masculinity by limiting men's ability to realize socially valued goals related to occupation and marriage. As discussed in Chapter 3, fishing was a viable occupation for drug users, providing access to the formal wage economy in a less stigmatizing environment; however, it was not the solution to all problems. For a 28 year-old Malay man, drug use stood in the way of him pursuing a career in the government, a more stable and middle-class occupation, and fishing was his only option: "*When I was young, there were all these stories - have to work, have to keep money, have to get a good job - but when using the stuff [drugs], [I] lose everything already. Yes, work also has become...[I'm] not supposed to be a fisherman. I became a fisherman...no, no choice, because we are...people already know that we are a user, you know...have to accept*." Further, despite the money that fishing did provide, being a drug user (and the money required to support a drug habit) also stood in the way of the social status and economic stability needed to get a girlfriend or to be deemed a marriageable man. A 35 year-old Chinese man noted that though he thinks about having a girlfriend, he wants "*everything to be stable. Money comes first - a steady income, a steady house - once these are settled, then I'll think of having a girlfriend. If one has nothing...you know, in the society now, everything is about cash. If you have no money, even if you have a very good girlfriend, it's*

useless." Without financial stability, which is challenging as a drug user, this man could not even think about having a girlfriend.

The challenges drug use posed to both finances and the need for responsibility were also highlighted by this 48 year-old Malay man who had never married:

> *My aunts, they'll ask me to get married, but I...my excuse is, because what...I...I can't even support myself. Ha, what more to support a wife. Ha. So my vow is, as long as I haven't stopped this [drug use], I won't get married. Yes, yes. As long as I've not stopped taking drug, I won't. I don't want to take drugs and get married. I'm afraid I won't be able to stop it. If possible I want to stop it, then I'll get married.*

As this man notes, he faced pressure from his family to marry, but he did not feel that he was able to get married and be a good husband so long as he continued to use drugs. As these examples illustrate, being a drug user was associated with being seen as "less of a man," both by respondents and by society at large. At the same time, drug use also served to block men's attempts to overcome these threats to masculinity and to participate successfully in institutions, such as marriage that would make them a more socially respectable man. Put another way, drug use prevented men from "doing masculinity" properly (Coleman, 1990).

Descriptive Statistics

Descriptive statistics for individual items and composite subscales for predictors of masculine ideology are shown in Tables 5.1 and 5.2. In terms of fishermen's personal attitudes towards gender roles and relations, men who had ever injected drugs had a mean score 8.02 (SD=1.68) out of 12 on the Sex and Gender Relations Subscale, with higher scores indicating more normative masculine attitudes. Injectors had a mean score of 5.67 (SD=1.41) out of 8 on the Performance of Masculinity Subscale. There were no significant differences in scores for injectors relative to non-injectors in terms of composite personal attitude scores.

Table 5.1: Descriptive Statistics on Personal Attitudes towards Gender Roles and Relations for Total Sample, PWID and Non-Injectors

	Total Sample (n=395)	Non-Injector (n=246)	Ever PWID (n=149)	Sig.
PERSONAL ATTITUDES TOWARDS GENDER ROLES AND RELATIONS				
Sex and Gender Relations Subscale Items				
Men need sex more than women	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Strongly Disagree	8.90 (35)	10.60 (26)	6.00 (9)	0.266
Disagree	42.30 (167)	42.70 (105)	41.60 (62)	
Agree	45.60 (180)	42.70 (105)	50.30 (75)	
Strongly Agree	3.30 (13)	4.10 (10)	2.00 (3)	
It's important for me that a woman be a virgin when she marries	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Strongly Disagree	5.80 (23)	6.10 (15)	5.40 (8)	0.441
Disagree	24.60 (97)	22.80 (56)	27.50 (41)	
Agree	54.40 (215)	54.90 (135)	53.70 (80)	
Strongly Agree	15.20 (60)	16.30 (40)	13.40 (20)	
A man should have the final word about decisions in his home	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Strongly Disagree	5.80 (23)	6.10 (15)	5.40 (8)	0.732
Disagree	21.50 (85)	23.20 (57)	18.80 (28)	
Agree	62.50 (247)	59.30 (146)	67.80 (101)	
Strongly Agree	10.10 (40)	11.40 (28)	8.10 (12)	
Composite Scale (3 items)				***p*-value**
Mean (SD) Median (Range)	7.99 (1.69) 8.00 (3-12)	7.98 (1.70) 8.00 (3-12)	8.02 (1.68) 8.00 (3-12)	0.800
Performance of Masculinity Subscale Items				
If someone insults me, I will defend my reputation, with force if I have to	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Strongly Disagree	10.40 (41)	10.60 (26)	10.10 (15)	0.600
Disagree	13.90 (55)	15.90 (39)	10.70 (16)	
Agree	54.70 (216)	52.00 (128)	59.10 (88)	
Strongly Agree	21.00 (83)	21.50 (53)	20.10 (30)	
It disgusts me when I see a man acting like a woman	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Strongly Disagree	13.20 (52)	15.40 (38)	9.40 (14)	0.200
Disagree	23.30 (92)	27.20 (67)	16.80 (25)	
Agree	43.80 (173)	33.70 (83)	60.40 (90)	
Strongly Agree	19.70 (78)	23.60 (58)	13.40 (20)	
Composite Scale (2 items)				***p*-value**
Mean (SD) Median (Range)	5.56 (1.50) 6.00 (2-8)	5.50 (1.56) 6.00 (2-8)	5.67 (1.41) 6.00 (2-8)	0.273

Men's perceptions of male community members' sexual behaviors (shown in Table 5.2) varied by injection drug use status. Injectors had significantly lower composite subscale scores than men who had never injected drugs, indicating that PWID thought that their male peers were

generally engaging in safer sex behaviors - for instance, using condoms and taking responsibility for protecting partners from HIV and STIs - while non-PWID were less likely to think that their

Table 5.2: Descriptive Statistics on Community Safer Sex Peer Norms and Masculinity and Drug Use for Total Sample, PWID and Non-Injectors

	Total Sample (n=395)	Non-Injector (n=246)	Ever PWID (n=149)	Sig.
COMMUNITY SAFER SEX PEER NORMS SUBSCALE ITEMS				
In general, most men in my community use condoms during sex (rev. coded)	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Agree/Strongly Agree/Neutral	49.90 (197)	43.90 (108)	59.70 (89)	0.002
Strongly Disagree/Disagree	50.10 (198)	56.10 (138)	40.30 (60)	
Most married men in my community have sex outside of marriage	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Disagree/Strongly Disagree/Neutral	85.80 (339)	89.00 (219)	80.50 (120)	0.021
Strongly Agree/Agree	14.20 (56)	11.00 (27)	19.50 (29)	
Most men in my community use condoms when they have sex with other sexual partners or their girlfriend (rev. coded)	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Agree/Strongly Agree/Neutral	51.40 (203)	46,30 (114)	59.70 (89)	0.010
Strongly Disagree/Disagree	49.40 (195)	53.70 (132)	40.30 (60)	
Most men in my community use a condom when they have sex with a sex worker (rev. coded)	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Agree/Strongly Agree/Neutral	50.60 (200)	42.70 (105)	63.80 (95)	0.000
Strongly Disagree/Disagree	49.40 (195)	57.30 (141)	36.20 (54)	
Most men in my community take responsibility for protecting their sexual partners from HIV and STIs (rev. coded)	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Agree/Strongly Agree/Neutral	69.60 (275)	61.40 (151)	83.20 (124)	0.000
Strongly Disagree/Disagree	30.40 (120)	38.60 (95)	16.80 (25)	
Composite Scale (5 items)				***p*-value**
Mean (SD) Median (Range)	1.93 (1.47) 2.00 (0-5)	2.17 (1.50) 2.00 (0-5)	1.53 (1.32) 1.00 (0-5)	0.000
MASCULINITY AND DRUG USE				
Men who use drugs are not real men	**% (n)**	**% (n)**	**% (n)**	***p*-value**
Disagree/Strongly Disagree	60.00 (237)	54.50 (134)	69.10 (103)	0.004
Strongly Agree/Agree	40.00 (158)	45.50 (112)	30.90 (46)	

peers were engaging in safer sex behaviors. Injectors had a mean score of 1.53 (SD=1.32) out of 5 compared to a mean score of 2.17 (SD=1.50) for non-injectors. Fishermen who injected drugs were also significantly less likely than non-injectors to feel that men who use drugs are not real

men. Although 45.5% of non-injectors indicated that men who use drugs are "not real men," only 30.9% of ever injectors felt this way.

Masculinity and Risk Behavior

The results of multivariate models assessing the relationships between various indicators of masculine ideology and risk behavior are shown in Table 5.3. Having engaged in one or more unsafe injection practice in the past 30 days (including receptive and non-receptive sharing, back or frontloading, etc) was significantly associated with the Performance of Masculinity Subscale. Men who scored higher on the scale, which may indicate more normative masculine ideology, were significantly less likely to have recently engaged in injection-related risk behavior than men with lower scores (AOR=0.658, 95% CI=0.489-0.885). Views on the linkages between drug use and being a man were marginally significant, with PWID who reported that men who use drugs are "not real men" being more likely to have engaged in any risky injection practice (AOR=2.216, 95% CI=0.966-4.678). Neither the Sex and Gender Relations Subscale nor the Community Safer Sex Peer Norms Subscale were significant predictors. HIV knowledge was also not a significant predictor.

Masculinity measures were also associated with receptively sharing a needle or syringe in the past 30 days. Having a higher score on the Community Safer Sex Peer Norms Subscale was associated with a greater likelihood of receptive sharing (AOR=1.488, 95% CI=1.057-2.096). In other words, men who thought that their male peers were engaging in riskier sexual behaviors were more likely to engage in riskier injection practices. Having a higher score on the Performance of Masculinity Subscale was associated with lower likelihood of receptive sharing (AOR=0.578, 95% CI=0.397-0.842). Attitudes toward the connection between drug use and masculinity were also predictive of risk behavior. Men who thought that drug use threatened

masculinity (drug users are not real men), were much more likely to have used a needle or syringe used by someone else one or more times in the past 30 days (AOR=3.481, 95% CI=1.372-8.836). The Sex and Gender Relations Subscale was not a significant predictor of receptive needle/syringe sharing.

Table 5.3: Logistic Regression Results for Relationship between Masculine Ideology and Injection Risk Behavior

ANY UNSAFE INJECTION PRACTICE IN PAST 30 DAYS (n=149)	**Odds Ratio**	**95% CI**
Marital Status	0.969	0.426-2.203
Education Level	2.018	0.884-4.605
Age	0.958*	0.914-1.003
Deep sea Vessel	1.705	0.828-3.510
HIV Knowledge Scale	1.039	0.904-1.195
Personal Male Role and Sexual Attitudes: Sex and Gender Relations Composite Subscale	1.207	0.952-1.530
Personal Male Role and Sexual Attitudes: Performance of Masculinity Composite Subscale	0.658***	0.489-0.885
Community Safer Sex Peer Norms: Composite Subscale	1.179	0.896-1.551
Masculinity and Drug Use	2.216*	0.966-4.678
RECEPTIVE NEEDLE OR SYRINGE SHARING IN PAST 30 DAYS (n=149)	**Odds Ratio**	**95% CI**
Marital Status	0.541	0.160-1.828
Education Level	1.097	0.347-3.474
Age	0.992	0.938-1.050
Deep sea Vessel	0.772	0.312-1.911
HIV Knowledge Scale	0.807**	0.675-0.965
Personal Male Role and Sexual Attitudes: Sex and Gender Relations Composite Subscale	1.227	0.920-1.636
Personal Male Role and Sexual Attitudes: Performance of Masculinity Composite Subscale	0.578***	0.397-0.842
Community Safer Sex Peer Norms: Composite Subscale	1.488**	1.057-2.096
Masculinity and Drug Use	3.481***	1.372-8.836

* p<.10, ** p<.05, *** p<.01, **** p<.001

DISCUSSION

When looking at these findings in the context of changing control over the means of production for fishermen and Malay fishermen's position in the social and economic hierarchy,

we see that fishermen who use drugs struggle to achieve the goals of socially accepted masculinity. In the qualitative interviews with drug-using men, there was consensus that to be a "good man" one must have financial resources, a job, and get married. This "dominant cultural ideal of manhood" was how men judged how successfully "they achieved manhood" (Connell, 2005), but drug use did not easily fit into this ideal. In the pursuit of these goals, fishermen who used drugs faced a number of challenges that threatened their health.

First, it is important to note that in the survey, PWID did not differ significantly from non-injectors in their personal attitudes towards gender relations and roles, including measures on sex and gender relations and on the performance of masculinity. Given previous research on masculinity and drug use (Collinson, 1996; Kulis, et al., 2008; Lash, et al., 1998), one would expect that men who use drugs would be more likely to express attitudes of "exaggerated masculinity." Instead, PWID attitudes were in line with other men, which suggests that for PWID, drug use was not necessarily a means to constructing a powerful oppositional masculine identity (Collinson, 1996), but that their masculine ideology was relatively consistent with that of other fishermen.

Similarly, the construction of manhood in the productive sphere was in line with broader goals of masculine achievement. Having a good job and being a hard worker are some of the most valued characteristics of a man according to both the qualitative data presented here and other studies of masculinity in Malaysia (Ng, Tan, & Low, 2008). As discussed in chapter 3, fishing was a safe haven for many drug users - a place where they could access drugs and engage in the formal wage economy. Other studies suggest that unemployment undermines the dominant image of masculinity, leading marginalized men to seek out new ways to create masculine identities (Haywood & An Ghaill, 1997), but in this study the men were employed. Fishermen

who used drugs were sometimes even considered more desirable workers because they had "less fear" and were willing to go out to sea during monsoon. Drug use was sometimes integral to work, and fishermen spoke of drugs making them "strong" and making them "hard workers." Men were able to fulfill desired goals of manhood in the productive sphere despite of the fact, or even *because*, they were drug users. Further, the acceptance of drug use by boat captains and other fishermen (and sometimes encouragement by captains) served to validate men's drug use as part of the performance of being a man and a worker. This also suggests that PWID were not employing an "oppositional masculinity," but instead that drug use was viewed as part of an acceptable strategy of manhood tied to participation in the wage economy.

Despite this, men who used drugs faced stigma in their broader community and were perceived by their non-drug using peers, and sometimes by themselves, to be "less of a man" or not a "good man." By engaging in drug use, men were considered to be lacking in "reason" and therefore ruled by "passion," suggesting weakness and a lack of restraint, which was supported in the qualitative data. Men also indicated that drug use prevented them from engaging in the socially valued achievement of masculinity through marriage. This may be indicative of stigma against drug users in broader society, but I was unable to find literature to support the linkages between stigma, drug use and the marriageability of men. In general, stigmatization can lead directly to poor mental and physical health by increasing exposure to chronic stress and experiences of discrimination (Krieger, 1999; Link, Struening, Rahav, Phelan, & Nuttbrock, 1997; Young, Stuber, Ahern, & Galea, 2005). Chronic stress that results from rejection or the expectation of rejection can lead individuals to withdraw or isolate themselves as a way to cope, which is particularly true for drug users (Link, et al., 1997). In this context of Malaysian fishermen, stigma made PWID more vulnerable by increasing social marginalization and

isolation and undermining men's ability to protect their health (Aggleton, Wood, Malcolm, & Parker, 2005). Once marginalized, either by having been excluded or by excluding themselves, men who use drugs are more likely to lead itinerant lifestyles in a liminal space between family and state (Collinson, 1996).

Indeed, the feeling that drug use makes you less of man may be an expression of internalized stigma, which manifested in risky health behaviors: PWID who reported that using drugs "make you less of a man" were more likely to have receptively shared a needle or syringe in the past 30 days. Why would this be the case? Men who were of the opinion that drug use threatens their masculinity may be at a disadvantage when it comes to protecting themselves from drug-related harms. Men whose masculinity was threatened by drug use were only marginally more likely to engage in *any* injection-related risk, but they were significantly more likely to engage in *receptive* sharing, which can indicate a position of diminished authority (Friedman, 1999). Receptive syringe sharing is a social behavior, and such men may feel less powerful to negotiate in sharing situations or less able to refuse to share. Again, this does not support a view of drug use as form of protest masculinity and goes against research that highlights the linkages between being a "real man" and engaging in risk-taking behavior (Mane and Aggelton, 2001). Instead, risk-taking was not a reflection of "being a real man," but a response to feeling like they were not one. In the context of marginalization, they may also have a greater desire for social bonding and a sense of belonging than other men and may be more isolated in drug-using social networks. Drug-related risk-taking behavior can be part of the process of male bonding (Fordham, 1995; VanLandingham, et al., 1993), as receptive sharing can also demonstrate intimacy (Bailey, et al., 2007), which may be more important for these men.

At the same time, drug-using men who had higher scores in relation to the performance of masculinity (how they or other men are "supposed" to act: stronger agreement on the composite summed scale of the following items: 1) If someone insults me, I will defend my reputation, with force if I have to; and 2) It disgusts me when I see a man acting like a woman), were *less* likely to engage in injection-related risk behavior. This suggests that some men were able to better protect themselves and refuse to share needles or syringes. Perhaps by "doing masculinity" well these men were in a greater position of authority to determine the rules of injecting. These two findings - that risky behavior was *more* likely among PWID who felt less "like a man" and was *less* likely among men with views that supported more inflated expressions of masculinity - are in contrast to many of the findings on masculinity and drug use. They do, however, point to the presence of multiple masculinities. In other words, while men who had higher scores on certain masculine attitudes could protect themselves by refusing to share needles or syringes, men who felt that drug use was a threat to their masculinity, and thus their *akal* or "reason," were unable to do so. In these ways, competing projects of gendered meaning dominate the terrain for drug-using fishermen within this community in ways that may have implications for health.

Masculinity was associated with risk behavior in other ways: in multivariate analysis, having the perception that your male peers were engaging in riskier behaviors with regard to sex was associated with a greater likelihood of personally engaging in injection-related risk behavior. Why might this be the case? One interpretation is that men who engage in riskier behavior are more likely to associate with other men who engage in riskier behavior, whether that be in the sexual or drug-using domain. The RDS network analysis supports this argument and showed that men who shared needles/syringes had a slight preference for others who shared. Although the

perceived peer norm composite scale is measuring sexual behaviors and not drug use practices, this finding suggests that perceived norms of risk-taking more generally may be influential in health behavior. This highlights the social nature of both drug use and risk behaviors and that risk may be defined in response to social relationships and context. It is unclear, however, whether this finding supports the view that within networks of drug users, some men employ an oppositional masculinity that values risk-taking. Future research needs to more fully explore these distinctions within PWID networks.

It is important to note, however, that substantial portions of the masculinity scales did not end up being significant, which highlights the challenges to trying to quantify masculinity or trying to argue that a "normative" masculine ideology even exists. It is unclear how well I was able to truly capture concepts of masculinity, which is a weakness of this study. Despite this, I feel that the findings presented here still add to our understanding of gender and the social drivers of HIV risk behavior. First, in the context of this fishing community, the act of "being a man" threatened men's health by linking drug use to employment and the pursuit of economic resources. The connection between masculinity, drug use, and labor, was shaped by larger social structures, but also constituted a more immediate constraining structure that influenced risk behavior. Second, this research highlights the complex ways in which gender is tied to risk behavior by focusing on how drug use is both a way to enact masculinity and a threat to masculinity. The findings here point to a need for future research that moves away from assumptions of an oppositional masculinity to more deeply explore the connections between masculinity, drug use and risk behavior. Third, the stigma that drug users faced was linked to conceptions of masculinity and increased men's vulnerability to HIV by driving risk behavior.

Efforts to reduce harm among drug users in this population will need to account for the multitude of ways that stigma shapes men's lives.

CONCLUSION

Previous chapters explored the occupational risk environment for fishermen and the role of social network relationships in driving risk behavior. This chapter looks at how conceptualizations of masculinity can increase risk behavior among some men, while protecting others. By examining gender in the context of local and global economic transitions, I illustrate the ways in which masculinities are contested and how this affects men's health, drug use, and HIV risk behavior. In the next chapter, I integrate the findings on occupational characteristics, social networks, and masculinity as social drivers of HIV risk behavior and shift the focus to a discussion of: 1) how occupational factors, networks, and masculinity intersect to shape risk behavior; and 2) what interventions or policies might best curb the HIV epidemic among fishermen given the multilevel factors shaping risk behavior.

CHAPTER 6

CONCLUSION

Fishing is one of the most dangerous occupations in the world (Drudi, 1998), but there are other risks of fishing that may have less to do with the actual work, and more to do with a host of other social factors that place fishermen at greater risk for HIV. HIV rates are high among fishermen in Southeast Asia (Kissling, et al., 2005a). In places like Thailand and Cambodia, sexual risk behavior is the primary driver (Entz, et al., 2000; K. Ford & Chamratrithirong, 2008; Samnang, et al., 2004), but in these data from Malaysia, reporting of sexual activity among fishermen was low and injection drug use was the primary form of HIV transmission. In this study, 46% of fishermen reported that they had ever used drugs and about 37% had injected drugs. Yet, there is limited research on the factors shaping HIV prevalence in this community, which is almost 26% among PWID fishermen. It is not enough to understand risk behavior, however, because behavior is situated within larger social contexts and shaped by a multitude of complex factors. This dissertation set out to assess *why* it is that fishermen in Kuantan are at risk.

Through an explication of the social nature of health behaviors, this research assessed possible pathways through which social structures shape drug-related HIV risk behaviors. This dissertation contributes to empirical research on fishermen, while highlighting the ways in which the social and economic organization of a male-dominated occupation can support risk environments conducive to drug use; it provides insight into how conceptions of masculinity and the social network relationships between men influence drug use and HIV; and it advances our

theoretical understanding of risk and the social drivers of HIV through an exploration of the linkages between work environments, social networks, and masculinity. This study has implications for both research and policy on the social determinants of health, particularly as it relates to HIV prevention strategies and substance use globally.

Public health has relied heavily on the Health Belief Model (HBM), which posits that health behavior is determined by personal perceptions about a disease, including its perceived seriousness, perceived susceptibility, perceived benefits of adopting a new behavior to decrease risk, perceived barriers to adopting a new behavior, and self-efficacy (Rosenstock, Strecher, & Becker, 1988). Although HBM recognizes that these perceptions may be modified by factors like culture, education, motivation, and past experiences, and suggest that behavior is influenced by "cues to action" from events or people that motivate change (Glanz, Rimer, & Viswanath, 2008), it fails to move away from the individual and truly account for the influence of social structure in shaping behavior, thus allocating sole responsibility for change to the individual. Furthermore, it assumes that health outcomes are prioritized in health decision-making, which may not be the case. There is a need for models of health behavior that assess how people experience health and risk within context so that we can more deeply understand the multitude of factors, both related to health and not, that motivate behaviors and affect health.

In HIV prevention efforts too, substantial attention has been placed on altering "unhealthy" behaviors, like needling-sharing, by focusing on behavior-change models and HIV knowledge. Despite these efforts, knowledge about HIV transmission has proven insufficient to curb individual behaviors that affect the health of both individuals "at risk" and the people they interact with. As shown in this dissertation, for instance, injection-related risk behavior occurred even while controlling for HIV knowledge. So what is going on? This research suggests that

multilevel factors tied to occupational structure shaped drug use and risk behavior contexts. At the same time, gendered attitudes and social relationships influenced behavior in ways that both amplified or attenuated risk. As this dissertation shows, individual behaviors and decisions do not occur in isolation, but are shaped by social interactions and by larger social structures.

IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The individual chapters of this dissertation contribute to our understanding of health behavior through a contextualized analysis of the social factors that shape drug-related risk behaviors; however, the contributions of this research to our understanding of the drivers of HIV risk and vulnerability are best realized by focusing on the social organization of vulnerability in the context of occupations and occupational health. Theory on the social drivers of HIV recognizes the social and cultural norms, values, networks, structures, and institutions that influence behaviors and HIV epidemics in particular settings (Auerbach, et al., 2009). This dissertation highlights that social factors are, in fact, shaping the HIV epidemic among Malaysian fishermen, and points to the ways in which occupational factors shape men's social relationships and how this drives risk behavior. Much of the existing research on occupational health focuses on worker safety in terms of injuries and research on psychosocial or organizational factors that shape health are primarily interested in job strain and stress (Karasek & Theorell, 1990). HIV researchers, in noting the concentration of HIV epidemics within certain occupations, joined this discussion adding insight on what it is about certain workers and certain work environments that increased vulnerability to HIV. Their conclusions center on the mobility of workers and how separation from partners can lead to increases in sex with casual partners or sex workers (CARE, 2002; Deane, Parkhurst, & Johnston, 2010; Sopheab, et al., 2006; Weine & Kashuba, 2012). Some research, most notably work by Williams and Campbell (Campbell, 1997;

Williams & Campbell, 1998) on mineworkers in South Africa, also discusses how gender dynamics in concert with living and dangerous working conditions shape perceptions of risk and drive engagement in alcohol use and sexual risk behavior as way to cope.

This dissertation picks up where these studies leave off, expanding our understanding of HIV risk behavior in occupational contexts to include injection drug use and analyzing elements of the work environment other than mobility that drive risk. So what happens when a work environment becomes a risk environment? As these analyses indicate, a constellation of social factors intersect in ways that make fishing an occupational environment supportive to drug use and HIV risk. First, the social and economic organization of the occupation of fishing support drug use in this fishing community. As discussed in Chapter 3, drug use and injection-related risk behavior was more common on deep sea commercial vessels, with captains playing an important role in driving risk. Boat captains loaned money to buy drugs and some supplied drugs for the purpose of work, which resulted in unsafe injection practices and more limited access to clean needles/syringes. Captains' acknowledgement and even encouragement of drug use was just one indicator of the acceptance of drug use among fishermen. Many men also discussed how they faced stigma in broader society, but among fishermen it was a non-issue: there was a mentality of "if you can work, I don't care if you use drugs." Heroin was even seen as helping fishermen to be "strong" and "work harder." This connection between labor and drug use served to support an occupational culture of drug use that gave drug users access to drugs and the formal wage economy, while also being less stigmatizing.

Second, the integration of drug use and drug users into the occupational culture of fishing within Kuantan also shaped the social and drug-using networks of fishermen. Although drug use was more accepted in the fishing community, PWID still faced isolation. As a result, drug users

were more likely to find community with other drug using fishermen; this had mixed effects on risk behavior. This sense of community was incredibly important for support and shared identity, but because it was the result of marginalization, it also had real costs in terms of health and risk. For some fishermen, these relationships translated into a false sense of safety, with sharing needles/syringes deemed less risky for those with whom they were close friends or worked. As discussed in Chapter 4, multidimensional aspects of social network relationships, including social support, trust, participation, and isolation were significantly associated, both positively and negatively, with recent injection and sharing needles/syringes. Although social support and engagement offered protection, isolation and a lack of trust in police drove riskier behaviors.

Third, the relationship between drug use and HIV risk behavior was also shaped by masculinity. There were close ties between labor and drug use, such that work in the fishing industry validated men's drug use as part of the pursuit of manhood in the productive sphere; however, PWID were marginalized in their communities in multiple ways. Drug use posed a threat to masculinity as men who used drugs were seen as "less of a man" or lacking in "reason." When this marginalization was internalized, men were more likely to engage in receptive sharing of a needle/syringe. At the same time, men who scored higher on masculine performative measures were less likely to engage in injection-related risk behavior. This suggests that some men were able to leverage their masculinity to avoid sharing needles/syringes, while risk was amplified for others. The results also indicate that perceptions of male peer risk behavior were an important predictor of injection-related risk behavior. In contrast to previous work on masculinity and drug use, these results do not support the conclusion that drug use is part of an expression of manhood based on an oppositional masculinity.

Collectively, these results suggest that social network relationships and masculinity

intersect with occupational characteristics in complex ways to increase drug use and HIV among fishermen in Kuantan. These results also raise a number of questions about occupational health and HIV that need to be addressed in future research:

1. ***Occupational Health:*** When work environments become risk environments, how do we reduce harm and promote health? When drug use is tied to labor itself, or when employers are the ones providing drugs, how can men protect their health? Apart from mobility, what is it about certain occupations that make them "high-risk" for HIV? Are PWID concentrated in other occupations such that risk for HIV increases? What does agency look like in this highly constrained context?
2. ***Occupational Health and Networks:*** What does it means to think about the influence of social networks and drug-related HIV risk behavior within an occupation? How does network position within an occupation shape drug use and risk behavior? Does turnover within occupational risk networks increase HIV transmission to other occupational sectors? Do occupational support networks affect drug-related HIV risk behavior differently than family or friend support networks? How do female family members and female friends shape fishermen's health and risk behavior?
3. ***Occupational Health and Gende*r:** How is masculinity constructed and contested in other male-dominated occupations and how does this shape drug-related HIV risk behavior? How do men leverage their masculinity in ways that can promote protective health behaviors?

Limitations

This research provides a unique exploration of the social drivers of HIV risk among an understudied population; however, there are some limitations. This study utilized a cross-

sectional design, making it difficult to establish temporal precedence and thus posing a threat to internal validity; however, efforts were made to control for potential confounders to improve internal validity. Another potential limitation of this study has to do with its sampling procedures and the extent to which data will be generalizable. This study used RDS to recruit its sample. Although a random sample is preferable, there was no sampling frame from which to work, given the hidden nature of the population, so RDS was a good alternative. Problems arise, however, as there has been recent debate over the ability of RDS to produce a representative sample (Goel & Salganik, 2010). This is certainly an important debate, but in this study, RDS was used primarily as a method of recruitment rather than a method to generate a representative sample. This study is then limited in its ability make generalizations to the larger fisherman population of Malaysia or fishing populations elsewhere.

Data collected through RDS also cannot provide complete information on network structure, density, or average distance between nodes. In the absence of full network data, however, the use of RDS data for basic analyses of network structure can provide useful information on network constraints (Wejnert, 2010). One limitation to consider, however, is that the eight seeds selected for this study produced a recruitment network consisting of 8 main components. This may suggest that we are missing key network clusters in the larger fishermen network, which can skew the results. For instance, it is necessary to examine in greater detail the extent to which the insights on occupational structure and risk are an artifact of the work environment or of the social networks of fishermen. Next steps include a more detailed analysis of the characteristics of central nodes to determine patterns underlying the observed network structure. The results of this study are thus preliminary and require further investigation to more fully assess the relationship between social networks and HIV risk.

Further, the overall goal of the main study was to assess HIV risks among all fishermen, not only among fishermen who injected drugs. Although 46% of respondents reported ever using drugs, analyses in this dissertation focus most frequently on injectors only, leaving a sample size of 149 for many key analyses. This required me to limit the scope of the analysis to a sub sample of injection drug users. Smaller sample sizes can make it difficult to find significant relationships, so every effort was made to identify the most important predictors from a large pool before entry into multivariate models. Despite this limitation, a number of statistically significant predictors were identified; however, future research should focus exclusively on drug users, and injection drug users in particular, to tease out these relationships more rigorously using a larger sample.

This dissertation also must deal with limitations associated with content validity and the operationalization of key constructs. Risk, masculinity, and social networks are complicated constructs and therefore not easy to measure. Most importantly, many of the quantitative measures of masculinity were not statistically significant and failed to remain after factor analysis, which highlights some of the challenges of quantifying masculinity, more broadly. I may only be getting at a very limited concept of what it means to be a man and how this relates to drug-related HIV risk behavior. In general, although scales of masculinity exist, most have been developed for use in the United States and with college students, and focuses on roles and beliefs. In these analyses, I attempted to utilize some existing measures that have been used internationally and supplement them with qualitative data to aid with the assessment of underlying meanings behind these key constructs; however, the quantitative measures, in large part, do not advance our understanding of masculinity in the Malaysian context to a great extent. As such, the results should be interpreted with caution. Future research on masculinity and drug

use is needed, however, as the findings here suggest that protest masculinity may not be the best or only way to understand the relationship between drug-related risk behavior and masculinity. In particular, next steps should include more extensive qualitative work focused on gender and masculinity that can be used to inform these relationships. Additionally, the qualitative findings of such a study could inform the development of quantitative measures of masculinity that are more culturally congruent and that better capture the nuances of multiple masculinities in this region.

Bias may also have been introduced due to social desirability. The majority of data reported in this dissertation centers on potentially sensitive information around drug use behaviors, sexual behaviors, social support or lack of support, and views on gender, all of which can result in biased self-reporting. In the Malaysian context, in particular, drug use is highly stigmatized making men who do use drugs, or who inject, less likely to report doing so. In this sense, it is likely that there is some degree of underreporting of drug use, but also of sexual activity. Results from this study suggest that injection drug use, rather than sex, is the primary mode of HIV transmission; however, sexual transmission may be also be underreported. Although the extent of underreporting of drug use and sex cannot be fully known, if reporting of sexual activity, particularly among unmarried men, is viewed as more sensitive, sexual transmission may be a larger factor in overall risk. To do reduce concerns of social desirability bias, efforts to increase anonymity and confidentially were made, including using computer-assisted survey technology that allowed respondents a greater level of privacy when participating in the study.

Despite these limitations, this is the first study of its kind in the region and thus salient, and the findings of this dissertation provide an important contribution to the empirical literature

on the social drivers of HIV risk behavior and the conditions that make men some more vulnerable to health inequities. The findings highlight a number challenges to reducing HIV in this population, but they also a point to a number of possible interventions.

OPPORTUNITIES FOR INTERVENTION

The primary focus of this dissertation was to situate an exploration of what individuals do within an understanding of the context within which risk behavior occurs. Such an approach provides a deeper understanding of how HIV risk occurs and points to how best protect men's health. In particular, this work demonstrates that the social organization of occupations can shape patterns of health in ways that produce more health vulnerabilities not related to occupational injuries. This research also adds new information on "high-risk" occupations by focusing on drug use and HIV rather than sexual risk behavior. Among this population of fishermen, occupational factors, aspects of social networks, and masculinity combined to support an environment conducive to injection-related HIV risk behavior. These social and occupational drivers had a direct and indirect impact on men's health, but the identification of the ways in which they operated to constrain behavior and drive risk behaviors, or alternatively, to promote protective behaviors, suggests a number of places where intervention is possible. Fishing, as an occupation, is a risky endeavor, not just because of the potential hazards of death at sea, but because the chances of being exposed to drugs and HIV are that much greater.

The findings of this research suggest that reducing HIV transmission and the harms associated with injecting drugs among fishermen will require intervention within the occupation at multiple levels. At the more macro-level, this research notes that the risk for HIV among fishermen stemmed from power structures within the fishing industry that shaped the organization of local labor in ways that put some men at greater risk for poor health than others.

Malay men, in particular, were not in a social or economic position to take advantage of the commercialization of the fishing industry as they did not have the capital to finance the boats or equipment needed to compete in the deep sea commercial fishing market. This left Malay men more often as crewmembers on boats, while Chinese men were more often boat captains or owner. The marginalized position of Malay fishermen in the social and economic hierarchy shaped opportunities within local fishing communities and had an impact on fishermen's health.

Although the government has implemented some programs to assist ethnically Malay individuals to compete in these commercial fishing markets, these programs have not gone far enough and fail to address broader ethnic inequalities. Addressing economic inequalities tied to ethnicity within the fishing industry is not entirely out of the question, however, and greater efforts could be made to support ethnically Malay men through a combination of subsidies, loans, and training programs. Investments in new boats, however, is unlikely to adequately promote economic development because it will just increase competition among fishermen for already depleted fish stocks. Rather, investments in aquaculture, food production using fish products, or other industries, may be more beneficial to communities. Further, economic development initiatives might focus on creating greater standardization of wages for fishermen to provide economic stability for crewmembers or focus on introducing micro-finance programs for fishermen to raise capital for their own vessels. This, in turn, could result in improvements in population health, more broadly.

When thinking about structural interventions in relation to occupational health and HIV, protecting fishermen's health also requires a shift in perspective on who is responsible for the production work-related risks. As discussed in Chapter 3, boat captains, in particular, played a important role in increasing drug use on boats and injection-related risk behavior among

fishermen, while also potentially limiting access to clean needles and syringes. Yet, boat owners or captains might not see HIV risk as their responsibility to manage. Because the potential risk for drug use and HIV that fishermen face is closely tied with the occupation of fishing itself, it is essential to reframe risk in a way that makes HIV part of the economic project of supporting fisheries. As Hirsch (2014) notes, "the organization of production [is] a modifiable element of the social context." Getting buy-in from administrators at fishing complexes, as well as boat owners and captains, requires efforts on multiple fronts. Not only must there be financial and moral motivation to support harm reduction, for instance, but there must be regulations to ensure that the prioritization fishermen's health extends beyond workplace injury to drug use and HIV.

The role of national and local fishing and economic development agencies in improving the working conditions for fishermen and extending occupational safety to include risks related to drug use and HIV is certainly important, but this is not an easy task. A first step could be getting buy-in from key stakeholders locally at the Kuantan jetty to develop harm reduction programs geared toward fishermen. In this context, training on harm reduction approaches must extend to administrators at fishing complexes, as well as boat owners and captains. Although a needle and syringe exchange program is in place in Kuantan and outreach workers engage with fishermen, making clean needle/syringes more readily available could be an important step towards curbing the HIV epidemic among Malaysian fishermen who inject drugs. For instance, local fishing associations and jetty administrators could work with the local needle-exchange program to ensure that boats have clean needles/syringes and condoms and that boat captains get training on drug safety and harm reduction. The creation of safe injection spaces, which have been shown to reduce injection-related comorbidities and increase utilization of other health services (Broadhead, Kerr, Grund, & Altice, 2002; Wood, et al., 2004; Wood, Tyndall, Zhang,

Montaner, & Kerr, 2007), may be crucial to risk reduction if made accessible to fishermen at jetties or at other places where boats dock. Of course, there would have to be buy-in by police to ensure that these safe injection sites were not the targets of raids.

In addition to the expansion of needle/syringe exchange within fishing work spaces and communities, knowledge of HIV transmission was quite low in this population pointing to the need for HIV education programs, more broadly. Given the amount of time spent at sea for many of these men, the use of multimedia to disseminate information on risk while men are on boats might be a useful tool. Further, we know little about fishermen's use of methadone. In addition to more research on where fishermen get methadone and how they use it, an expansion of methadone programs that go hand in hand with harm reduction may be important to curbing the HIV epidemic in this community. Making the jetty a site for methadone distribution may also increase uptake of such programs.

These findings also suggest that leveraging social networks and harnessing existing systems of social support and influence within occupational networks could promote harm reduction and improve the health of PWID fishermen. Studies suggest that the cultivation of social networks that promote protective norms and practices may act as a buffer against HIV risk behavior (Duff, 2009); here, PWIDs' relationships with captains often increased risk, so working with captains, in particular, may be a key point of intervention. Two recent developments in HIV network epidemiology studies are particularly salient to the case of fishermen in Malaysia: 1) identifying and targeting specific venues, in this case boats, where more risk behavior occurs; and 2) identifying Peer Change Agents who are appropriately located in the network to create greater change.

This research demonstrated that fishermen's relationships with other crewmembers were important sources of support and influence, which were tied to risk practices and the ability to engage in protective behaviors, but I also note that boats may be a key place where risk behavior occurs and may be central to understanding risk dynamics. In this vein, an analysis of networks of boats, and not just fishermen, may illuminate to a much greater extent where HIV risk behaviors occur. In two-mode network analysis, assessment of the spaces or venues that are most bridging or most centrally located allow for one assessment of the sociostructural properties of networks and gives the ability to "model how certain risks, behaviors, and protective factors might move through a social network made up of individuals through the affiliation patterns of venues that these individuals are connected to" (Schneider, 2013). This approach has been used successfully to describe injection drug use and blood-born pathogen prevalence by looking at the connections between individuals and specific hotels within the City of Winnipeg, Manitoba, Canada (Wylie, Shah, & Jolly, 2007). In that example, the incorporation of data on hotels as a place where risk occurred allowed the authors to "develop a novel way of defining and characterizing networks" and to "delineate the different positional attributes of IDU and hotels with respect to network density." This approach yielded unique information useful to understanding both networks among injection drug users and the risk environments and public health needs of vulnerable populations. Future research should focus on extending this method to fishermen and identifying particular boats, as a key place where drug use occurs, where risk behavior is most common and where intervention might be most effective.

Additional analysis of fishermen's social and drug-using networks could identify Peer Change Agents. Research suggests that the approval of males peers, male homosociality, and the public display of masculinity is linked to health behaviors and outcomes, such as drinking

behaviors (Fordham, 1995; Korcuska & Thombs, 2003), and sexual risk behaviors (Flood, 2008; Kimmel, 1996); it may also play a role in drug use and injection practices (Charles & Walters, 2008). Though HIV prevention interventions frequently rely on the Peer Change Agent model, Schneider et al. note that "change agents themselves can be more important than the messages they convey" (Schneider, Zhou, & Laumann, 2014). In Schneider et al.'s (2014) study with men who have sex with men in Southern India, they found that Peer Change Agents who were selected based on their bridging position in the network, as opposed to individual attributes or how centrally located the individual was in the network, were more likely to be innovators and more effective at diffusion. For fishermen, identifying Peer Change Agents based on network position could be an effective way to utilize peer influence in the adoption of protective behaviors. Harnessing the power of male peer influence for harm reduction may be particularly effective in this context as it is so male-dominated. Overall, understanding the structure of PWID occupational, social, and drug-using networks to a much greater extent is instrumental in the ensuring the diffusion of information and health interventions.

The success of these multi-level interventions to address PWID health is unlikely, however, without additional measures. Drug users in Malaysia exist in a highly punitive environment (IHRD, 2008; Wolfe, et al., 2010) and fishing boats and jetties are key place where police or national drug agency raids occur. The threat of arrest was a primary concern for PWID, and often a more prominent worry than HIV. Half of the total sample reported having ever been arrested and among PWID, almost 91% had been arrested one or more times. Arrest and the threat of police harassment is disruptive to health, to work, and to communities. PWID who fear police often rush injections, which can lead to abscesses, and may share needles or syringes in the process. Once in jail or prison, men from the in-depth interviews reported that drug use does

not stop. Instead, these men may share one needle or syringe with 20 or more people. Imprisonment also removes men from their communities and takes them out of the workforce. For those with wives or children, it also keeps them from being able to support their families in financial and other ways. The imprisonment of sons, brothers, or husbands, furthermore, is not just a financial blow to families and communities; it can also be stigmatizing for those families. In this way, a comprehensive public health approach for PWID must include work with local police and drug agency officials, as well as policymakers at the national level. Locally, training with police and drug enforcement agents on harm reduction principles might reduce the number of arrests of PWID and may also have an impact on risk behavior. This could involve embedding harm reduction principles within police training programs and reinforcing these practices on the street as a way to change police attitudes towards PWID. It could also involve linking police programs with drug treatment services or needle exchange programs and creating internal policies that do not criminalize the possession of needles or syringes. Nationally, there must also be efforts to address the punitive nature of drug policies in Malaysia.

In all attempts at intervention, however, special attention must be paid to how we can create a more enabling environment and build greater resiliency within communities (Duff, 2009). In this regard, addressing the stigma that PWID face in their communities is a necessity. As this study indicates, the social marginalization of PWID limited their social and occupational opportunities. In particular, drug use was a threat to men's achievement of masculinity, standing in the way of attaining social markers of manhood and socially-valued goals of marriage. Fishing provided PWID access to the formal wage economy, but it also entailed a range of risks, including injection drug use and HIV. Interventions to address stigma might take different forms, including targeting PWID to improve coping skills and to instill a sense of agency, targeting

intrapersonal relationships by changing the attitudes and perceptions of individuals in fishing communities more broadly, and implementing policies that protect PWID rights and punish discriminatory practices. Such interventions are significant because they indicate the potential for shifted cultural norms and values through public health interventions, highlighting how changes geared towards multiple social levels can alter the environment in which PWID live and work. Reducing stigma and integrating PWID more fully into society and the economy could reduce the creation of occupational silos of HIV risk, like that which exists in the fishing industry, and could have important implications for the health of PWID.

CONCLUSION

High HIV rates among fishermen in Malaysia indicates a need for a better understanding of why fishermen are at risk and what efforts might best curb the epidemic. This research indicates that drug use and HIV risk behavior among fishermen is closely tied to social factors, including the social and economic organization of fishing, aspects of social networks, conceptions of masculinity, and the intersection of all three. Addressing the factors that drive HIV risk behavior and that create environments where some men are more vulnerable to poor health requires a multilevel approach. The identification of the social drivers of HIV risk discussed in this research is a starting point for developing appropriate interventions that can reduce the spread of HIV and keep individuals and communities safe.

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