Structural Violence, Life Stressors and Maternal and Child Health at the Thai-Myanmar Border

By

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…for Nong Suti, one of my youngest teachers, who drew me to questions I still pursue. For Nong Auto, my young and enthusiastic "research assistant" who departed from us too soon, at only seven years-old. And finally, to each of the women and children surveyed for this study. Keep going, and peace be with you.

Flare up like a flame, and make big shadows I can move in.
R. M. Rilke

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ABSTRACT

Global forced displacement is at record highs, continues to rise, and poses grave health concerns for the vulnerable populations affected, and for future global health needs more broadly. The effects of displacement remain woefully understudied, particularly among those in more protracted situations. Such cases compose the majority of those displaced and disproportionately face chronic and toxic stress related to adversity, including via poor social reception and lack of the same legal protections or social provisions offered to host country nationals. Studying displacement-related stressors and their health impacts has the potential to provide key insights into current understandings of the lived experiences of displacement and inform how related stressors are embodied. Current models of stress and health generally involve cumulative disadvantage, adaptive stress responses, or a combination of related pathways. A persistent challenge to empirically studying these theories is the rarity of formulating realistic counterfactuals that represent variable social stress patterns—i.e., individuals moving in and out of extreme stressful environments. I overcome a number of former challenges with data I collect at Thailand's border with Burma—now internationally known as Myanmar—a novel opportunity for capturing understudied protracted displacement situations, and for comparing diverging and converging stress exposure patterns. I find evidence that more traumatic and disruptive pre-displacement stressors (forced evacuation, acute deprivation, and military oppression) indeed carry lasting health effects relative to other migrants. I furthermore find a strong association between current high-threat environments and select health outcomes across all migrant groups surveyed.

CHAPTER I
Introduction: Violence, Displacement, and Health at the Thailand-Myanmar Border

Refugees without a Camp

The regime's soldiers advance.
They kill our animals, take our rice.
From our schools they take the learning and light.
They burn our villages and steal our minds.
We hear the soldiers' voice, and we are filled with fear and hate.
And we must run, run, run, until our legs break,
Refugees without a home, without a camp.
They dress our Buddhas in women's underwear.
We see our people floating bloated in the river.
We have land but cannot farm it, forced labor in our lot.
"peace, peace, peace", they say. Burma says we are at peace.
But we are not. We hear gunshots night and day.
And we must run, run, run, until our legs break,
Refugees without a home, without a camp.
Some Shan live in Thailand, work as servants or as slaves,
Some live in relocation camps, without money, food, or hope.
Some live in the jungle and hear their dying child's cries,
Mosquitoes on their limbs, and leeches in their eyes.
They dig a shallow grave and place the child inside,
And then they must run, run, run, until their legs break,
Refugees without a home, without a camp.

Original Shan language poem by Lenghsim (hsenhoe)
English adaptation by Bernice Koehler Johnson

(SWAN 2003)

An honest account of who wins, who loses, and what weapons are used is an important safeguard against the romantic illusions of those who, like us, are usually shielded from the sharp edges of structural violence.

(Paul Farmer 2004, p.308)

According to the United Nations High Commissioner for Refugees, global forced displacement has reached record highs with at least 65.3 million displaced persons worldwide, including refugees, asylum seekers, and internally displaced persons, averaging to 20 individuals displaced from their homes every minute (UNHCR 2015). This report furthermore includes the estimate of over 11 million refugees currently being in protracted situations, amounting to roughly two-thirds of all refugees. Many additional individuals affected by forced displacement are living in a more generally defined protracted situation—they have lived outside of their origin country for an extended period, are not able to safely return, but have not been able to permanently resettle as citizens of a new host country—e.g., asylum seekers not formally recognized as refugees, "illegal" migrants, and stateless individuals (those without nationality or legal documentation from any country).

The high prevalence of protracted displacement raises grave global health concerns, based on the few studies in such contexts and the negative health effects of social adversity and related stress (McEwen and McEwen 2017). Protracted displacement is known to pose health risks when individuals stay in camps longer than intended (e.g., Toole and Waldman 1997) and can furthermore exacerbate the long-term effects of conflict-related trauma on individuals' risks of mental health disorders, such as post-traumatic disorder (PTSD; Porter and Haslam 2005). Largely missing, however, are studies of individual health and wellbeing in protracted displacement situations outside of camp settings. This dearth of information is alarming since only 29% of refugees with known accommodations are living in managed camps and the accommodations for an additional three million individuals are unknown (UNHCR 2015).

The case of the Thai-Myanmar border is an especially informative setting for the study of displacement and health, and specifically the impacts of pre- and post-displacement contextual

stressors on health. Myanmar has experienced continuous civil conflict since the 1962 Burmese military coup d'état, has consistently ranked in the top ten major source countries of refugees worldwide since 2009, and is among the fifteen highest ranked countries for fueling the current protracted refugee crisis. As of the end of 2016, recognized refugees from Myanmar total approximately 490,300. This includes 102,600 displaced to Thailand in addition to an estimated 3 million "voluntary" migrant workers from Myanmar in Thailand (Chamratrithirong 2014; UNHCR 2015). The flows of displacement continue as fighting between the Tatmadaw (Burmese armed forces) and ethnic armed groups worsens in Shan, Kachin, Rakhine, and Karen States (Human Rights Watch 2017).

One of the main reasons that the Thai-Myanmar border is such a timely case study is the opportunity it provides for investigating health among displaced populations outside of typically studied settings—official camps and refugees permanently resettled (I will discuss more on why this is the case in subsequent chapters). For instance, it allows for a novel examination of how divergent life events and living circumstances post-displacement shape health and modify the health effects associated with initial forced migration. Furthermore, looking beyond recognized refugee populations to consider groups such as survival migrants (Betts 2018) and voluntary migrants who get stuck in similarly threatening post-migration contexts further elucidates the connections between migration and health more broadly.

For my dissertation, I collect novel survey data from recent mothers and their children at Thailand's northern border with Myanmar in order to document women's life histories in a new way that elucidates how displacement is embodied. I focus specifically on mothers and children to examine biosocial pathways linking structured violence, patterns of displacement, women's health, and childhood health and development. In this introductory chapter, I will lay out my conceptual framework for framing the case of violence, displacement, and health

in a broader field of migration and health studies. I will then introduce my dissertation specific aims and the organization of the remaining chapters.

1.1 **Conceptual Framework**

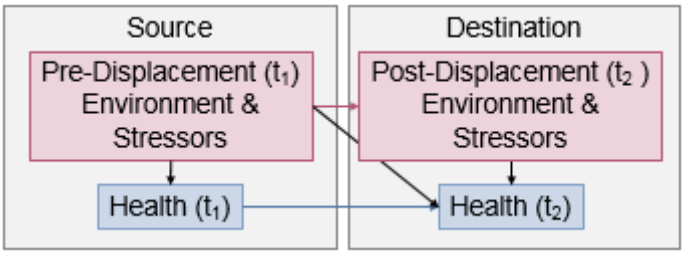
I lay out my conceptual model below by starting with the health consequences of displacement-related stressors, both social and environmental, and then build on this foundation for studying maternal and child health in displacement and border contexts.

A. *Displacement and health as a special case of migration and health*

A foundational conceptual model of the impact of displacement on individual health starts with the primary dimensions of migration, which in turn relate to social determinants of health. In a recent review of migration theory, Fussell (2012) lays out three primary dimensions involved: spatial, temporal, and volitional. These aspects of migration are key to understanding both macro- and individual level processes of migration, as well as migrant health. Figure 1.1 presents a simple conceptual model depicting the general environmental and social determinants of individual migrant health. In this model, displacement is considered for an individual from a source to a destination (spatial) between two time points, pre- and post-displacement (temporal). The social environment and stressors in pre-displacement settings confer an implicit volitional dimension in which more severe pre-displacement stressors indicate lower agency, or more reactiveness versus pro-activeness in the migration process (Richmond, 1993). I consider this concept of variably exercised, or constrained, volition a form of structured violence (the focus of Chapters II and III). Displacement works through these social and health pathways to affect post-displacement health at t_2 through health at t_1 and the social and environmental stressors experienced at t_2.

Figure 1.1: A simple conceptual model depicting the effects of displacement on health through pre- and post-displacement social environments and related stressors. In displacement contexts, environments and stressors of particular concern include acute deprivation, violence, other threats to livelihoods, housing and residence

type, legal documentation, social discrimination, and social support. General domains of health include nutrition and physical fitness, mental health, and infection or illness.



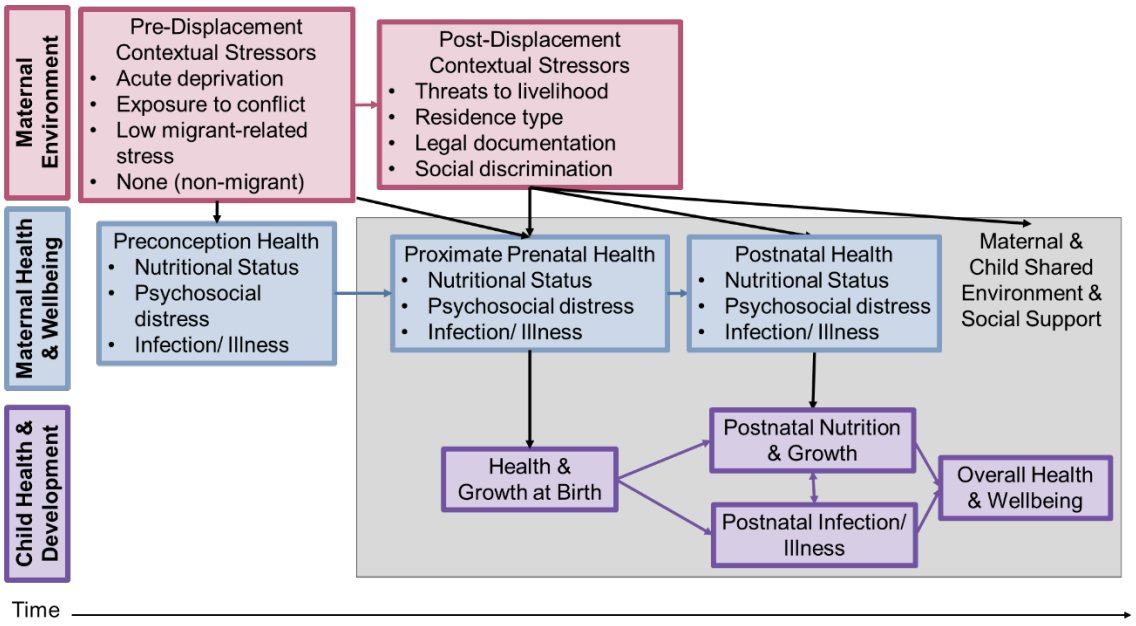
The existing research informing any single arrow in this model is severely limited and almost exclusively set in one of two areas: (1) public health emergencies in the midst of humanitarian crises immediately following displacement or (2) mental health needs of refugees related to acute pre-displacement trauma. Empirical work drawing from a more biopsychosocial framework (Engel 1977) in refugee health studies is desperately needed (Porter 2016), particularly that which jointly considers pre- and post-displacement environments and related stressors (Miller and Rasmussen 2010). For instance, research need to better bridge understandings of the health impacts of forced displacement and the social structural factors shaping immigration status as a health determinant more broadly, such as through racial and ethnic discrimination, exclusion from legal protections, and general social reception (Castaneda et al., 2015; Carswell et al., 2011; Sullivan and Rehm, 2005; Yip et al., 2008).

B. *Displacement and Health: Women's Health and Intergenerational Effects*

In addition to broadening a general understanding of migration and health in understudied settings, more closely examining forced displacement in places like the Thai-Myanmar border provides opportunities to elucidate how rare patterns of acute and chronic stress over the life-course shape health. The arbitrariness in how villages in Myanmar have either been exposed to severe military violence, forced relocation, or relatively little military violence at all, and how inconsistently Thailand has received more and less forcibly displaced migrants, sets up a study sample of migrants at the Thai-Myanmar border similar to a natural experiment for individuals

moving through high and low-stress settings. I investigate the resulting health patterns at the intersection of pre- and post-migration exposures in Chapters IV through VII, and link them to a more general model of stress and intergenerational health transmission. Building on the background covered, I depict my final conceptual framework below (Figure *1*.2), which I elaborate in the following section detailing my dissertation specific aims and chapters.

Figure 1.2 A conceptual model highlighting the relationship between displacement contexts and maternal and child health, with a special focus on maternal environments and stressors, maternal health and wellbeing, and child health and development. The gray box represents the physical and social environments (including social support) shared by mothers and children post-displacement that directly influence maternal and child health.



1.2 **Study Aims**

Using novel survey data of over 700 mother-child dyads that I collected at the Thai-Myanmar border, I focus on the following specific aims:

1. *Elucidate patterns of violence that emerge in women's life histories and current living circumstances at the Thai-Myanmar border.*

In Chapter II, I elaborate the concept of structural violence and the case of Thai-Myanmar border populations. In Chapter III, I present my collection of women's life event histories and

analysis of how experiences of overt and everyday violence—historical and present—are structured at the border.

2. *Investigate how displacement-related stressors influence women's health and wellbeing and how personal historical patterns of pre- and post-displacement contexts (i.e. interactions between these contexts) reveal stress-related health processes.*

I review linkages between patterns of displacement, stress, and health in Chapter IV, followed by the write-up of my analysis of displacement and women's health in Chapter V.

3. *Examine the child health impacts of maternal displacement and related stressors; and patterns of maternal displacement that could likely reflect stress-related health processes across generations.*

Chapter VI reviews the literature linking maternal stress and displacement contexts to early child health and development, and informs my empirical analysis of such associations in Chapter VII.

Finally, Chapter VIII concludes with study implications and future research directions.

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CHAPTER II
Aim 1 Background
Structured Violence in Women's Life Histories at the Thai-Myanmar Border

Recent events and media coverage have brought much needed attention to the global crisis of conflict, forced displacement, and statelessness. Yet, empirical research investigating the personal experiences and embodiment of these problems is starkly limited. In this chapter, I aim to uncover common configurations of personal migration histories and social contexts at the Thai-Myanmar border, *i.e.*, local patterns of displacement and violence in women's lives. First, I review: (I) the types of conflict-related violence that I expect to uncover in personal histories among women born in Myanmar and now residing at the border; and (II) the types of symbolic and everyday violence occurring in Thailand that I expect to uncover in personal experiences shared among minority and migrant women at the border.

2.1. The Thai-Myanmar Border: A Case Study of Structured Violence

Borders are often critically important spaces for better understanding more and less overt social violence related to ethnicity-, race-, and nativity-based discrimination and surveillance. At the more personal level, experiences of such violence and its effects on individuals furthermore intersect with existing life histories of violence and upheaval—characteristic of many of today's global migrants, and particularly those more forcefully displaced (UNHCR 2015). The psychosocial and health-related burdens of these compounding forms of violence furthermore disproportionately affect women and children (UNHCR 2015). Below I will elaborate on (a) how I conceptualize violence in this study, as it occurs structurally and how it is embodied personally; (b) the significance of studying personal experiences of violence at borders; (c) the importance of studying women specifically; and (d) why the case of the Thai border with the Shan State, Myanmar, is especially relevant to this area of study.

A. *Structured Violence*

Despite common dictionary definitions of "violence" in that focus on the use of physical force, several areas of social, anthropological, and political science scholarship have developed a broader concept of violence that goes beyond physical assault. These conceptualizations incorporate other personal experiences of social oppression and adversity—perceived or not—and direct attention to driving social structures that systematically constrain individual and group agency. I use the term "violence" to refer to personal experiences of overt physical assault, other social adversity, and systematic inequalities personally encountered due to social group membership. This conceptualization draws from foundational frameworks of structural violence, everyday violence, and potential violence, as follows.

Structural violence characterizes the social forces that drive and re-enforce social inequalities and injustices (Farmer 2004, Galtung 1969). In the words of Paul Farmer et al. (2006), it encompasses the "social structures—economic, political, legal, religious, and cultural—that stop individuals, groups, and societies from reaching their full potential." Kleinman et al.'s theory of "social suffering" similarly focuses on the role of political, economic, and institutional power structures in ultimately causing and exacerbating war, famine, disease, torture, and other social problems (1997). Farmer (2004) describes the structural violence principle as analogous to Bourdieu's use of the term "habitus" as "structured and structuring," but with the case of structural violence as "structured and stricturing." These conceptual frameworks emphasize the importance of how social suffering and inequalities emerge, are embedded in local power structures, and additionally shape social environments and individuals' lives.

Scheper-Hughes and Bourgois (2003) also expand on the concept of violence as on a continuum of personal and social experiences, from direct physical assault to routinized *everyday violence*. While physical and sexual violence are typically more readily identifiable and perceived,

other more insidious and sometimes unperceived forms of adversity can also be considered violent through the daily encounters, and even trauma, that can normalize oppression among marginalized groups (Bourgois 2009; Quesada et al. 2011). For instance, this is documented in settings of heightened police surveillance and brutality in the U.S. (Sabo et al 2014).

The case of lacking citizenship, or any legal documentation, also confers a specific and significant form of *potential violence* (Bloemraad and Sheares 2017). Hannah Arendt, as she writes about German Jews being stripped of their national citizenship, she describes it as the loss of their 'right to have rights,' and elaborates, 'their plight is not that they are not equal before the law, but that no law exists for them' (Arendt 1962, 295–96). This closely relates to the concept of violence as a threat or constraint on personal agency. It also alludes a broader human rights framework, notably Sen and Nussbaum's capabilities approach, viewing every human being as having the innate right to flourish, *i.e.*, experience individual wellbeing, justice and peace among states and societies (Nussbaum 2001).

The structural inequalities that lead to the forms of violence and human rights violations alluded to in these frameworks are a global health and public policy crisis, with increasing evidence of structural violence being embodied in individuals and reflected in population distributions of health and disease. Krieger et al.'s definition of structural racism stands out as an important case of structural violence: "the exploitive and oppressive social relationships that simultaneously define racial/ethnic groups and cause a system of inequalities that become embodied as racial/ethnic health inequities" (1993, p.938). Reviews have similarly drawn from a structural inequalities framework to understand persistently poor health among migrants in the U.S. (e.g., Viruell-Fuentes 2012).

I draw from these conceptual frameworks of violence to focus attention on two primary issues. First, individual's experiences of displacement and social marginalization involve violent

encounters across the physical and non-physical spectrum, but it is unclear how these encounters are systematically structured in diverse global contexts. Second, using the term "violence" brings to the forefront the severity and inequity of forced migration and other social forces driving inequalities in global border regions. I look for evidence of structured patterns within and across specific individual experiences and circumstances that indicate exposure to overt violence, everyday violence, and other circumstances that signal significant constraints on women's potential and capabilities at the Thai-Myanmar border, specifically. Below, I will discuss in more detail why women at the Thai-Myanmar border are an especially important case study.

B. *Why the Thai Border with the Shan State (Myanmar)?*

National borders are critical spaces for the study of concentrated conflict and everyday violence, particularly as they relate to heightened militarization, policing, ethno-racial profiling, and structural racism (Sabo 2014). In the last several decades, Thailand's borders have received more local and international attention for the elevated tensions introduced by militarization and border control (e.g., Cuasay 1998). Now, military posts on both sides of the border mark several major border crossings between northern Thailand and Myanmar. Many additional border landscapes are routinely surveyed and monitored for government land use restrictions—another relatively recent form of nation state enforcing and surveillance imposed on local highland minority populations that has gone ungoverned in the area for countless generations prior (Flaim 2017, Scott 2009, Sturgeon 2007).

In addition to borders being strategic locations for state surveillance and policing that shape physical and social environments and experiences of everyday violence, borders are natural aggregating points for displaced populations from neighboring countries in conflict. Initially, forced displacement from Myanmar to Thailand was concentrated in more of the northwest

and west Thai borders with Eastern Myanmar, mainly Mae Hong Son and Tak Provinces (in Thailand), and over eight different refugee camps were established to handle this influx of displaced persons into Thailand in the mid 1980's. Despite not being a signatory to the 1951 Refugee Convention, the Thai government allowed the United Nations management of these approved camps. Later, however, when more violence in the Southern Shan State began to displace civilians into Thailand's Chiang Mai and Chiang Rai Provinces—starting in the late 1990's and early 2000's—the Thai government faced competing political and economic pressure from the Myanmar government to not acknowledge any individuals from the Shan State as asylum seekers. Thus, only one unofficial camp has been established in Thailand along the border with the Shan State to date, whose occupants face underfunding and risks of refoulement on a year-by-year basis.

Many additional individuals that have fled the Shan state into Thailand also remain near the international border due to family connections, local employers' willingness to hire migrants—including those without documentation, and the long-established local Shan population and cultural heritage. The mountainous border landscape comprises only a few major border settlement areas, including rural townships, remote hamlets, a couple small urban centers, and more sprawling agricultural fields and plantations where many find seasonal wage labor.

Additional reasons for studying the case of individuals at the Chiang Mai (Thailand)-Shan State border specifically include that it encompasses a relatively small geographic area that in a brief period received migrants from a similar source location but under strikingly different circumstances. As mentioned above, unlike Burmese refugees from other areas that have fled and more readily had the option of entering a refugee camp, relatively few individuals were fleeing the Shan state to Thailand due to military violence before the 1990's. Up until this point, there were many migrants entering from the Shan state that identified as labor migrants,

though. These migrants were likely coming due to conflict-related conditions of poverty, poor infrastructure, and rising military tensions in their source communities, but military forced relocations had not yet reached emergency levels. Today there are still relatively low violence areas in the Shan State that also source migrants to the border, which has created a diverse social landscape in this particular region.

C. Why women, and why mothers specifically?

I focus on women because of the disproportionate health- and stress-related burdens they commonly face related to violence perpetrated by military, police, employers, and intimate partners in conflict, forced displacement, and other migrant situations (Rohwerder 2016), and because of the critical role women play in the nurturing and development of subsequent generations. Women are also a special population of interest for studying displacement in general since they are disproportionately represented in forced displacement situations. Women and girls in forced and protracted displacement situations additionally experience relatively high risks of gender-based violence, intimate partner violence, and health complications resulting from inadequate medical services, such as during pregnancy, in general and as documented in the case of women fleeing the Shan state (Caouette and Pack 2002, UNHCR 2015, SHRF and SWAN 2002).

In summary, the Chiang Mai-Shan State border serves as an insightful intersection point for women's distinct and overlapping life histories on both sides of the national border—a heterogeneous context of displacement and non-displacement. In the sections that follow I review the structuring forces driving past and ongoing violence that women at this border face, including pre-migration contexts in Myanmar for migrant women and general living conditions on the Thai side of the border for ethnic minorities, particularly migrants.

2.2. Conflict-Related Violence in Myanmar and Subsequent Displacement

In the Shan state many armed ethnic groups have signed ceasefires with the Tatmadaw as far back as 1989 but fighting still occurs in certain regions—south and central Shan state starting in 1996 and in the northern Shan State more recently—with devastating impacts on civilians (Human Rights Watch 2017). The Tatmadaw's "Four Cuts"—a counter-insurgency strategy focused on cutting off armed resistance groups' food, funds, intelligence, and support—involves targeting select villages for destruction based on suspected loyalty to resistance forces and choosing other villages as strategic hamlets for supporting Tatmadaw soldiers (e.g., with food, porters, etc.). Meanwhile, other villages deemed less useful or unthreatening remain essentially untouched (Grundy-Warr 2004). Below I review documented experiences related to common scenarios preceding displacement from Myanmar to Thailand: forced evacuation, military occupation of villages, and low-to-no direct military exposure.

A. *Military Violence and Forced Evacuations*

The Tatmadaw began their systematic forced relocation of civilian villages inside the Shan State in 1996—relocating an estimated 300,000 people in the first two years (Caouette and Pack 2002). One 22-year-old Shan women interviewed in 2002 a week after arriving at the Thai border in Chiang Mai Province recounts (Caouette and Pack 2002):

> *I came to Thailand because there was no money for planting or for our daily living expenses. It is difficult to work in our village because the Burmese military expels us to the towns. We didn't move to the town but hid in the jungle instead. Our plants were ready to harvest and all our livestock was there. The government military burned down our houses and whenever they saw a cow or buffalo they would shoot it. There was nothing left. They even burned my sewing machine. We had to ask for dishes from other people. We moved back and forth from my village to the town because we were not allowed to work on our land. If other people employed us, I could eat. We kept trying to sneak back to our farms to work, but we had to be very careful the military didn't see us. Sometimes we starved for two or three days when we went back because we were afraid to cook. We were afraid the military would see the smoke. We tried to cook at noon when the sun was very bright.*

Local NGO and humanitarian groups have published numerous similar accounts (Mekong Migration Network and Asian Migrant Centre 2012). Surveys inside conflict-affected areas in

Eastern Myanmar (including but not limited to the Shan State) have documented a high prevalence of human rights abuses. In a population-based survey of six states (including the Shan State), regarding displacement, forced labor, destruction of home and belongings, and physical violence, over a third of households suffered at least one human rights violation in the preceding year (Parmar et al 2014). In displacement situations immediately following, individuals in hiding—often in forests—additionally face acute nutritional deprivation, higher exposures to mosquito borne disease such as malaria, and risk of injuries from hidden landmines (Suwanvanichkij 2012).

B. *Military Occupation and Oppression*

The Burmese military have targeted certain villages in the Shan State as strategic hamlets where civilians are not evacuated but instead stay under close surveillance. Local advocates and researchers have documented military and other government officials' perpetration of human rights abuses against civilians in occupied villages that include forced labor, crop seizures, arbitrary arrest, torture, rape, and extrajudicial killings (Shan Women's Action Network and Human Rights Watch). One of the most thoroughly documented human rights abuses in Myanmar is Tatmadaw's extensive use of forced labor (Belser 2005). One 30-year-old Shan man who arrived in Chiang Mai Province from Myanmar in 2002 shares (Caouette and Pack 2002):

> *I couldn't do any personal work because I had to do forced labor for many months. I had to take my own pots and food with me too. We built a road. They forced me to carry rocks and sand. The people who had an oxcart and car used them to carry rocks and sand. For me, I just carried rocks and sand into the car for them. I didn't have time to earn a living or work personally for my family. If there were four persons in a family, two persons had to go.*

Studies suggest that militarization of villages in Burma are related to more human rights abuses, inadequate food production, inability to access health care, and diarrhea—all of which could be mitigated somewhat by village leaders reportedly negotiating with the Tatmadaw (Davis et

al 2015). Shan militias occupying Shan villages are assumed to be less oppressive, but some situations are rumored to be similarly exploitive during this time of limited resources and ongoing conflict. A report by the International Campaign to Ban Landmines documents instances of all military groups in the civil war using landmines and fighting tactics that routinely put civilians caught in the middle at greatest risk (International Campaign to Ban Landmines 2001).

C. *Poverty and Lack of Infrastructure*

Migrants coming from the Shan State in both areas of active military fighting and elsewhere similarly cite their inability to make a living, or even survive, as a primary reason for coming to Thailand. The long period of civil war following decolonization in Myanmar has left an extremely underdeveloped infrastructure, and increased pressure on civilians to forfeit their land and crops and pay heavy government taxes has made subsistence farming a much less viable option. A 27-year-old Shan women arriving in Chiang Mai Province in 2002 recounts in a report by Caouette and Pack (2002):

> *I moved to Thailand because I can work and make money. When living in (the) Shan State, we just barely survived and couldn't save any money. Sometimes we had to give a half basin of rice to the Burmese military each time they asked. We couldn't refuse. If we didn't give it, they would come and find fault with the headman. Then he would ask us to give the rice. If we didn't have it, we had to sell some of our property to buy rice to give.*

This story also highlights the complexity of the push and pull forces related to migration from the Shan State to Thailand, and how the degree of force involved is not necessarily apparent in the response to the single question, "Why did you come?" Ethnographic research in other marginalized communities facing high burdens of everyday violence have found a tendency for community members to normalize and minimize adversity and past trauma as coping mechanism, which, if occurring in this context, could result in fewer women actually reporting the war, or violence, as the actual cause for them leaving.

In summary, the ongoing civil conflict in Myanmar has been an underlying driving force of out-migration from the Shan state since at least 1996, but the microenvironments from which women have fled vary. The extent to which they vary, and that patterns in which they vary are only partially understood by piecing together existing ethnographic and interview research.

2.3. Threats to Livelihoods and Everyday Violence in Thailand

The microenvironments in Chiang Mai along the Shan State border also vary significantly. Below, I briefly describe the working and living situations that can confer different forms of violence, threats of violence, and related stress in women's current daily lives.

A. *Legal Status and Surveillance*

As alluded to earlier, because of the well-established flow of migrant workers from the Shan state into Thailand before more severe military violence broke out in the last two decades, when more of the in-migration switched to being more overtly forced it was not readily acknowledged by local Thai villagers or Thai government authorities. Hence, many asylum seekers from the Shan state have not received any typical legal protections as refugees by the Thai government or UNHCR—save some minimal protections as "temporary, unregistered residents" for the approximately 500 individuals in the single Shan refugee camp on the Chiang Mai-Shan State border. Now, both asylum seekers and originally voluntary migrants that no longer have a place to return to must decide whether to risk living in Thailand with no valid documentation or risk obtaining a passport or work permit that technically allows them temporary residence before they must return.[1] Similarly, even some individuals born in Thailand but with no birth certificate must make a similar wager despite having never lived in Myanmar.[2] Prohibitively high costs contribute additional barriers to the registration process.

[1] Koning field notes, January 14, 2016.
[2] Koning field notes, January 14, 2016.

The militarization and policing of the northern Thai border also poses threats to livelihoods and other risks to ethnic minority individuals born in Thailand, at least to some degree. The Thai side of the border has a long history of being settled by non-Thai ethnic groups (longer than by Thai ethnic groups), including ethnic Shan, many of whom were either excluded from early national censuses, included but have not obtained proper documents, or evaded government authorities early on—intentionally or unintentionally (Flaim 2017). These scenarios have led to a significant proportion of individuals in the border area (and likely in other remote areas of northern Thailand) not being counted as citizens of Thailand, or any other country, despite being born in Thailand. Insteach, they are functionally stateless or in possession of some national identification card that confers a form of legal residence but not full citizenship (Flaim 2017). In a census of statelessness administered by UNESCO in 2010 of all households within 25 km of Thai-Myanmar in the five northernmost border provinces of Thailand, only 59% of individuals surveyed who were born in Thailand were able to confirm their citizenship status (UNESCO Highland Peoples Survey 2010).

Routine surveillance and ethno-racial profiling—regardless of actual legal status—affect everyday violence among ethnic minority communities more generally as well. Beyond differences in legal protections by nativity or possession of documents, systematic de facto discrimination and violence against ethnic minorities, migrants, refugees, and stateless individuals commonly occur. International reports of human rights violations in Thailand continue, including (but not limited to) race- and nativity-based brutality by Thai police, refoulement of Burmese refugees, and sexual violence, extreme labor exploitation, and human trafficking by employers, criminals, and, in some cases, Thai government authorities (Human Rights Watch 2017).

B. *Working and Living Conditions*

Beyond military and police surveillance, women working at the border encounter severe power imbalances in relation to their employers. As found in a variety of migrant worker contexts globally, migrants from impoverished source circumstances can easily become taken advantage of by local employers in new host settings (Castañeda et al 2015). Constraints on choice and any legal recourse are especially limited for those without legal documentation or work permits in Thailand. Many workers stay in very small and unsanitary living quarters on worksites, receive pay below minimum wage or not as agreed, and experience additional severe human rights abuses—such as having one's papers kept from them or not being allowed to leave. One such account comes from a 27-year-old Shan woman working in Chiang Mai (Mekong Migration Network and Asian Migrant Centre 2012):

> *I had a work permit card but my employer took the original card and I had to use a copy. One time… I ran into some police and they wanted to check my ID card. I showed them the copy but they asked for the original and I replied that my employer keeps it. The police said that the employer don't have the responsibility to keep it, so they arrested me and called my employer to pick me up. My employer said that they couldn't pick me up, so the police took me to stay with them at the checkpoint for five hours then released me.*

Other workers have had their documents completely taken from them by employers who refuse to let them leave or they enter job positions in which they are already indebted to their employer due to travel, smuggling, and/or registration costs. The large number of workers in gravely vulnerable situations, based on their migration histories and lack of legal documentation, has also led to a broader exploitative norm, where even individuals with documentation may have to work in poor working environments in order to compete for jobs. Additional personal accounts of Shan migrants and asylum seekers is included in Table A1 (appendix), taken from a collection of autobiographical essays published by the Mekong Migration Network and Asian Migrant Centre (2012).

In summary, informative interviews, essays, and reports have documented threats to livelihoods and personal security and safety among individuals on the Thai side of the border

with the Shan State that are closely linked to general border surveillance, individual legal status, housing, and working conditions. However, patterns in these threats, both within and between women at the border, and how they relate to migration histories is still unclear.

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CHAPTER III:
Aim 1 Analysis
Patterns of Displacement and Violence in Women's Life Histories

SUMMARY

Civil war in Myanmar and related forced migration to the northern Thailand border constitute powerful social forces, i.e., structural violence, affecting local populations and inequalities at the border. In this chapter, I draw from theories of structural and everyday violence and build on existing ethnographic and interview work to measure women's life histories at the Chiang Mai-Shan State (CMSS) border in a new, systematic way that uncovers common configurations of life events and circumstances in this region using cluster analysis. Among migrant women, I additionally link these configurations together in order to conduct an analysis of women's sequenced life contexts, pre- and post-migration. This analysis elucidates how specific aspects of overt and everyday violence characterize patterns in women's life histories and how these patterns reveal a greater structure of violence experienced at the border.

From the cluster analysis, I find configurations of pre-displacement events that reveal significant patterns of military-based violence, which can be characterized as either dominated by surveillance and taxation ("Military Occupation"); severe deprivation, evacuation, and forced labor ("Deprivation/Evacuation"); more severe violence associated with military invasion and occupation ("Severe Violence"); or less severe or direct military exposure ("Low Military Violence"). I additionally uncover groupings of violence-related circumstances on the Thai side of the border (women's current situations) related to Low Threat, Moderate Threat, and High Threat circumstances, as related to potential threats conferred by legal status and housing as well as experiences of threats related to work, police and Thai government authorities, and mobility constraints.

3.1. Approach

I aim to build on existing ethnographic and interview work to measure women's life histories at the Chiang Mai-Shan State (CMSS) border in a new, systematic way that uncovers common configurations of life events and circumstances in this region using cluster analysis. Among migrant women, I additionally link these configurations together in order to conduct an analysis of women's sequenced life contexts, pre- and post-migration. This analysis elucidates how specific aspects of overt and everyday violence characterize patterns in women's life histories and how these patterns reveal a greater structure of violence experienced at the border.

A. *Objectives*

In this chapter, I aim to elucidate patterns of violence that emerge in women's histories and current living circumstances at the Thai-Myanmar border as follows:

(1) Collect life event history information from women that captures different aspects of violence and adversity related to displacement and social marginalization at the CNSS border, including: adverse life events (ALE) in Myanmar (for women born in Myanmar), ALE's in Thailand, and other aspects of living conditions in Thailand.

(2) Analyze how experiences of overt and everyday violence—historical and present—are structured at the border:

   a. Among women born in Myanmar and now at the border, what are common dimensions and configurations of violence experienced before migration to Thailand?

   b. Among women at the border in general, what are common dimensions and configurations of violence they have experienced in Thailand?

c. To what degree do common migration profiles predict the types of violence women experience in Thailand?

B. *Study Sample*

The final analytical sample for this chapter is a subset of the entire study sample for whom I have interview data for mother recruits (and not proxies). Of the 824 recruits, 644 individuals were interviewed (78%)—521 (81%) of whom were actual mothers and were included in the final analyses presented in this chapter. Supplementary appendices include more information on the survey instrument and data collection.

3.2. Measures

A. *Adverse Life Events (ALE) in Myanmar*

All respondents who had lived at all in Myanmar were asked during their in-depth interviews about a series of Myanmar-specific ALE's.

The questions regarding ALE's were designed to jointly capture a broad range of types and intensities of conflict-related violence, trauma, human rights abuses, and other threats to survival. Initial questions were developed based on existing instruments designed to capture acute conflict-related trauma, as found in cross-culturally tested general instruments such as the Harvard Trauma Questionnaire (Mollica 1992), and documented human rights abuses inside of the Shan State and through Eastern Myanmar (Mullany et al 2007; Parmar et al 2014). My research team included additional questions to distinguish between different pre-migration experiences and capture more subtle forms of everyday violence. For instance, we wanted to capture differences in personal accounts, such as having one's village occupied by the Burmese military, or even the Shan military, but not experiencing overt physical violence (Grundy-Warr 2014, SHRF and SWAN 2002; Mekong Migration Network and Asian Migrant Centre 2012).

The English translations of the final questions are listed in Table A1.2 (appendix). Dimensions

of violence and adversity emphasized include: (1) forced evacuation from one's home; (2) felt discrimination or oppression due to one's ethnicity or religion; (3) having a militia occupy one's village, confiscate materials, or force family members to work for the military; (4) experiencing any war- or violence-related trauma; (5) lacking adequate food, water, shelter, or needed health services.

B. *Adverse Life Events (ALE's) and Living Circumstances in Thailand*

Questions regarding ALEs occurring in Thailand were structured similarly to those above. These questions were designed to emphasize specific aspects of insecurity or threats to personal safety and livelihoods that have been documented in existing ethnographic research and reports issued by local humanitarian and non-government organizations that work closely with refugee, migrant worker, and stateless populations in Thailand (e.g., Flaim 2017; Pollock and Lin 2010; SHRF and SWAN 2002). English translations of the Thailand ALE's are listed in Table A1.3 (appendix). Dimensions of violence covered include: (1) lacking adequate food, water, shelter, or needed health services; (2) being exploited by an employer, intermediary, or broker; (3) perceived threat from an employer, intermediary, or broker; (4) perceived threat from the police; and (5) fearing or avoiding travel outside of one's village or neighborhood.

Beyond ALEs, specific living conditions that are known to be associated with significant restrictions on individual mobility and protection of personal rights in Thailand were asked about—specifically legal documentation and residence. Legal status is self-reported and coded as categorical: Thai citizen, legal alien, passport or work permit, 'unregistered resident' card, and undocumented. Residence was self-reported (and confirmed by the interviewer in most cases, when the interview was conducted at the respondent's home) and coded as categorical: town or village, worksite (factory or agricultural), or refugee camp (unofficial[3]).

[3] Not managed by the United Nations High Commissioner for Refugees

C. *Additional contextual factors and other covariates*

Other variables used in the study analysis include self-reported country of birth (Thailand or Myanmar) and self-reported ethnicity, coded as Thai, Shan, or other ethnic minority.

3.3. Analysis

I analyze the survey data I collected in several steps that build on each other in order to address each of the study aims. For the first aim, I collect and summarize the life event histories of the entire study sample regarding aspects of violence and adversity.

Second, I analyze how experiences of overt and everyday violence—historical and present—are structured at the border. This involves the separate, but parallel, two-step analyses of the sets of Migrant (Myanmar)- and Thailand-based life event/circumstance questions that uncover: (a) the underlying structure of how these individual life events are related within and between subjects (Multiple Correspondence Analysis [MCA]) and (b) how women cluster based on common configurations of life events within that structure (cluster analysis on MCA results).

Lastly, in order to assess the degree to which common migration profiles predict the types of violence women experience in Thailand, I use type of migration experience identified (Migrant/Myanmar cluster membership) to predict type of Thailand-based experience identified (Thailand cluster membership). I describe each analytical step in more detail below.

A. *Multiple Correspondence Analysis*

In order to uncover and characterize the underlying structure of women's personal histories related to their migration histories and to their living circumstances in Thailand, I perform multiple correspondence analysis (MCA) on the coded responses for these sets of questions separately. MCA identifies latent dimensions of correspondence within and between women's response sets. Of the different available dimension-reducing approaches, I choose MCA—a

method very similar to principal components analysis but optimized for categorical loading variables—because it allows me to analyze related, and sometimes rare, occurrences in women's lives along with other categorical characteristics.

Multiple correspondence analysis (MCA) is a multivariate graphical technique and essentially splits a total chi-square of dependence between variables into meaningful component pieces, thereby identifying which variable categories represent similar or different experiences. The total inertia refers to the total standardized chi-square across all variable pairs. Linear combinations of variables define dimensions that explain components of the inertia (i.e., the contribution of the dimension to the departure from independence between variables summed across all variable pairs). The meaning of each dimension is drawn from the relative magnitude of the cosine values for each variable on the dimension (more in appendix) and from the interpretation of the relative positioning of each variable response category on the dimension axis. Technically the dimensions are found by eigenvalue decomposition of a matrix consisting of all cross-tabulations of variables. For more information, see Greenacre and Blasius (2006), Husson and Josse (2014), and Sourial (2010).

B. *Hierarchical Clustering on Principal Components (HCPC)*

After uncovering the MCA latent dimensions, I perform a cluster analysis of women based on their relative positioning across these dimensions, i.e., a hierarchical clustering on principal components (HCPC). This HCPC identifies prominent configurations of violence and adversity in Myanmar and Thailand respectively, as reflected in the study sample. I use the FactoMineR package in R for the joint MCA, HCPC, and multiple imputation for missing values (Le and Husson 2008; Josse and Husson 2016; Husson et al 2018; Husson et al 2018).

I hierarchically cluster individuals based on their MCA primary dimension values using the Ward's criterion, which decomposes the total inertia, or variance, into between and within-

group components. The Ward's method aggregates and splits clusters in order to minimize within-group inertia. The algorithm is depicted by a dendrogram, indexed by the gain of within-inertia with each cluster split, the relative distances of which can be used to determine the final number of clusters to retain. I use the HCPC (Hierarchical Clustering on Principal Components) function in the FactoMiner package in R (which is compatible for MCA results). It relies on the following empirical criterion for determining the final number of clusters, where Δ(Q) is the between-group inertia when moving from Q-1 to Q clusters:

$$\Delta(Q) / \Delta(Q+1)$$

The number Q that minimizes the criterion corresponds to the number of clusters kept (Husson et al. 2010).

C. *Multinomial Logistic Regression: How well does migration history predict living circumstances in Thailand?*

In order to assess to what degree migrant types, or profiles, predict the types of threats women experience in Thailand, I perform a multinomial logistic regression model in Stata 15. The dependent variable is membership to the categorical cluster defining ALE's and living circumstances in Thailand, and the independent variable is membership to the categorical cluster defining migration history and related circumstances.

3.4 **Results**

A. *Description of life event histories*

Personal historical life events captured in the study are in Table 3.1, disaggregated by subject country of birth. The most common adverse events or circumstances in Myanmar reported by women born there include feeling oppressed based on their ethnicity or religion (43.9%), having the Burmese military enter their villages (30.7%), and having their belongings seized or destroyed (30.7%). The most common adverse events or circumstances in Thailand among the

study sample include experiences related to arrest (18.5% either were arrested, hid from police in order to not be arrested, or had a close family member arrested), being afraid while traveling outside one's village (15.9%), and avoiding travel outside of one's village altogether out of fear (14.5%). Most of the percentage differences in Thailand adverse events or circumstances are statistically significantly different between migrants and non-migrants (bolded in Table 3.1).

B. *What are common dimensions and configurations of violence experienced in Myanmar before migration to Thailand?*

1. Underlying dimensions of migration circumstances: Multiple correspondence analysis (MCA)

The MCA of retrospectively reported ALE's occurring in Myanmar uncovers three prominent underlying dimensions among the 316 women with completed interviews who were born in Myanmar. Together these three dimensions account for 56.8% of the total variability (inertia) in women's responses (for more details on the number of dimensions, see appendix). Additional MCA plots and squared cosine value tables (unit less descriptors of the degree of association between variable responses and each dimension, and overall) are included in the chapter appendix.

The first dimension (D1) captures a scale of intensity of exposure to military force, forced evacuation, violence, and material deprivation. All adverse life events and human rights abuses load positively on this scale, with unmet medical care, severe traumatic or violent event exposure, and witnessing fighting or homes being destroyed or raided having the highest loadings (see plot of variables by D1 and D2 in appendix). The variables that are most correlated with D1 (i.e., the variables for which D1 captures the most variability, as indicated by squared cosine values) are having slept outside in hiding, having been forced to flee one's village because of an attack, and having had the Burmese military come into one's village.

The second and third dimensions are more nuanced in the exposures that they represent.

Dimension 2 distinguishes between exposure to military violence and to severe material deprivation. The positive side of the axis captures exposure to military occupation in one's village, with relatively less material deprivation. The variables that load most positively are severe traumatic or violent exposures, witnessing explosives detonate, and seeing fighting or homes destroyed; and the variables that load most *negatively* on this dimension are unmet medical need, not having enough food or water, and having to sleep outside. In contrast, D3 captures exposure to violence and forced evacuation with more limited, if any, exposure to a military occupation in one's village. Acute violence or trauma also loads positively on this dimension, along with unmet medical needs and home raids. Having witnessed temples or sacred structures desecrated, military enter one's villages, or belongings seized load moderately negatively on D3.

2. Migration life event history configurations: Hierarchical clustering on principal components (HCPC)

The HCPC analysis on the MCA dimensions yields four clusters characterizing different types of pre-migration contexts for women in the study who were born in Myanmar. Table 3.2 lists cluster totals and mean values for ALEs and other attributes, with the highest values for each experience or attribute bolded.

The first cluster is characterized by minimal exposure to military violence or severe material deprivation. None of the women falling in this category reported severe trauma, home raids, or witnessing fighting or homes being destroyed. Very few women in this group report instances of severe deprivation either (0-2%). Four percent ever had Shan military in their village and 8 percent reported Burmese soldiers ever in their village. Thirty-seven percent still report having felt oppressed based on ethnicity or religion and 7% report having to leave their village because of fighting or their home being destroyed. This is also the cluster that includes the largest proportion of ethnic minorities that identify as an ethnicity other than Shan. A

characteristic woman of this cluster (situated at or near the cluster centroid) happens to be a 26 year-old Dara-Ang (another ethnic minority group found on both sides of the border) migrant who reports having never experienced any of the Myanmar ALE's asked about. Based on the features of the first cluster, I refer to it as the *Low Military Violence Migrant* group.

The second cluster stands out as encompassing the greatest proportion of women having had the Shan military in their village (81%) and the second greatest proportion of women having had the Burmese military in their village (84%). Relative to other clusters, women grouped in this cluster experienced moderate-to-high levels of direct forced evacuation—70% report having to flee their village because of fighting or their home being destroyed and 51% ever sleeping outside in order to hide. They also experience relatively high percentages of ever having their belongings seized or destroyed (84%) and having been forced to work for soldiers or having a relative forced to work for soldiers (48%). Other conflict-related exposures are moderately high in this cluster. Given these characteristics, I refer to this group as the *Military Occupation Migrant* group. A representative individual from this cluster —a 39-year-old Shan migrant—reports having both Shan and Burmese soldiers enter her village and being forced to leave her village because of fighting and to sleep outside in hiding—all in a single year. She reports having never experienced any of the other ALEs listed, including never lacking enough food or water nor witnessing any violence directly.

The third cluster is characterized by the highest proportion of women reporting being directly forced to leave their villages, feeling oppressed based on their ethnicity or religion, and experiencing severe deprivation of critical resources, relative to all other clusters. Eighty-one percent of women in this cluster report having been forced to leave their village due to fighting or their home being destroyed and 92% reported having to sleep outside or in the forest in order to hide. Ninety-one percent of the women in this cluster reports ever feeling oppressed

based on their ethnicity or religion and 63% ever forced to work for soldiers or knew someone else who had. All of the women in this cluster have had to sleep outside at some point due to having nowhere else to sleep, 71% have been without enough food or clean water to drink, and 30% have gone without needed medical care. Additional conflict-related exposures are moderately high in this group and exposure to severe violence is relatively low or moderate. A 28-year-old Dara-Ang migrant characteristic of this cluster reports having had the Burmese military (only) enter her village, having been forced to leave her village due to fighting, and having to sleep outside out of necessity and in order to hide while in Myanmar. She reports unmet medical care needs but none of the other ALE's. Based on the attributes of this cluster, I refer to it as the *Deprivation/Evacuation Migrant* group.

The fourth and final cluster contains the highest proportion of women reported having the Burmese military ever enter their village, having their belongings seized or destroyed, and experiencing the most severe military violence and related trauma. Ninety percent of the women in this group report experiencing the Burmese military come into their village and 90% report having their belongings seized or destroyed. Eighty-eight percent witnessed explosives detonated, 75% witnessed fighting or homes being destroyed, 73% reported a severely traumatic incident, and 80% reported their or a neighbor's home being raided. This group additionally contains moderate-to-high proportions of forced evacuation and deprivation. A 30-year-old Dara-Ang migrant representative of this cluster reports having the Burmese and Shan military enter her village and being forcefully evacuated due to fighting. She had her belongings seized and home raided, and directly witnessed the fighting. Based on the characteristics of this cluster, I refer to it as the *Severe Violence Migrant* group.

C. *What are common dimensions and configurations of adverse life events and circumstances experienced in Thailand?*

1. Underlying dimensions of adversity in Thailand: Multiple correspondence analysis (MCA)

The MCA of retrospectively reported ALE's occurring in Thailand uncovers two prominent underlying dimensions among the 512 women with completed interviews. Together these two dimensions account for 42.0% of the total variability (inertia) in women's responses. More MCA diagnostics and dimension descriptions are included in the appendix.

The first dimension (D1) captures a scale of intensity of perceived and realized threats related to arrest, traveling outside of one's village, and worker rights—including threats to finding work, being treated unfairly, and threats to personal safety. All adverse life events and human rights abuses load positively on this scale, with fearing and avoiding travel, not having enough food or water, and experiencing severe mistreatment by an employer having the highest loadings (see MCA plot in appendix). The variables that are most correlated with D1 include fearing travel, avoiding travel, and being arrested, having a relative arrested, or fearing arrest.

Dimension 2 (D2) differentiates between work and mobility related threats, and between migrant worker and legal resident status. Not being able to provide for one's family because of lack of work, not being paid as agreed, living on a worksite, possessing a passport or work permit, and experiencing severe mistreatment or exploitation by an employer or moneylender all strongly and positively load on D2. In contrast, fearing travel, avoiding travel, having a personal experience or fear of arrest, holding a legal resident card, or living in a refugee camp all moderately negatively load onto D2. The variables best represented in D2 are residence and legal documentation.

2. Thailand life event history configurations: Hierarchical clustering on principal components (HCPC)

The HCPC analysis yields three clusters characterizing different types of current (post-displacement) contexts. Table 3.3 lists cluster totals and mean values for ALEs and other attributes, with the highest values for each experience or attribute bolded.

The first cluster is characterized by a majority of women living in a village or town (95%), holding a legal resident card (74%), and experiencing lower threats to livelihoods than the other clusters (0-6%). Women in relatively low-threat situations as "unregistered residents" in camps are also part of this group—23% are unregistered or without documentation and 5% are in a refugee camp. One percent or fewer of the women in this group report severe deprivation or mistreatment by an employer or moneylender. One percent have felt afraid while traveling, but none have avoided travel due to fear. Six percent have, however, either been arrested, hid in order to prevent being arrested, or had a relative arrested. A women characteristic of this cluster is 21 years-old and Dara-Ang. She does not know which side of the border she was born on and now holds a "hill tribe" alien resident card and lives in a village. She responded as not experiencing any of the ALE's in Thailand asked about (however, some responses are missing from this individual). Based on the composition of this cluster, I refer to it as the *Low Threat* group, with the caveat that threats experienced by women in this group are still very important.[4]

The second cluster is predominantly characterized by individuals currently working or trying to work, and reporting low-to-moderate levels of experiences indicative of employer or moneylender mistreatment or exploitation. It contains the greatest proportion of women with passports or work permits (71%) and women residing in worksites (59%), relative to all other clusters. Twenty-five percent report not being able to find enough work to provide for their family at some point and 3% report having gone without enough food or drinking water. This group overall reports low-to-moderate levels of mistreatment by an employer or moneylender and small but nontrivial levels of threat related to mobility and arrest. A women identified as

[4] It is important to recognize that while this group experiences relatively low reported levels of the severe cases questioned about, this group still includes individuals that are known to hold fewer civil rights than Thai citizens and therefore experience some level of threat as well (Flaim 2017).

representative of this cluster is 19 years-old and is Shan. She holds an "unregistered resident" card that allows her to temporary reside in Thailand for 10 years and she has had trouble finding enough work to provide for her family. She did not respond to all of the ALE questions, but her non-missing responses suggest she has never experienced any of the other ALE related to work and travel. Based on the characteristics of this cluster, I will refer to it as the *Moderate Threat* group.

The third cluster is characterized by experiencing unambiguous adversity in Thailand related to deprivation, work, interpersonal interactions, travel, and threats of arrest. It contains the greatest proportion of women experiencing each of the ALE's asked about. Relative to other clusters, it does not contain the greatest proportion of any given legal status or housing situation. Fifty-two percent are legal residents; 27% hold a passport, work permit, or both; and 21% hold an "unregistered resident" card or no documentation. Seventy-one percent of women in this group live in a village or town, 25% are on a worksite, and 4% live in a camp. A woman selected as representative of this cluster is 28 years-old, born in Burma, and Dara-Ang. She lives on an orchard where she works and has no documents. She reports not having experienced any events indicative of severe material deprivation, or mistreatment by an employer or moneylender, but she does fear traveling outside of where she lives and, while never being arrested nor having a family member arrested, she has hidden in order to avoid being arrested. Given the attributes of this group, I will refer to it as the *High Threat* group.

D. *To what degree do common migration profiles predict the types of threats women experience in Thailand?*

As expected, membership in a given migration-based cluster is not independent of one's membership to a cluster based on ALEs and living conditions in Thailand. Table 3.4 displays the cross-tabulation of each respective clustering. Of the women born in Thailand, 79% are identified as in Low Threat circumstances, 16% are in Moderate Threat, and 5% are in High

Threat. Of the Low Military Violence Migrants in the sample, 40% end up in the Low Threat group, 43% end up in the Moderate Threat group, and 17% end up in the High Threat group. In contrast, among the women in the Severe Violence Migrant group, only 25% end up in Low Threat, 35% land in Moderate Threat, and 40% land in High Threat. The differences represented in this cross-tabulation are overall statistically significant (Pearson chi square=86.6; $p<0.001$).

Results from the multinomial logistic regression model of Thailand-based clusters on Myanmar/Migrant-based clusters are shown in Table 3.5. Being in the Low Threat Group is the reference, or base, outcome group and being born in Thailand is used as the reference independent variable category. Relative to women born in Thailand, all migrant women are more likely to end up in Moderate Threat or High Threat groups in Thailand, with a mostly monotonic relationship between more violent or forced pre-migration circumstances and greater risks of landing in more threatening situations in Thailand. For instance, Low Military Violence Migrants are 5.2 (95% CI: 3.1, 8.7) times as likely than women born in Thailand be in the Moderate Threat group in Thailand, and 7.5 (95% CI: 3.2, 17.6) times as likely to end up in a High Threat group. The Severe Violence Migrant group is 6.6 (95% CI: 2.0, 22.7) times as likely be in the Moderate Threat group and 27.2 (95% CI: 7.0, 105.2) times as likely to be in the High Threat group.

3.5 Discussion

A. *Violence Reflected in Women's Life Histories, Pre- and Post-Displacement*

1. Pre-Displacement Contexts

Overall, I find a substantially high prevalence of stressful pre-displacement life events among migrant women in the study sample. Sixty-six percent of migrant women with completed interviews reported at least one of the Myanmar-based ALE's asked about. This is twice as high as the prevalence of human rights abuses reported in the household survey conducted in

conflict zones in Eastern Myanmar in 2010 (Parmar et al. 2014). I make this comparison with caution, as the study populations are not the same—my study sample is not representative of all women in their original source communities in Myanmar, nor is it representative of as broad of a geographic landscape. However, this comparison does reveal a high burden of historical stressors in the study sample all the same. Furthermore, it is likely that I captured an underestimation of exposure to ALE's among migrants given that such events tend to be underreported and that migrants in the most vulnerable situations on the border (e.g., in closed worksites and with the most controlling employers) did not participate in the study.

The configurations of pre-displacement events that emerged from the cluster analysis reveal significant patterns of military-based violence, which can be characterized as either dominated by surveillance and taxation ("Military Occupation"); severe deprivation, evacuation, and forced labor ("Deprivation/Evacuation"); more severe violence associated with military invasion and occupation ("Severe Violence"); or less severe or direct military exposure ("Low Military Violence"). These configurations do not represent the only possible groupings of women's experiences, but their selection is based on the underlying dimensions of violence I measured and believe are salient to the situation. As discussed in detail elsewhere (Garip 2012; Grimmer et al. 2011), cluster analysis results cannot easily be validated or tested conclusively but are meaningful in as far as they are useful descriptions, based on the research content. The cluster categorizations of women's migration circumstances that I identify are based on theory and background information and go beyond what is measure-able by a single variable or even a combination of variable values. The grouping of similar life histories agrees with the background literature on different contexts in the Shan state, and they provide valuable distinctions in patterns that suggest different forms of violence and related stressors of variable nature and intensity. For instance, all of these women have experienced significant social oppression in Myanmar, but exposure to greater military surveillance and acute violence could

manifest in different short and long-term stress responses and related coping mechanisms that would translate to different social and health interventions.

2. Post-Displacement Contexts

Thirty-two percent of the women in the study sample reported some threat to their livelihoods related to work, mobility, or other constraints. This, again, is not population representative, but it highlights an alarmingly high prevalence of such threats in the group studied, at least. Considering that the sample is most representative of villagers in the study field sites, and more migrant workers were missing due to being difficult to find and some employers not allowing us to survey their workers, this estimate is likely an underestimation of threats to livelihoods among migrants at the border.

The clusters of violence-related circumstances on the Thai side of the border (women's current situations), as discussed above, provide one way to categorize women's experiences, which I label as: (1) Low Threat, (2) Moderate Threat, and (3) High Threat. I deem these groupings meaningful as they characterize both experiences and contextual factors that suggest different levels of everyday violence and related stress.

B. *Structured Violence, as Patterned by Sequenced Pre- and Post-Displacement Contexts*

The multinomial regression model of post-displacement context on pre-displacement context (respective cluster memberships) reveals a powerful (but not deterministic) link between more severe historical violence and forced displacement predicting greater probabilities of ending up in high-threat circumstances post-displacement. This is one of the clearest reflections of structural violence, where historical adversity and constraints on individual agency and potential can lead to subsequent adversity and re-enforcing social inequalities. Furthermore, the observed dose-response relationship between increasingly more violent pre-displacement

contexts predicting greater risk of increasingly threatening post-displacement contexts further suggests a measurable continuum of violence reflected in women's life histories.

C. *Limitations*

This study is limited by potential sources of selection bias, where for instance pre and post-group membership affect selection into sample, thereby causing a spurious association between pre- and post-displacement factors. Most likely, when considering the realm of migrants alone at least, it is the individuals in both the most favorable pre- and post-displacement situations, or alternatively both the least favorable pre- and post-displacement situations, that are systematically missing. These cases of missing-ness (i.e., the extreme cases) would attenuate the estimated measures of association.

Additional limitations of this study involve the potential under-reporting of certain stressful life events, which also could be leading to underestimations. There is also the unavoidable limitation that I could have missed key events and dimensions of violence in women's lives due to not asking all of the most pertinent questions in the survey instrument.

D. *Implications and Future Directions*

As mentioned previously, the use of cluster analysis provides a valuable categorization of contexts that capture multidimensional aspects of structural violence and complex interactions between social factors, but additional research is needed—ideally longitudinal—in order to identify more specific mechanisms through which structural violence, displacement, and related stressors get under the skin. Most importantly, a better understanding of mechanisms will greatly serve efforts to mitigate and prevent future exposures to the aspects of violence highlighted in this study.

In conclusion, findings from this study should cause alarm. Desperately needed for migrant

populations in such high violence and stress contexts are additional human rights protections and expanding access to important services, such as social, health, and legal service provisions that can significantly counter the threats to livelihood that women currently face. Such provisions are not only needed among women that legally fit the UNHCR definition of refugee and remain unrecognized, but among migrants in vulnerable situations more broadly defined, including cases of displacement and "survival migrant" (Betts 2018) that fall out of the legal definition of refugee. Betts comments on the scholarship on forced migration that emphasizes causes of migration alone. While pre-migration circumstances are a critical part of women's lived experiences, social perceptions and legal determinations of "deservingness" (e.g., in the form of constrained access to legal status and other civil liberties for many of the migrants from the Shan state) are also a major part of the violence problem faced by women at the CMSS border that must be addressed (Betts 2018).

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Chapter III Tables & Figures

3.7 Table 3.1. Study life event and socio-demographic characteristics

Summary of socio-demographic and life event history data captured in the study, disaggregated by subjects' country of birth. Means and percentages that are statistically significantly different between countries of birth (at $p<0.05$) are bolded.

	Born in Thailand	Born in Myanmar	All
Socio-Demographic			
Age	**26.8**	**29.5**	28.6
Other Ethnic Minority	**39.8%**	**18.1%**	23.4%
Myanmar Events and Circumstances			
Forced Evacuation			
Fled village because of fighting or home being destroyed	--	28.5%	--
Slept outside or in forest in hiding	--	21.6%	--
Conflict-Related Exposures			
Felt oppressed based on ethnicity or religion	--	43.9%	--
Witnessed sacred monument desecrated	--	7.1%	--
Shan military in village	--	24.8%	--
Burmese military in village	--	30.7%	--
Belongings seized or destroyed	--	30.7%	--
Forced labor for military	--	20.5%	--
Witnessed explosives	--	12.4%	--
Witnessed fighting or homes destroyed	--	8.9%	--
Severe trauma or violence	--	4.4%	--
Home raided	--	7.8%	--
Critical Resource Deprivation			

	Born in Thailand	Born in Myanmar	All
Lacked food or drinking water	--	8.5%	--
Slept outside out of necessity	--	16.1%	--
Unmet medical need	--	2.9%	--
Thailand Events and Circumstances			
Critical Resource Deprivation			
Lacked food or drinking water or shelter	2.7%	3.6%	3.3%
Adverse Life Events			
Could not provide for family	**7.3%**	**15.4%**	12.8%
Not payed as agreed	**2.6%**	**10.5%**	8.0%
Severe mistreatment by employer/ moneylender	4.0%	5.4%	5.0%
Fear during travel	**3.3%**	**22.1%**	15.9%
Avoided travel	**2.6%**	**20.3%**	14.5%
Arrested, hid to avoid arrest, or had relative arrested	**5.3%**	**24.9%**	18.5%
Living Conditions			
Legal status/documentation			
Legal alien resident/ Citizen	**78.4%**	**39.8%**	52.6%
Passport and/or worker permit	**6.8%**	**40.8%**	29.5%
Unregistered resident' card or no documentation	**14.9%**	**19.4%**	17.9%
Housing situation			
Town/ village	**91.6%**	**65.7%**	74.4%
Worksite (factory/ agriculture)	**6.3%**	**31.8%**	23.3%
Refugee camp	**2.1%**	**2.5%**	2.3%
Total (n)	151	316	467

3.8 **Table 3.2. Myanmar Life Events by Cluster Membership**

Proportion within each cluster listed.

	Low Military Violence	Military Occupation	Deprivation/ Evacuation	Severe Violence
	1	2	3	4
Socio-Demographic				
Age	28.7	31.7	30.2	29.9
Other Ethnic Minority	**0.21**	0.13	0.12	0.15
Forced Evacuation				
Fled village because of fighting or home being destroyed	0.07	0.70	**0.81**	0.50
Slept outside or in forest in hiding	0.02	0.51	**0.92**	0.47
Conflict-Related Exposures				
Felt oppressed based on ethnicity or religion	0.37	0.52	**0.91**	0.35
Witnessed sacred monument desecrated	0.00	0.24	0.07	**0.25**
Shan military in village	0.04	**0.81**	0.26	0.65
Burmese military in village	0.08	0.84	0.37	**0.90**
Belongings seized or destroyed	0.08	0.84	0.37	**0.90**
Forced labor for military	0.04	0.48	**0.63**	0.53
Witnessed explosives	0.01	0.31	0.04	**0.88**
Witnessed fighting or homes destroyed	0.00	0.15	0.12	**0.75**
Severe trauma or violence	0.00	0.02	0.00	**0.73**
Home raided	0.00	0.04	0.16	**0.80**
Critical Resource Deprivation				

	Low Military Violence	Military Occupation	Deprivation/ Evacuation	Severe Violence
	1	2	3	4
Lacked food or drinking water	0.02	0.03	**0.71**	0.15
Slept outside out of necessity	0.02	0.27	**1.00**	0.21
Unmet medical need	0.00	0.00	**0.30**	0.05
Total (n)	207	62	27	20
Percent of total sample	39.73	11.9	5.18	3.84

3.9 **Table 3.3. Thailand Life Events by Cluster Membership**

Proportion within each cluster listed.

	Low Threat	Moderate Threat	High Threat
	1	**2**	**3**
Socio-Demographic			
Age	28.5	27.6	29.8
Other Ethnic Minority	0.24	0.26	0.18
Critical Resource Deprivation			
Lacked food or drinking water or shelter	0.00	0.03	0.13
Adverse Life Events			
Could not provide for family	0.00	0.25	0.27
Not payed as agreed	0.00	0.13	0.24
Severe mistreatment by employer/ moneylender	0.01	0.03	0.23
Fear during travel	0.01	0.01	0.89
Avoided travel	0.00	0.01	0.83
Arrested, hid to avoid arrest, or had relative arrested	0.06	0.02	0.91

	Low Threat 1	Moderate Threat 2	High Threat 3
Living Conditions			
Legal status/documentation			
Legal alien resident/ Citizen	0.74	0.16	0.52
Passport and/or worker permit	0.03	0.71	0.27
Unregistered resident' card or no documentation	0.23	0.14	0.21
Housing situation			
Town/ village	0.95	0.41	0.71
Worksite (factory/ agriculture)	0.00	0.59	0.25
Refugee camp	0.05	0.01	0.04
Total (n)	269	166	86
Percent of total sample	51.63	31.86	16.51

3.10 **Table 3.4. Cross-tabulation of migrant types and Thailand circumstances**

Column percentages in parentheses.

	Born in Thailand	Low Military Violence Migrant	Military Occupation Migrant	Deprivation/ Evacuation Migrant	Severe Violence Migrant	Total
Low Threat	119	82	22	7	5	235
	(78.8)	(39.6)	(35.5)	(25.9)	(25.0)	(50.3)
Moderate Threat	25	89	22	11	7	154
	(16.6)	(43.0)	(35.5)	(40.7)	(35.0)	(33.0)
High Threat	7	36	18	9	8	78
	(4.6)	(17.4)	(29.0)	(33.3)	(40.0)	(16.7)

Total	151	207	62	27	20	467

3.11 **Table 3.5. Multinomial logistic regression results.**

Outcome	**Odds Ratio**	**95% Confidence Interval**	
Low Threat	(Base)	(Base)	(Base)
Moderate Threat			
Born in Thailand	(Ref)	(Ref)	(Ref)
Low Military Violence Migrant	5.17	3.06	8.74
Military Occupation Migrant	4.76	2.29	9.89
Deprivation/ Evacuation Migrant	7.48	2.64	21.19
Severe Violence Migrant	6.66	1.96	22.71
High Threat			
Born in Thailand	(Ref)	(Ref)	(Ref)
Low Military Violence Migrant	7.46	3.17	17.59
Military Occupation Migrant	13.91	5.20	37.22
Deprivation/ Evacuation Migrant	21.86	6.28	76.11
Severe Violence Migrant	27.20	7.03	105.20

CHAPTER IV
Aim 2 Background
Displacement Contexts and Health

The Thai-Myanmar border provides a rare case study of a region that has served as the destination for asylum seekers fleeing conflict zones in Myanmar over decades, along with additional migrants from other parts of Myanmar fleeing poor living conditions and infrastructure—still related to conflict and government instability—who can also be considered displaced or survival migrants. In this study, I shed light on overlooked displacement contexts with findings from a survey I fielded in 2015-2017 among women living at the Thai-Myanmar border where these migration histories and post-migration living conditions intersect. I aim, specifically, to describe women's health and life histories at this intersection and to investigate how displacement patterns at this intersection match health processes related to stress.

In the following background sections, I will lay out: (I) why the Thai-Myanmar border is an advantageous context for better understanding the relationship individual displacement and health, and (II) theoretically, how displacement and related stressors shape individual health, including *how post-displacement contexts could modify the health impact of pre-displacement stressors*. I will then proceed to the study approach, methods, results, and conclusions.

4.1 The Thai-Myanmar Border: The Case of Displacement from the Shan State

My study focuses on the Thai-Myanmar border between the Shan State in Myanmar and Chiang Mai Province in Thailand, a case uniquely well suited for comparing patterns of displacement and their health consequences. In the following sections, I will briefly review: (1) dominant drivers of displacement out of Myanmar that have led to common profiles of personal out-migration histories—i.e., pre-displacement contexts—related to ongoing conflict;

and (2) Thailand's social and political reception of different migrants from Myanmar, and how this has resulted in common profiles of personal environments and related threats to livelihoods affecting migrants currently in Thailand—i.e., post-displacement contexts.

Structured discrimination, oppression, and violence has led to certain common types of war exposure and displacement out of Myanmar conflict areas such as the Shan State (Grundy-Warr 2004; see prior chapter). In review, the cluster analysis from the previous chapter uncovers configurations of pre-displacement events in the study sample characterized as either dominated by surveillance and taxation ("Military Occupation"); severe deprivation, evacuation, and forced labor ("Deprivation/Evacuation"); more severe violence associated with military invasion and occupation ("Severe Violence"); or less severe or direct military exposure ("Low Military Violence").

Upon arrival in Thailand, individuals who have fled conditions in the Shan State have landed in situations that do not consistently align with pre-displacement contexts as perhaps expected (although pre-displacement contexts are indeed predictive of post-displacement contexts). Shan individuals meeting the UNHCR definition of refugee can be found in post-displacement settings that range from UN-managed refugee camps, to remote villages, to urban construction sites (Mekong Migration Network 2012). Similarly, individuals have quite arbitrarily obtained different legal statuses and documentation that affect their daily personal safety, ability to work, and human rights protection (Grundy-Warr 2004). In the previous chapter, cluster analysis on life events and circumstances on the Thai side of the border uncovers configurations of post-displacement contexts related to these factors that can be characterized as High Threat, Moderate Threat, and Low Threat.

4.2 **Displacement, Stress, and Health**

In this study, I aim to elucidate how processes of displacement can shape individual health and

wellbeing, specifically how displacement patterns drive social stressors that individuals can embody (Krieger 2005). This question also includes how post-displacement contexts could contribute to or modify the impact of historical stressors on current health and wellbeing. Below, I highlight key social and biological pathways linking displacement, stress, and health.

A. *Biosocial pathways linking individual displacement, stress, and health*

Below I review some of the major mechanisms linking social adversity and stress to health. Contrary to dominant conceptual models that focus primarily on the pathology of stress in mental disorders, I will draw from a broader biosocial framework in which stressors are in every environment, but pose distinct challenges to an individual or group depending on their nature (e.g., predictability or controllability), frequency or duration, proximity (how recent), and intensity (acute or chronic). These defining features of stressors dramatically shape individual responses and adaptations to stress, both advantageously and disadvantageously (Koolhaas et al 2016).

1. Accumulation of toxic stress: Allostatic load and weathering over time

The patterns of displacement in this study reflect general layers of toxic stressors, such as acute trauma, military oppression, and additional stresses post-displacement. McEwen and McEwen's (2017) conceptualization of the toxic stress model builds on multiple previous proposed biosocial models of how poverty and social stratification lead to differential health outcomes via stress pathways. The model postulates that past trauma, repeated adverse life events, and chronic social disadvantages are all stimuli that contribute to the buildup of toxic stress in the body and can overload the body's physiological state and ability to maintain allostasis. Allostasis is the optimal, well-balanced regulation of the body's stress responses via the HPA axis that involves the autonomic nervous system, metabolic hormones, and pro- and anti-inflammatory cytokines of the immune system and neurotransmitters in the brain

(McEwen and McEwen 2017). Toxic stress and allostatic load refer to the "wear and tear" on the body and brain that result from the over-activity or inactivity of these stress responses (McEwen 1998). The concept of "weathering" is relatively similar, which postulates specifically that toxic stressors cause premature aging. This theory has focused primarily on Non-Hispanic Black mothers in the United States (Geronimus…).

2. *Prolonged exposure to everyday violence or chaos: Military occupation, police surveillance, and other daily threats*

Beyond general social stressors, personal experiences of oppression and everyday violence—e.g., military occupation or threatening encounters with police—also translate to specific dimensions of stress and health implications. Two ways in which this type of oppression could influence stress and health outcomes include: (1) a heightened state of anxiety or unrest in response to the uncertainty, lack of security, and feelings of powerlessness around what will happen (Duschinski 2009; Goldsmith 2009; Romero and Serag 2004; Weitzer and Tuch 2002); and (2) the normalization of such threats or actual violence as a coping mechanism that can be internalized in ways harmful to one's health and wellbeing (Gee et al 2012; Green 1994; Thoits 2010). The pathways are not necessarily separate those in the toxic stress framework, but they get at a specific natured stressor that has received relatively little attention in social stress research—except for maybe some of the social health research on neighborhoods and the health effects of chaotic environments (CITE).

3. *Acute Trauma: Post-traumatic reactions and mental health disorders*

Personal histories of acute violence and war-related trauma, such as experiences of forceful evacuation by a militia, direct exposure to overt violence, severe food or shelter deprivation, or any combination of these events, can pose distinct health risks beyond daily stressor. Existing research linking personal histories of war trauma and adverse life events to stress and health overlaps with the toxic stress research reviewed above and also focuses more on

posttraumatic reactions that more commonly involve mental health disorders and maladaptive coping behaviors, such as substance use (Schnurr and Green 2004). Acute trauma can trigger or accelerate hyperactivity or shutdown of the biological stress responses reviewed above as well (McEwen and McEwen 2017).

4. Severe food deprivation: Long-term effects through human biology, development, and behavior

Episodes of severe food deprivation over the life-course also carry important child health implications (Alaimo et al 2001; Hackett et al 2009) that influence health into adulthood (Cesar et al., 2008; Osmond and Barker 2000). In addition to prohibiting health and development during critical periods through adolescence, personal histories of severe food deprivation have also been linked to excessive body fat and obesity (Townsend et al 2001). It is possible that there are biological mechanisms driving adaptive changes to food preference and body fat storage following prolonged food deprivation as well, i.e., a predictive adaptive response similar to what had been observed in very early human development (Gluckman and Bateson…). Behavioral mechanisms could also be driving this association to some extent. For instance, this has been observed among survivors of war-related trauma and deprivation who end up in calorie-rich environments and is associated with binge eating, preoccupations with food, worrying about food and hoarding, and favoring high-fat foods post-starvation experiences (Peterman et al 2010; Polivy et al., 1994; Sindler et al., 2004).

5. Adaptation, vulnerability, and resilience: Interactions between the past and present

Past exposures, current exposures, and exposures that are ongoing can each lead to immediate and long-term individual stress responses and adaptations, which are furthermore shaped by individual characteristics and social support—i.e., primary drivers of vulnerability or resilience (McEwen and McEwen 2017). In the patterns of displacement under study, current social environments and related support are an especially important area of interest because they

represent a critical opportunity for mitigating any negative health impacts of past trauma and highlight key areas of concern for preventing the further accumulation of toxic stress in post-displacement contexts.

B. *Expectations of how stress-related health pathways are reflected in patterns of displacement*

As reviewed above, theoretical frameworks for the health effects of adversity and toxic stress typically include pathways involving cumulative disadvantage and weathering, altered stress responses, or a combination of these. The empirical testing of such theories is still relatively limited by the rarity of formulating realistic counterfactuals that represent variable social stress patterns, specifically individuals that have experienced different types of extreme stress at different times within their lives. I overcome a number of these challenges with the data I collect at the Thai-Myanmar border that captures diverging and converging stress exposure patterns reflected in individual histories of displacement.

Among migrants, pre- and post-displacement contexts can be conceptualized as two segments in a historical sequence of stressor exposures. These two-segment sequences, or patterns of displacement, can be thought of as stressor trajectories: high-to-high (H-H), low-to-low (L-L), high-to-low (H-L), and low-to-high (L-H)—these can be adapted further to include additional levels or types of stressors, e.g., by adding different migrant types as indicative of variable pre-displacement stressor intensities and types.

Below I describe how comparisons of health outcomes between such trajectories can reflect different underlying stress-related processes, which are not all necessarily mutually exclusive. I present several visuals of hypothetical scenarios that agree with selected explanations below in Figure 4.1, where the vertical axis represents a negative health outcome, the horizontal axis includes migrant histories ranging from least stressful (e.g., non-migrant) to most stressful (e.g.,

Severe Violence Migrant) left-to-right, and separate symbols depicting current stress contexts (e.g., High Threat and Low Threat).

1. Cumulative Stress/Disadvantage (CS/D) – Non-interactive.

As reviewed above, in most scenarios the negative effects of toxic stress presumably accumulate over the life-course based on the duration and intensity of past and ongoing stressors. This would be reflected in allostatic load and health being poorest among individuals that had been displaced under the most intensely and chronically stressful situations (acute violence, deprivation, or military oppression) and individuals that ended up in high-stress environments following displacement. A non-interactive cumulative stress process would result in pre-displacement stressors contributing similarly to current health across post-displacement settings, and the presence of both pre- and post-displacement stressors resulting in the worst health outcomes. Figure 4.1(a) depicts such a relationship in a simple additive linear relationship for ease of visualization, but it could alternatively be on the multiplicative scale.

2. Cumulative Stress/Disadvantage (CS/D) – Positive interaction.

Also aligned with the cumulative toxic stress model, a long-term response to pre-displacement stressors could result in an exaggerated physiological stress response to subsequent stress (i.e., post-displacement), possibly due to overstimulation or failed shutdowns. This would be represented by a positive interaction in which presence of intense stressors in both pre- and post-displacement settings results in worse health beyond what would be expected from their independent effects. Figure 4.1(b) depicts this kind of positive interaction, again on a simplified additive linear scale. This type of relationship could also be indicative of low-stress environments including more positive coping and social resources that negate the harmful effects of past toxic stress, i.e., this model is not necessarily deterministic. These explanations

would involve different biological mechanisms but could co-occur.

3. Post-traumatic shock and legacy effects – More selective effects.

A greater health disadvantage related to the trauma of witnessing or experiencing severe violence, severe deprivation, or both that goes beyond other background stressors suggest this model. This aligns with studies of PTSD in psychiatry that attribute more severe trauma with essentially a rewiring of the habitual stress response. Thus, the worst health response by far would be in response to acute historical (pre-displacement) trauma, regardless of post-displacement conditions. Figure 4.1(c) depicts a possible scenario like this.

4. Resilience: Beneficial Adaptation, or Selection.

There are adaptations to past stressors that could enhance individual's abilities to respond to subsequently stressful environments, i.e., increase their capacity to withstand future stressors through conscious or subconscious coping strategies. If this kind of resilience prevails, then worse pre-displacement stressors could actually be associated with better current health outcomes. Figure 4.1(d) depicts such a scenario. A pattern like this could also be driven by survival or by only more resilient individuals selectively migrating.

5. Resilience: Short-term Stress Memory.

Resilience to historical stress could be considered short-term stress memory, i.e., individuals would be sensitive to immediate stress environments (post-displacement contexts) but would not show long-lasting effects of historical stress environments (pre-displacement contexts). This would look sometime like the illustration in Figure 4.1(e).

6. Maladaptive Predictive Response.

If stressful environments in the past led to predictive adaptive responses that were advantageous in ongoing stressful environments, but disadvantageous in subsequently low-

stress environments, a qualitative interaction between pre- and post-displacement stressors could emerge. Figure 4.1(f) illustrates such a pattern is illustrated.

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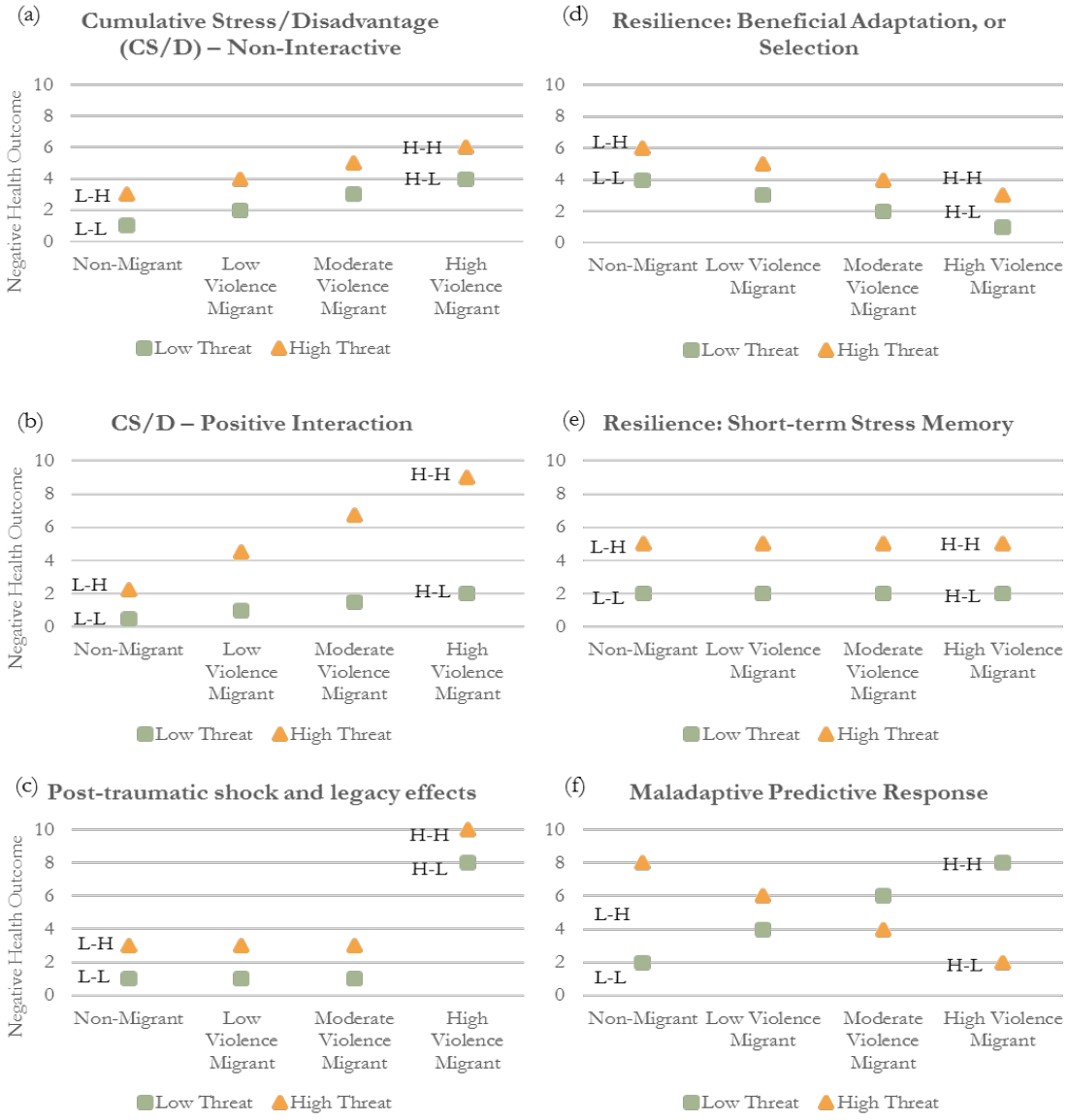
Chapter IV Tables & Figures

Figure 4.1. **Expectations of how stress-related health pathways are reflected in patterns of displacement.**

I present several visuals of hypothetical scenarios that agree with selected explanations below, where the vertical axis represents a negative health outcome, the horizontal axis includes migrant histories ranging from least stressful (e.g., non-migrant) to most stressful (e.g., Severe Violence Migrant) left-to-right, and separate symbols depicting current stress contexts (e.g., High Threat and Low Threat). Plots indicating groups that have experienced relatively extreme patterns of displacement, or stressor trajectories, are flagged: high-to-high (H-H), low-to-low (L-L), high-to-low (H-L), and low-to-high (L-H).



CHAPTER V
Aim 2 Analysis
Patterned Stressors and Women's Health

SUMMARY

Global forced displacement is at record highs, continues to rise, and poses grave health concerns for the vulnerable populations affected, and for future global health needs more broadly. The effects of displacement remain woefully understudied, particularly among those in more protracted situations, who represent the majority of those displaced and who disproportionately face chronic and toxic stress related to adversity, including via poor social reception and lack of the same legal protections or social provisions offered to host country nationals. Studying displacement-related stressors and their health impacts has the potential to provide key insights into current understandings of the lived experiences of displacement and inform how related stressors are embodied. Current models of stress and health generally involve cumulative disadvantage, adaptive stress responses, or a combination of related pathways. A persistent challenge to empirically studying these theories is the rarity of formulating realistic counterfactuals that represent variable social stress patterns—i.e., individuals moving in and out of extreme stressful environments.

I overcome a number of challenges with data I collect at the Thai-Myanmar border, a novel opportunity for capturing understudied protracted displacement situations, and for comparing diverging and converging stress exposure patterns. I find evidence that more traumatic and disruptive pre-displacement stressors (forced evacuation, acute deprivation, and military oppression) indeed carry lasting health effects relative to other migrants, particularly risk of elevated blood pressure and body fat accumulation. I furthermore find a strong association between current high-threat environments and self-rated health across all migrant groups. Study findings suggest that individual resilience and vulnerability to stressors related to forced

migration are dependent on the health pathways involved and both individual pre- and post-displacement contexts. They furthermore highlight the need to address general health needs among individuals in protracted displacement situations that include but also go beyond mental health. Findings additionally highlight how migrants more and less forcefully displaced can similarly end up in vulnerable displaced situations that raise serious health concerns.

5.1 Approach

In this study, I use novel survey data of women with different histories of displacement from the Shan State, Myanmar, to Thailand and compare their current health status at the Thai-Myanmar border in order to elucidate the following:

1) How do different displacement contexts, defined by related stressors, influence women's health and wellbeing?

2) How do personal historical patterns of pre- and post-displacement contexts—i.e. interactions between these contexts—influence women's health and wellbeing?

A. *Data: Maternal and Child Health Survey at the Chiang Mai-Shan State Border*

The final analytical sample for this study is a subset of the entire study sample for whom I have both anthropometric and interview data for the mother recruits. After accounting for mothers with survey components unlinked or completed by a different child guardian, there are 375 women study subjects remaining (46% of total recruits), 261 (70%) for whom I have complete, non-missing data for the analyses. None of the women in the final analytical sample were pregnant when surveyed. Table 5.1 includes additional descriptive information.

B. *Measures*

1. Histories of displacement and related stress patterns

Women's individual patterns of displacement, and related stressors, define the study's primary comparison groups of interest, and emerge directly from the cluster analysis performed in the previous chapter. In review, I conceptualize these patterns as comprising two segments: pre-displacement contexts in Myanmar and post-displacement contexts in Thailand. I define and characterize each by context-specific configurations, or types, of stressful life events in the study sample, based on retrospective reporting. Thus, each woman belongs to a group defined

by pre-displacement stressors and by post-displacement stressors (for a breakdown of group membership see Table 5.2).[5] Group memberships are coded as binary indicator variables and each study subject is a member of a single pre-displacement context group and a single post-displacement context group.

Pre-displacement contexts (ordered from high to low stress level)

a. *Migrant – Severe Violence/Deprivation/Evacuation (M-SVDE)*: This group consists of the two most severe stressor groups uncovered in the original cluster analysis (I collapse these categories due to their small size). It includes migrants coming from pre-displacement contexts characterized by either (1) more severe violence associated with military invasion and occupation, or (2) severe deprivation, evacuation, and forced labor (or both).

b. *Migrant – Military Occupation (M-MO)*: These migrants have come from pre-displacement contexts characterized by military surveillance and taxation, but not with as high of exposures to severe military violence or deprivation.

c. *Migrant – Low Military Violence (M-LMV)*: These migrants experienced relatively low violence in Myanmar, with few adverse life events before coming to Thailand, except for some more pervasive experiences like report having felt oppressed because of their ethnicity or religion.

d. *Born in Thailand (M-Th/TEM):* Women born in Thailand constitute an additional control group for comparing pre-displacement categories, including ethnic Thais (Th) and Thai ethnic minorities (TEM).

[5] More on types of displacement were identified and group membership assigned is covered in a separate (unpublished) chapter.

Post-displacement contexts

a. *Low Threats to Livelihoods (LT):* These individuals reported very few instances of feeling unsafe or have adverse experiences at work, with moneylenders, during travel, or with police or Thai military.

b. *High Threats to Livelihoods (HT):* Common threats to livelihood in this group involve work or employers (e.g., not having enough work to afford food, being threatened or taken advantaged of at work) and mobility or the Thai police (e.g., fearing travel outside of one's village, having been arrested or fearing arrest). This group also includes individuals identified as Moderate Threat in the previous chapter (due to sample size), which is additionally characterized by contextual factors implying mobility- and work-related threats based on housing and migrant legal status.

2. Health outcomes

I select the following health outcomes because they are sensitive measures to stress-related health processes, include complimentary physical and self-reported measures, and can be reliably measured in the field.

Self-rated fair/poor health (FPH)

Self-rated health (SRH) is a well-established measure of overall physical health and wellbeing that has been closely linked to psychosocial stress and migrant health specifically (Finch and Vega 2003). The measure has been shown to be sensitive to past and ongoing stressors and rating one's health as fair or poor is a strong predictor of future individual morbidity and mortality (Baum and Posluszny 1999; Idler and Benyamini 1997). I model the variable as binary for fair/poor (FPH; as opposed to the other response options, good or very good).

Elevated blood pressure (EBP)

The cardiovascular system plays an influential role in allostasis and is vulnerable to social stressors in ways detectable in elevated blood pressure (McEwen 1998; Rozanski et al 2005). Blood pressure (BP) is considered elevated, and indicative of pre-hypertension or hypertension, at a systolic BP of 120 mmHg and above or a diastolic reading of 80 mmHg and above (Wang and Wang 2004). I use this definition to create a binary indicator of elevated BP, based on the average of three BP readings taken at rest[6] by the research team during the anthropometry survey component using the automated and validated Microlife BP A2 Basic blood pressure monitor.[7]

Waist Circumference (WC)

Central accumulation of depot fat—often indicated by waist circumference (WC) or waist-to-hip ratio (WHR)—is another indicator of chronic stress activation of the HPA axis and central sympathetic nervous system; original empirical studies revealing the mechanisms connecting stress to central fat are reviewed in more detail elsewhere (Bjorntorp 2001). Women's waist and hip measurements were part of the anthropometry component and followed WHO guidelines (2011). I focus on WC as a primary outcome, but also look at WHR (results not shown but discussed).

Body mass index (BMI)

General body fat accumulation—as indicated by body mass index (BMI)—while distinct from abdominal fat accumulation is similarly associated with chronic HPA stress activation (Bjorntorp 2001; Torres and Nowson 2007). I analyze BMI continuously (kg/m^2), based on

[6] The BP measurements were taken after the subject rested while seated for at least five minutes, with each measurement spaced by at least one minute apart, based on guidelines from the Survey of the Health of Wisconsin and the National Health and Nutrition Examination Survey (CDC).
[7] According to Microlife (2015) the device model (BP3GQ1-3P) has been clinically tested according to the British Hyptertension Society with the highest possible grade, A/A.

the study team's measurements of women's height and weight[8]. Also, due to this sample being from a population where the BMI metric (kg/m^2) is not necessarily the most accurate indicator of overweight and underweight (WHO), I also consider BMI z-scores standardized by the study sample to interpret relative body fat relative to the sample mean (results not shown but discussed). The regression models used for the subgroup comparisons additionally include a binary indicator for self-identifying as a non-Thai ethnic minority.

3. Additional contextual factors and other covariates

For the staged regressions in the first part of the analysis, fully adjusted models account for more specific post-displacement contextual factors beyond high/low threat. These contextual factors include legal documentation (categorical: legal resident, passport or work permit, or no documents), residence type (categorical: village or town, worksite, or camp), and health insurance status (binary: any or none). All of the analyses shown adjust for maternal age (continuous and squared term) and number of children (one vs. two or more). Models of body fat outcomes (WC and BMI) also adjust for months since childbirth.

C. *Analysis*

The analysis of each health outcome entails two separate parts. First, I perform staged main effects models with pre- and post-displacement context group membership added sequentially in order to look at average, non-interactive associations between health and pre- and post-displacement stressors. Pre-displacement context group membership is included separately first since it is an upstream determinant that influences post-displacement context as well as health. The equation below specifies the fully adjusted logistic regression model for FPH:

$$\text{Log (odds of FPH)} = \beta_0 + \beta_1(\text{M-LMV}) + \beta_2(\text{M-MO}) + \beta_3(\text{M-SVDE}) + \beta_4(\text{HT}) +$$

[8] Using Seca portable stadiometers (model 213) and digital scales (model 869) measuring to the tenth decimal point in centimeters and kilograms, respectively.

$$\beta_5(X_1) + \ldots + \beta_n(X_n)$$

where the β's are logistic regression coefficients, the X_j (j=1 to n) are covariates, and the intercept represents individuals born in Thailand and living in LT post-displacement contexts. For instance, here β_1 represents the estimated log of the odds ratio for FPH comparing women from the Migrant-Severe Violence/Deprivation/Evacuation (M-SVDE) group to women born in Thailand. Other binary outcomes are modeled similarly, and BMI is modeled linearly as a continuous outcome, where β's represent estimated mean differences.

Second, I model individuals' sequenced pre- and post-displacement contexts (i.e., patterns of displacement) to further examine their joint impact on health outcomes. These comparisons are estimated from models very similar to those specified above, but with interaction terms between each pre- and post-displacement context group indicator. With FPH again as the example, the equation below specifies the model used for the subgroup comparisons:

$$\begin{aligned}\text{Log (odds of FPH)} = \quad & \alpha_0 + \alpha_1(\text{M- LMV}) + \alpha_2(\text{M-MO}) + \alpha_3(\text{M-SVDE}) + \alpha_4(\text{HT}) + \\ & \alpha_5(\text{M-LMV*HT}) + \alpha_6(\text{M-MO*HT}) + \alpha_7(\text{M-SVDE*HT}) + \\ & \alpha_8(X_1) + \ldots + \alpha_n(X_n)\end{aligned}$$

where here the α's are logistic regression coefficients and α_5 through α_7 are the interaction terms between pre-displacement contexts and post-displacement context. For the subgroup predicted standardized prevalence, I use adjusted predictive margins in Stata 15 (i.e., marginal standardization).

5.2 **Results**

A. *Fair/poor self-rated health (FPH)*

1. Staged regressions (Table 5.3)

The association between pre-displacement stressor types and odds of FPH vary by migrant

group. The LMV migrants are at a 55% greater odds of FPH than non-migrants in the fully adjusted model (odds ratio [OR]=1.55; 95% confidence interval [CI]=0.71, 3.38), and the OR for SVDE migrant is much higher (and even highest in the fully adjusted model) at 2.52 (CI: 0.91, 6.99). In contrast, the MO migrants are consistently at a lower odds of reporting FPH (OR=0.66; CI: 0.25, 1.74). Being in a high threat post-displacement context is not associated with a higher risk of FPH, but specific contextual factors in Thailand are: relative to holding a citizenship or legal residence card, having a passport or work permit or having no legal documentation, and having health insurance are all associated with a lower risk of FPH. These somewhat surprising findings could be due to some individuals in more disadvantaged or chronically stressful systematically perceiving their health as better, for instance, if they have experienced more chronically stressful settings that differentially affect their point of reference for SRH relative to other groups

2. Subgroup comparisons (Figure 5.2)

The subgroup patterns in displacement-related stressors and FPH are not entirely clear. On average, migrant women who have historically experienced more acute military violence are more likely to report FPH that any of the other groups which possibly suggests a negative legacy of historical stress on SRH; however, the estimated FPH risk among non-migrants in LT environments are almost as high. The relatively low risk of FPH among only the non-migrants in the HT group is also unexpected. The interaction between pre- and post-displacement contexts in the associated regression model is not statistically significant (likelihood ratio [LR] test p-value=0.09).

B. *Elevated Blood Pressure (EBP)*

1. Staged regressions (Table 5.4)

Risk of EBP is associated with pre-displacement stressors to a variable degree. It is most

strongly and consistently associated with being a MO migrant (relative to a non-migrant), with an overall average OR of 3.00 in the unadjusted model (CI: 1.16, 7.77) and 2.6 in the fully adjusted model (CI: 0.95, 7.11). Being in a high threat post-displacement situation is also independently associated with an increased odds of EBP (adjusted OR=1.96; CI: 0.88, 4.39).

2. Subgroup comparisons (Figure 5.3)

Subgroup predictive marginal probabilities of EBP also suggest cumulative disadvantage associated with pre- and post-displacement stressors. This pattern is pronounced among the MO migrant group particularly, but is also strikingly when looking at all of the subgroups together (although differences between neighboring groups are not statistically significant.

C. *Bodyfat (WC & BMI)*

1. Staged regressions (Tables 5.5 & 5.6)

The more stressful pre-displacement contexts, MO and SVDE, are associated on average with greater abdominal and general body fat in both minimally and fully adjusted models than non-migrants, with differences of 3 to 4.5 cm in WC, 0.01 to 0.05 (absolute difference) in WHR, and 1 to 1.2 kg/m^2 in BMI (0.2 to 0.3 standard deviations). These differences are only statistically significant in the WHR (minimally adjusted) models and remain significant for the MO group in the fully adjusted WHR model. Living in currently HT contexts is associated with lower abdominal fat values based on WC but not WHR, with approximately a 1.2 cm lower WC compared to low-threat contexts (not statically significant), and with lower general body fat by 0.9 kg/m^2 (0.2 standard deviations).

2. Subgroup comparisons (Figures 5.4 & 5.5)

Indicators of abdominal and general body fat follow patterns of displacement fairly consistently, with low-to-moderate values among non-migrants and migrants from relatively low-stress pre-displacement contexts, and with strikingly high values among migrants that

experienced greater historical stressors. These comparisons are not statistically significant with any measure, but consistency of the patterns suggest that the differences likely exist but are underpowered.

On average, based on WC only the high pre-displacement stressor groups are abdominally overweight (>80 cm). All of the groups are at least slightly abdominally overweight for Asian populations according to WHR (>0.8 [results not shown]; WHO). Similarly, none of the subgroup averages are underweight ($\leq$18.5 kg/m^2), only the historically-stressed migrants that are now in low-stress environments are overweight using the WHO global standard ($\geq$25 kg/m^2), and all of the groups are at least slightly overweight using a more conservative cut-off proposed for Asian populations ($\geq$23 kg/m^2; World Health Organization 2011).

5.3 Discussion

A. *Patterns of Pre- and Post-Displacement Stressors Shaping Health*

1. Fair/Poor Health: Conditional Resilience or Differential Reporting?

The patterns in displacement-related stressors and risk of FPH are not entirely clear and it is unexpected that FPH would be so low (SRH so relatively high) among only the non-migrants in HT settings. There could be some factor driving a form of adaptive resilience that is conditional on some baseline level of privilege among non-migrants. This could also be an artifact of some factor influencing how this group perceives their health differently relative to other groups, such as in other studies that find some social and cultural groups more likely to systematically underreport FPH, which can make SRH a problematic measure for comparing health across subgroups.

Despite these unclear patterns among subgroups, it is still an important area of public health concern that in the models without interaction terms, migrants who have experience severe violence, deprivation, or trauma are more than two times as likely to report SRH, across post-

displacement settings (although this is not statistically significant). Additionally, risk of FPH in the entire sample is very high in the sample overall, with most group averages hovering around 50% (as a reference, across all counties in Wisconsin prevalence of FPH ranges from 10-16%). These findings are significant given that FPH is one of the most sensitive and reliable measures for overall health and risk of mortality (Baum and Posluszny 1999; Idler and Benyamini 1997).

2. Elevated Blood Pressure: Cumulative Stress/Disadvantage

The findings on EBP in this study tell a relatively clear story of toxic stress accumulation across life exposures to displacement-related stressors. Both pre- and post-displacement stressors contribute positively to higher risks of EBP, and the independent association between pre-displacement stressors and EBP remains strong (albeit no longer statistically significant) after adjusting for post-displacement threats and specific contextual factors in the staged regressions. Particularly of interest is the especially high risk of EBP among individuals that migrated out of military-occupied villages. This type of stressor could be especially important for EBP as one of the markers for allostatic burden and as hypothesized in the theories about the particularly harmful effects of prolonged exposure to everyday violence or chaos.

It makes sense that toxic stress would be more readily observable in EBP compared to the other health measures in the study, given how it responds to stress through: (1) repeated stressors that trigger its elevation in the central neuroendocrine and sympathetic activated response, which accelerates atherosclerosis and increases risk of myocardial infarction over time, and (2) "failed shut-downs" when chronic stressors lead to the persistent upregulation of the hypothalamic-pituary-adrenal (HPA) axis and persistently high blood pressure (McEwen 1998; Rozanski et al 2005). Both mechanisms could be underlying the patterns observed in this study and are additionally supported in longitudinal studies tracking blood pressure over time that link EBP at a given time point to higher blood pressure reactivity to stress at earlier

time points (Matthews et al 1993; Matthews et al 2004; Rozanski et al 2005).

3. General and Abdominal Body Fat: Post-Traumatic Legacy Effects & Maladaptive Predictive Response

An additionally striking health outcome along patterns of displacement is the consistently higher level of general and abdominal fat accumulation among women formerly in more stressful environments, albeit not statistically significant. This pattern agrees most closely with a version of post-traumatic legacy effects and maladaptive predictive responses. The difference is, furthermore, more pronounced among women in currently low threat settigns. Two potential explanations for this finding, which are not entirely mutually exclusive, are: (1) that the association is driven by eating behaviors, such as overeating and favoring calorie-rich foods, as a long-term effect of experiencing past food insecurity and deprivation; or (2) that historical stressors more generally have a lasting impact on adult metabolism, and this effect is more pronounce in relatively higher nutrient environments—as women in the low threat group presumably are—suggesting a maladaptive predictive response to severe historical psychosocial stressors.

Because historical food deprivation, specifically, is relatively rare compared to other psychosocial stressors in this study sample (even among the more severe pre-displacement stressor groups), the second explanation likely plays a significant role in this association. More specifically, the adaptive mechanism would involve dysregulation in the HPA axis stress response brought on by more chronic stress, that in turn would increase lipid accumulation and retention in visceral adipose tissue concentrated in the abdominal area and also could affect food intake control and general appetite for nutrient dense food (Bjorntorp 2001; Torres and Nowson 2007). Similar predictive adaptive responses (PAR) have been studied in-depth in animal models of early development and plasticity (Gluckman et al 2005) and are suggested by select natural experiments in humans, such as the Hunger Winter, or Dutch Famine, studies

(Painter et al. 2006, 2005a, 2005b; Ravelli et al., 1999; Roseboom et al., 2001).

B. *Limitations*

This study is limited in its ability to test causal associations and uncover very specific mechanisms, as it relies on cross-sectional survey data and retrospectively reported information. However, most plausible selection bias mechanisms would attenuate the estimated measures of association, such as survivorship and selection into pregnancy. It is also important to highlight that the relative differences between groups do not capture full effects of war or related trauma (given that by design this study is focused exclusively on individuals that have experienced displacement).

My interpretations of how histories of displacement pattern health are furthermore limited by my inability to measure pre-displacement health status and therefore I cannot easily distinguish between current health outcomes that reflect more direct associations with pre-displacement stressors and those mediated through pre-displacement stressors' earlier effects on pre-displacement health status. My measurement of displacement-related stressors is also currently limited by not accounting for the timing and duration of stressors in subjects' histories. While the sequence of exposures (pre- versus post-) is straightforward, there is still unaccounted-for variability regarding these dimensions. This lack of precision limits my interpretation of precise stress mechanisms related to health and it also likely attenuates estimates of associations between stressors and health outcomes.

Lastly, this study is not clearly representative of the entire Thai-Myanmar border and may have only limited generalizability regarding the specific sub-group predicted marginal means and probabilities. However the study was designed with the primary intent to interpret *associations* that should be more generalizable, by characterizing differences in women's experiences and seeing if health patterns matched these differences. For this reason, the *relative* differences

between study comparison groups are the most interpretable. However, since the study population is still representative of a key demographic group in the study population—mothers of young children who are presumably likely to have more children—the strikingly high rates of FPH, EBP, and obesity among certain groups highlights key areas of concern for immediate public health action at the Thai-Myanmar border and among other comparable populations.

C. *Future Directions*

Reducing risks of mobility- and labor-related threats for refugee, refugee-like, and migrant populations is a public health crisis that demands greater attention. This study highlights multiple important ways in which displacement situations influence health, both through historical and ongoing social stressors that are structurally violent against women who have been more or less forcefully displaced. Addressing this public health crisis more successfully still requires better understanding the relationship between histories of violence, displacement, and current health.

Risks of obesity and EBP are special public health concern that needs to be investigated more closely among displaced populations broadly. Obesity is a public health concern that should be examine more broadly among populations that have transitioned from high to low psychosocially stressful environments.

The stress-related processes underlying experiences of displacement for women unfold over the life-course and they need to be examined more closely, as well as their implications on future generations, including in more longitudinal studies that follow individuals in pre- and post-displacement settings but also that follow individuals and future generations in more protracted displacement situations.

5.4 **Literature Cited**

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Chapter V Tables & Figures

Table 5.1. Study socio-demographic characteristics

Study socio-demographic characteristics, with means and standard deviations (sd), or percents.

	Mean/ Percent	sd
Health Outcomes		
Fair/Poor Health	51.7%	
Elevated Blood Pressure (Sys.>=120 or Dial.>=80)	27.6%	
Body Mass Index (kg/m^2)	24.6	4.5
Migration History (Pre-Displacement Context)		
Born in Thailand	31.4%	
Migrant – Low Military Violence (M-LMV)	41.4%	
Migrant – Military Occupation (M-MO)	13.8%	
Migrant – Severe Violence/ Deprivation/ Evacuation (M-SVDE)	13.4%	
Ethnic minority	89.7%	
Thailand (Post-Displacement) Context		
Thailand: Low Threats to Livelihoods	43.3%	
Thailand: High Threats to Livelihoods	56.7%	
Legal documentation		
Citizen/ Legal resident	52.5%	
Legal documents: Passport/ work permit	30.3%	
Legal documents: None	17.2%	
Residence Type		
Residence: Village	69.7%	
Residence: Worksite	28.7%	

	Mean/ Percent	sd
Residence: Camp	1.5%	
Any Health Insurance	87.4%	
Months since childbirth	26.9	18.5
Age	29.0	6.0
With single child	38.7%	

Table 5.2. Subgroups by Pre- and Post-Displacement Contexts

Patterns of displacement in light of pathways from pre- to post-displacement contexts used for sub-group comparisons, as counts with row percent in parentheses (the percent of women within each pre-displacement group that lands in a given post-displacement group.

	Subsequent Post-Displacement Context: n (row percent)		
Migration/ Pre-Displacement Circumstances	Low Threat	High Threat	Row Totals
Born in Thailand (M-Th/TEM)	63	19	82
	(76.8%)	(23.2%)	
Migrant – Low Military Violence (M-LMV)	28	80	108
	(25.9%)	(74.1%)	
Migrant – Military Occupation (M-MO)	13	23	36
	(36.1%)	(63.9%)	
Migrant – Severe Violence/Deprivation/Evacuation (M-SVDE)	9	26	35
	(25.7%)	(74.3%)	
Column Totals	113	148	261

Table 5.3. Fair/Poor Health (FPH): Staged regression models

Estimated odds ratios based on staged logistic regression models of FPH. *p<0.05, **p<0.01, ***p<0.001

	Fair/Poor: Mod1	Fair/Poor: Mod2	Fair/Poor: Mod3	Fair/Poor: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	0.988	1.218	1.593	1.550
Migrant – Military Occupation (M-MO)	0.550	0.655	0.696	0.662
Migrant – Severe Violence/ Deprivation/ Evacuation (M-SVDE)	1.623	2.050	2.565	2.521
Ethnic minority	0.774	0.866	0.994	0.967
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		0.618	1.073	1.119
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			0.277**	0.295**
Legal documents: None			0.280**	0.171***
Residence Type				
Residence: Village				
Residence: Worksite			0.930	0.843
Residence: Camp			4.277	5.359
Any Health Insurance				0.293*
Observations	261	261	261	261

Figure 5.2. Fair/Poor Health (FPH): Subgroup Comparisons

Predictive marginal probabilities (point estimates and 95% CI) of self-rated fair/poor self-rated

health (FPH), based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for age (continuous) and number of children (1 vs. >1). Subgroups from left to right: Thai-Low Threat (Th-LT); Thai Ethnic Minority-Low Threat (TEM-LT); Migrant Low Military Violence-Low Threat (MLMV-LT); Migrant Military Occupation-Low Threat (MMO-LT); Severe Violence/ Deprivation/ Evacuation -Low Threat (SVDE-LT); Thai Ethnic Minority-High Threat (TEM-HT); Migrant Low Military Violence-High Threat (MLMV-HT); Migrant Military Occupation-High Threat (MMO-HT); Severe Violence/ Deprivation/ Evacuation -High Threat (SVDE-HT).

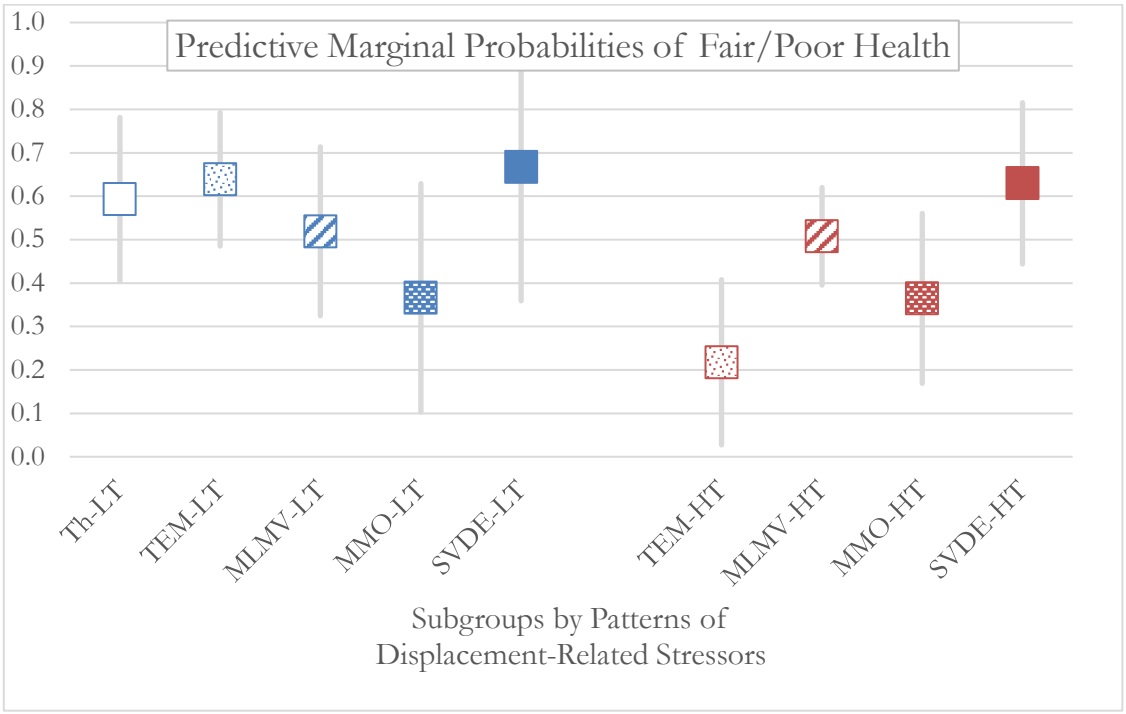


Table 5.4. Elevated Blood Pressure (EBP): Staged regression models

Estimated odds ratios based on staged logistic regression models of EBP. *p<0.05, **p<0.01, ***p<0.001

	EBP: Mod1	EBP: Mod2	EBP: Mod3	EBP: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	1.044	0.835	0.887	0.893
Migrant – Military Occupation (M-MO)	3.001*	2.498	2.547	2.600
Migrant – Severe Violence/ Deprivation/ Evacuation (M-SVDE)	1.179	0.910	1.002	1.007
Ethnic minority in Thailand	1.676	1.473	1.611	1.632
Thailand (Post-Displacement) Context				

	EBP: Mod1	EBP: Mod2	EBP: Mod3	EBP: Mod4
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		1.758	1.987	1.961
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			0.710	0.686
Legal documents: None			0.477	0.620
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			1.032	1.073
Residence: Camp			1.339	1.236
Any Health Insurance				2.002
Observations	261	261	261	261

Figure 5.3. Elevated Blood Pressure (EBP): Subgroup Comparisons

Predictive marginal probabilities (point estimates and 95% CI) of EBP, based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for age (continuous) and number of children (1 vs. >1). Subgroups from left to right: Thai-Low Threat (Th-LT); Thai Ethnic Minority-Low Threat (TEM-LT); Migrant Low Military Violence-Low Threat (MLMV-LT); Migrant Military Occupation-Low Threat (MMO-LT); Severe Violence/ Deprivation/ Evacuation -Low Threat (SVDE-LT); Thai Ethnic Minority-High Threat (TEM-HT); Migrant Low Military Violence-High Threat (MLMV-HT); Migrant Military Occupation-High Threat (MMO-HT); Severe Violence/ Deprivation/ Evacuation -High Threat (SVDE-HT).

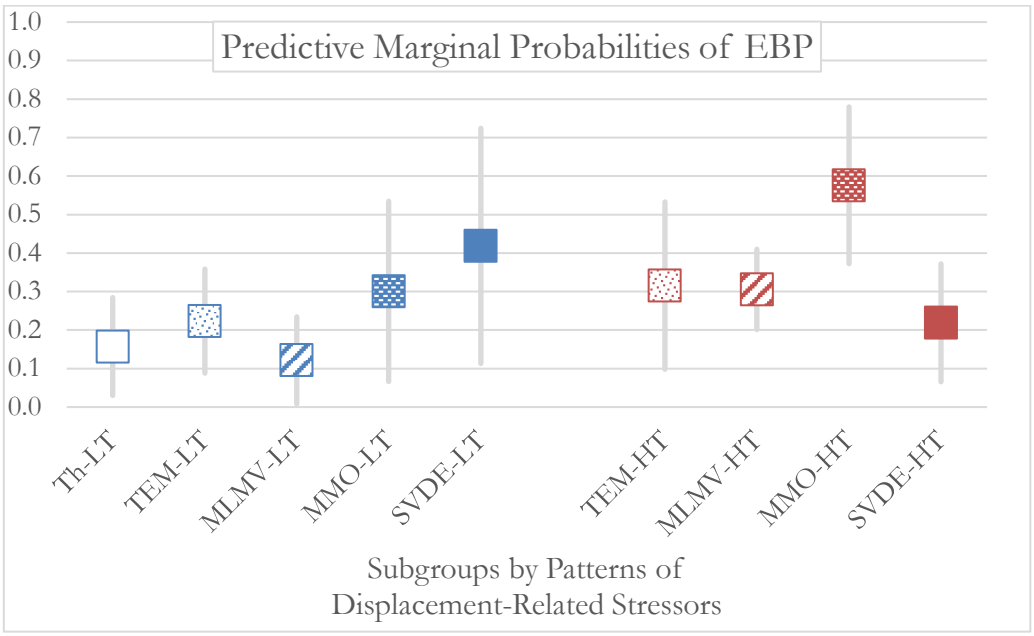


Table 5.5. Abdominal Body Fat: Staged regression models

Coefficients for staged linear regression models: waist circumference (WC). *p<0.05, **p<0.01, ***p<0.001

	WC: Mod1	WC: Mod2	WC: Mod3	WC: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	-0.701	-0.320	-0.453	-0.430
Migrant – Military Occupation (M-MO)	4.155	4.482	4.470	4.493
Migrant – Severe Violence/ Deprivation/ Evacuation (M-SVDE)	2.618	3.035	2.939	2.961
Ethnic minority in Thailand	-3.180	-2.993	-3.028	-3.011
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		-0.850	-1.194	-1.209
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			1.533	1.484
Legal documents: None			0.324	0.525

	WC: Mod1	WC: Mod2	WC: Mod3	WC: Mod4
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			-0.780	-0.736
Residence: Camp			-2.566	-2.641
Any Health Insurance				0.586
Observations	258	258	258	258

Table 5.6. General Body Fat: Staged regression models

Coefficients for staged linear regression models: Body mass index (BMI; kg/m^2). *p<0.05, **p<0.01, ***p<0.001

	BMI: Mod1	BMI: Mod2	BMI: Mod3	BMI: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	-0.767	-0.359	-0.335	-0.328
Migrant – Military Occupation (M-MO)	0.617	0.972	1.021	1.029
Migrant – Severe Violence/ Deprivation/ Evacuation (M-SVDE)	0.757	1.210	1.194	1.202
Ethnic minority in Thailand	-0.842	-0.624	-0.680	-0.675
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		-0.946	-0.909	-0.914
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			0.0600	0.0440
Legal documents: None			0.267	0.334
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			-0.150	-0.135
Residence: Camp			-0.512	-0.536

	BMI: Mod1	BMI: Mod2	BMI: Mod3	BMI: Mod4
Any Health Insurance				0.195
Observations	261	261	261	261

Figure 5.4. Abdominal Body Fat: Subgroup Comparisons

Predictive marginal probabilities (point estimates and 95% CI) of waist circumference (WC), based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for age (continuous) and number of children (1 vs. >1). Subgroups from left to right: Thai-Low Threat (Th-LT); Thai Ethnic Minority-Low Threat (TEM-LT); Migrant Low Military Violence-Low Threat (MLMV-LT); Migrant Military Occupation-Low Threat (MMO-LT); Severe Violence/ Deprivation/ Evacuation -Low Threat (SVDE-LT); Thai Ethnic Minority-High Threat (TEM-HT); Migrant Low Military Violence-High Threat (MLMV-HT); Migrant Military Occupation-High Threat (MMO-HT); Severe Violence/ Deprivation/ Evacuation -High Threat (SVDE-HT).

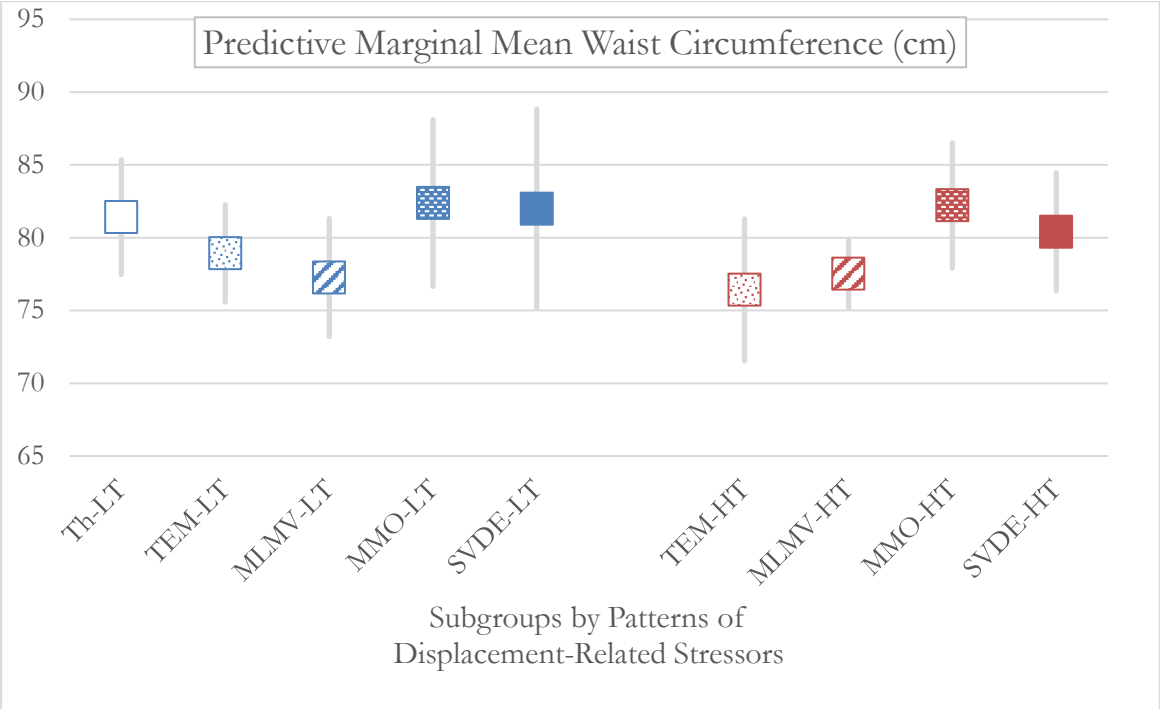
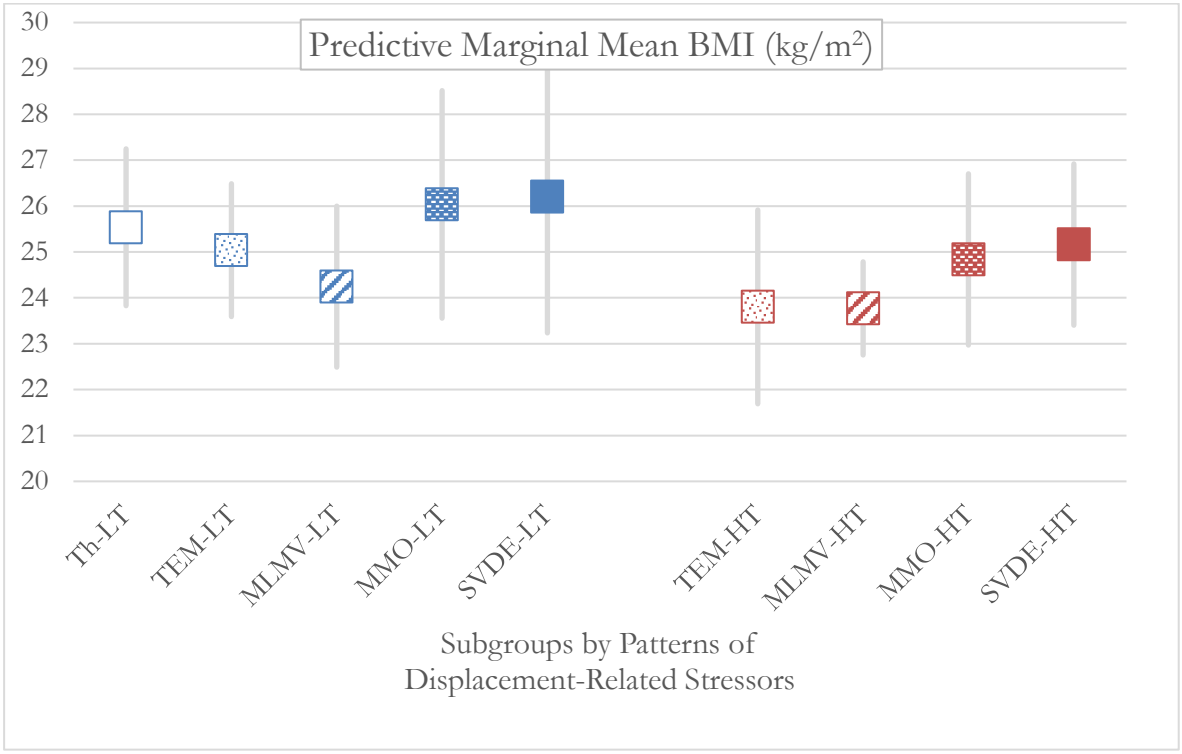


Figure 5.5. General Body Fat (BMI): Subgroup Comparisons

Predictive marginal probabilities (point estimates and 95% CI) of BMI (kg/m^2), based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for age (continuous) and number of children (1 vs. >1). Subgroups from left to right: Thai-Low Threat (Th-LT); Thai Ethnic Minority-Low Threat (TEM-LT); Migrant Low Military Violence-Low Threat (MLMV-LT); Migrant Military Occupation-Low Threat (MMO-LT); Severe Violence/ Deprivation/ Evacuation -Low Threat (SVDE-LT); Thai Ethnic Minority-High Threat (TEM-HT); Migrant Low Military Violence-High Threat (MLMV-HT); Migrant Military Occupation-High Threat (MMO-HT); Severe Violence/ Deprivation/ Evacuation -High Threat (SVDE-

HT).


Predictive Marginal Mean BMI (kg/m2)
30
29
28
27
26
25
24
23
22
21
20
Th-LT
TEM-LT
MLMV-LT
MMO-LT
SVDE-LT
TEM-HT
MLMV-HT
MMO-HT
SVDE-HT
Subgroups by Patterns of
Displacement-Related Stressors

Chapter VI
Aim 3 Background
Child Health Impacts of Maternal Histories Current Displacement Contexts

This chapter delves into this question looking at the study population of recent mothers and their young children at the Thai-Myanmar border, where mothers have experienced different degrees of exposure to conflict over their life-course. In the following introduction, I will briefly summarize current understanding of early child health in light of: (I) maternal exposures to war, forced displacement, and other preconception trauma, (II) mechanisms transmitting maternal environmental exposures to offspring during the perinatal period, and (III) postnatal exposures in common post-displacement settings. I will then review my analytical approach for uncovering the impacts of maternal displacement, and related life stressors, on offspring health, growth, and future health risks.

6.1 Maternal histories of war and trauma and child health

For this chapter, I focus on child health effects of past maternal trauma, as well as past and ongoing daily stressors, tied to war, forced displacement, and other forms of structural violence against ethnic minorities (as reviewed in previous chapters). In the following sections I review what is more and less understood regarding the impacts of such stressors on early child health (ages 0-5). To start, I take a closer look at existing studies of refugee and other displaced populations, as well as other populations at the Thai-Myanmar border in order to briefly summarize: (1) conflict- and displacement-related contexts and associated stressors that pose distinct maternal and child health risks, particularly when pregnancy begins after reaching asylum, and (2) additional stressors faced at the Thai-Myanmar border that present additional pregnancy and infant health risks.

A. *Conflict- and displacement-related stressors on maternal and child health risks*

I will first review current scholarship looking at early child health for refugee and displaced populations, with closest attention to studies involving children born after their mothers left conflict settings. I will focus nearly exclusively on studies measuring child health indicators observable and easy to measure between ages 0-5 and indicative of child nutrition, morbidity, and mortality risk: birthweight, stunting, wasting, and infection or disease. Most of the research highlighted is from refugee camp settings because that is where the majority of empirical health research on child health and development has taken place.

1. Nutritional deficiencies and resilience

Child nutrition and development concerns in refugee camps are highest for refugees in protracted camp situations and with small portion allotments and inadequate micronutrient supplementation (e.g., Seaman & Rivers, 1989; Toole, 1992; Mears and Young, 1998; Mason, 2002). In a recent review of nutritional needs in refugee camps, Henry and Macbeth (2014) found substantially higher concentrations of micronutrients in pet food than standard camp fare. Prevalence of iron deficiency has been found to be alarmingly high among refugee children from Burma (Kemmer et al., 2003). Surveillance of child wasting, specifically height-for-age, and a zero tolerance of severe wasting (<-3 standard deviations based on WHO guidelines) is recommended for monitoring child malnutrition and lowering child mortality risks (Mason, 2002).

High stress environments—such as refugee camps or other displacement situations—likely have direct impacts on child nutritional status, but some studies suggest that maternal stress and mental health could be even more influential or at least mediate effects of stressful environments for children. A study looking at nutritional status, specifically stunting (height-for-age), of Palestinian preschoolers in the Gaza Strip identified low birthweight—indicative of maternal health and stress during pregnancy—as a leading risk factor for poor child

nutritional resiliency (as have studies in other global settings, e.g., Adair & Guilkey, 1997), followed by maternal mental health status and family residential instability (Massad, 2012). In this same study, direct war exposure had no effect on child nutritional status. Still, much more research is needed to better understand the relationship between stressful environments, child nutrition and development, and maternal distress.

2. Infectious disease and other illnesses

Infectious disease and related illness is another area of special concern for refugee children globally, although general child infectious disease burden among refugee and migrant populations is not well-documented (Eiset & Wejse, 2017; Bradby et al., 2015). The most commonly screened infectious diseases among refugee and migrant populations in secondary and third host countries are tuberculosis and Hepatitis B and C (Eiset & Wejse, 2017). Screenings of Burmese refugees in Australian revealed *Helicobacter pylori* infections in 80% of those screened, latent tuberculosis in 70%, vitamin D deficiency in 37%, and strongloidiasis in 26% (Chaves et al., 2009). Additional concerns for migrants from Myanmar include HIV, malaria, and lymphatic filariasis (Suwanvanichkij, 2008).

The majority of health studies among refugees and other displaced populations at the Thai-Myanmar border have been based in refugee camps, which have been established since 1984. In these settings, childhood anemia a leading concern, and associated both with high rates of iodine deficiency and more common infections in the region, including hookworm, thalassemia, and malaria (Kemmer et al., 2003). Respiratory infections also pose especially high risks to children, who are most susceptible to developing pneumonia and other complications. Respiratory pathogens can easily spread in the often-crowded living quarters and poor sanitation in refugee camps (Vathanophas et al. 1990; Ezard & Gupta, 2006), which is also common for migrant worker housing but very little surveillance has occurred in these settings.

Risks of infectious disease to pregnant women in camps and other displacement settings are also disproportionately high and pose health risks for offspring in utero. Anemia during pregnancy is serious public health concern at the Thai-Myanmar border and risks are exacerbated by the relatively high burden of malaria and other parasites. A study at one large border camp found that 70% of pregnant women were positive for a geohelminths, including hookworm, roundworm, and whipworm alone or in combination (Boel et al., 2010). Additionally, although HIV and STI infection rates have been found to be exceptionally low among pregnant women in some refugee communities on the Thai-Myanmar border (Plewes et al., 2008), it is still a greater concern for the Shan and other ethnic minorities coming from the Shan state (Suwanvanichkij, 2008).

B. *Additional stressors and MCH concerns at the Thai-Myanmar border*

Beyond the more proximate risks to child development and disease discussed above, there are additional social factors that contribute to MCH at the Thai-Myanmar border. A limitation of existing health studies is that they do not incorporate migrants and refugees across the spectrum of forced displacement and they fail to pick up on the common and unique risks posed to differently displaced groups, as well as native born individuals of the same ethnicity who face some of the same barriers to health. Below I briefly review additional social factors that can shape local maternal and child health disparities in light of the social landscape this border region.

1. Disparities in perinatal health care services and immunization rates

A study of immunization rates among migrants' children at the Thai-Myanmar border summarized barriers to timely services as follows: physical distance, fear of arrest, not remembering appointments, and parental work (Canavati, 2011). Such barriers extend to refugees and some native born ethnic minorities as well, particularly those without up-to-date

legal documentation. Additional financial barriers also exist for perinatal health care services and other child healthcare services not necessarily free-of-charge in Thailand (select child immunizations are free). In refugee camps, health services are typically available but the services available and the quality of those services can vary by funding cycles and health personnel staffing such clinics at any given time.

Additional barriers common, but not unique, to newly displaced persons in Thailand involve substantial language barriers at local health care facilities, and inability to afford health insurance and the other prerequisite legal documents. Despite recent policy reforms in Thailand to extend more affordable healthcare to migrants (universal health care coverage and related benefits were extending to legal migrants in 2013), it can still be extremely difficult to navigate the process of acquiring the appropriate legal documents for insurance, and each step in the process can be prohibitively expensive (US$91-513 for a work permit, plus additional fees for initial health screenings). The process can be even more convoluted for ethnic minorities with longer histories in Thailand (up to multiple generations), in which case some decide it is worth applying for legal documentation and insurance as a recent migrant, even if it means de-legitimizing claims to citizenship or more permanent legal alien residence (sometimes this actually allows for more immediate legal documentation and advantages related to health insurance and work permits).

2. Mobility and work related threats to livelihood

The living situations for individuals at the Thai-Myanmar border—for many, their post-displacement contexts—are shaped by where they live (either in a village, on an agriculture or construction worksite, or in a camp), their legal documentation (resident, local worker permit, passport, or undocumented), and the social stressors in their immediate environment. As revealed in previous chapters, social stressors captured in reported maternal life events reflect

high or low threats to livelihoods (and also correlate to where they live and legal documentation). The greatest distinctions in types of threats to livelihood exist between work-related (e.g., experiences of labor exploitation or threats from employers) and mobility-related (e.g., whether she can move freely within and across provinces in order to find work and not be arrested or deported).

Such threats to livelihood in Thailand can pose acute stressful life events (e.g., loss of job or arrest) as well as daily stressors or chronic strain (e.g., worries about getting paid on time or anxiety over possibly getting pulled over on the way to work). These forms of social stress can have significant effects on maternal distress that occur before, during, or after pregnancy and influence child health (more on the pathways will be discussed in the following section). These stressors are also closely correlated to barriers that must be overcome to simply get to a health center for maternal and child health related care (e.g., getting time off work to get there or safely avoiding arrest on the way).

3. Ethnic-based discrimination and social prejudice against migrants

Social and structural discrimination against ethnic minorities and migrants in Thailand is another source of maternal distress in many subgroups that compose the study population. Structural violence and discrimination is covered in more depth in Chapter 1, but it is worth highlighting again as a powerful shaper of many of the factors discussed in this chapter. Ethnic- and nativity-based discrimination could also shape the quality of maternal and child health received at local health services, and ultimately indicators of child health status examined in this chapter.

6.2 **Pathways linking prenatal distress to child health**

There are several pathways through which maternal life stressors are believed to translate into differential offspring health and development during or around the period of pregnancy. First,

environmental or social stressors during pregnancy can trigger stress responses via several different physiological pathways that can have negative effects on fetal health and development. Similarly, maternal nutritional deprivation during pregnancy—also a source of psychosocial stress—can lead to maladaptive metabolic programming in utero. Secondly, the general wear and tear on maternal preconception health can compromise the fetal environment during pregnancy. Thirdly, maternal stress, nutrition, and infections over the life-course could result in actual epigenetic markings on maternal DNA that subsequently influence fetal and child development. All three of these general types of perinatal pathways can contribute to intergenerational health shocks across multiple generations as well.

A. *Environmental and social stressors during pregnancy*

Maternal physiological stress responses during pregnancy, when overstimulated, can pose immediate harm to fetal health, with longterm implications for development. Existing studies have found maternal psychosocial distress and maternal mental disorders during pregnancy--as indicated by maternal adverse life events and symptoms of stress, depression, and anxiety--to be significantly related to fetal growth restriction, and maternal dysregulation of cortisol likely plays a mediating role (Wadhwa 1993, Lewis et al 2016). For instance, levels of cortiticotropic releasing hormone (CRH), which the hypothalamus releases as part of the cortisol-mediated stress response, in the placenta during pregnancy is positively correlated with fetal growth restriction (Thomson 2013). The relationship between maternal stress and placental catecholamines (I.e., epinephrine and norepinephrine) during pregnancy is less clear, but plasma catecholamines are indeed positively correlated with preeclampsia and gestational hypertension, which are associated with both maternal stress and elevated perinatal health risks (Kaaja et al., 1999; Manyonda et al 1998).

Stress reactivity is also linked to immune and inflammatory processes during pregnancy, which

can lead to longer term health complications for offspring. More specifically, exaggerated stress reactivity during pregnancy exacerbates susceptibility to infection (Culhane et al, 2001) and primes the inflammatory response in utero, with consequences including higher risk of preterm labor (Christian 2012). Related mechanisms could additionally contribute to longer term susceptibility to infection and maladaptive inflammatory response programming among offspring.

Maternal nutritional deprivation is a significant psychosocial stressor that also poses additional challenges to fetal development during pregnancy. Natural experiments, such as the Dutch Famine studies, have demonstrated how severe maternal malnutrition during pregnancy in one generation can have detrimental effects on offspring health and development, particularly the early onset of coronary artery disease and glucose intolerance (Roseboom et al., 2000). Hales and Barker's (1992) influential "thrifty phenotype" hypothesis interprets such findings as a result of plasticity during fetal development, where when confronted with a low-resource (I.e., nutrient deprived) environment the fetal growth is compromised as a means for survival and metabolic processes may be altered to enhance fat storage in anticipation of future nutrient-limited environments.

B. *Preconception stressors, allostatic load, and pregnancy health*

Links between maternal health conditions and fetal development are in motion well before the beginning of pregnancy, as will be discussed in the following sections. Stressors over the maternal life-course affect their offspring's health through maternal health status at conception and throughout pregnancy. The cumulative wear and tear, i.e., allostatic load (McEwen, 1998), on the mother's body is believed to cause premature aging, i.e. "weathering", that can create less than ideal fetal environments during pregnancy, including through poor vascular health and maladaptive stress and immune responses (Geronimus, 1992; Wadhwa 2005). It is very

possible that the mechanisms explained above linking maternal stress responses during pregnancy to fetal development could also be at work before pregnancy. For example, stress reactivity is a physiological process that can develop and adapt over the maternal life-course, which means preconception stressors can influence fetal development via their effect on stress reactivity during pregnancy.

C. *Epigenetic pathways*

Maternal stressors can also influence fetal health and development via epigenetic pathways involving DNA methylation and histone modifications in mothers and infants. Animal studies have provided the clearest demonstrations of such effects via manipulations of maternal traits or environments that lead to divergent offspring health trajectories, including experimental manipulations of maternal nutritional (Choi and Friso, 2010; Park et al., 2008; Lillycrop et al, 2008; Thompson et al., 2010; Zeisel, 2009; Sandovici et al., 2011), psychosocial (Elliott et al., 2010; Weaver et al., 2004; Meaney et al., 2007), and environmental toxin (Yauk et al., 2008; Perera and Herbstman 2011) exposures before and during pregnancy. Furthermore, epigenetic markings acquired in utero can last well into adulthood. Sibling studies looking at DNA methylation in the Dutch Hunger Winter birth cohort show that siblings that underwent periconceptual conditions of famine and related stress in the periconceptual, or early gestation period, exhibited different methylation of several genes as adults (Heijmans et al., 2008; Tobi et al., 2009), in particular the insulin-like growth factor II (IGF2) gene, which plays a significant role in growth and development (Garfield and Ward, 2006).

D. *Reverberating intergenerational shocks*

Environmental stressors and trauma can produce shock waves across multiple generations. Consider three generations: grandmother, mother, and daughter. Environmental stressors experienced by the grandmother during pregnancy can already influence the mother's

reproductive capacity during the critical period in utero when the mother's lifetime supply of oocytes, or egg cells, are produced, which will, in turn, affect the daughter's fetal development and adult health. Less direct pathways can also play a role, such as through other fetal origins of the mother's health (Barker 1995, Barker 2002). For instance, low birth weight, a marker of intrauterine health and development, is associated with adult health, notably coronary heart disease. Such chronic conditions in adulthood affect maternal health during pregnancy and are associated with significant perinatal health risks, including risk of preterm birth and low birth weight (Barros et al, 2010; Bhutta et al, 2011; Goldenberg et al, 2008; Iams et al., 2010), which for the daughter at least, can contribute to positive feedback loops for poor health in subsequent offspring (Kuzawa and Fried 2017).

6.3 **Postnatal maternal stress and child health**

Beyond the pathways linking prenatal maternal stress to infant health and development, there is evidence of a strong link between postnatal maternal stress and continued child development. In this final introductory section, I briefly summarize existing literature highlighting this postnatal link in light of the following involved pathways: (1) maternal depression and child health, (2) neurological and epigenetic pathways linking maternal stress to child health, and (3) other biopsychosocial linking acute maternal trauma to offspring health.

A. *Pathways linking maternal depression to child health*

Maternal depression is highly correlated with early childhood growth, as revealed in a meta-analysis of developing countries by Surkan et al. (2010) that found children of mothers with depressive symptoms were at a 1.5 higher odds of being underweight and 2.2 higher odds of stunted growth. Mechanisms highlighted in the literature include compromised maternal caregiving behavior (MCB; McLearn, 2006b), maternal nonresponsitivity (Lovejoy et al., 2000), and shorter durations of breastfeeding (Papinczak & Turner, 2000; McLearn et al., 2006a; Bick et al., 1998). Maternal mental health postpartum is also strongly and positively correlated with

child cognitive development and behavior (Murray, Halligan, Goodyer, & Herbert, 2010; Lupien et al., 2011; Bagner, Pettit, Lewinsohn, & Seeley, 2010). Similar mechanisms involving MCB during infancy contribute to child emotion regulation (Hane & Fox, 2006), social and cognitive abilities, and stress reactivity (Hane, Henderson, Reeb-Sutherland, & Fox, 2010). Importantly, maternal distress during pregnancy is highly predictive of maternal postpartum depressive (PPD) symptoms (Beck, 1996; O'Hara & Swain, 1996; Sutter-Dallay, Giaconne-Marcesche, Glatigny-Dallay, & Verdoux, 2004), and while studies still find an independent effect of maternal mental health on child health postpartum, PPD should still also be considered as a partial mediator in the greater relationship between maternal life stress and child health.

B. *Neurological and epigenetic pathways linking maternal stress to child health*

Maternal mental health that translates to positive MCB can also influence child health and development via neurological and epigenetic pathways postpartum. Well-studied demonstrations of such pathways involve rodent models and the maternal licking/grooming (LG) of pups--an aspect of positive MCB that influences offspring HPA activity, physical and cognitive development, and future reproductive behavior (Caldji et al., 1998; Cameron et al., 2008a; Campagne et al., 2008; Champagne, Francis, Mar, & Meaney, 2003; Meaney, 2001). Maternal LG is associated directly with DNA methylation in offspring that occurs after birth as early as in the second postnatal week (Weaver et al., 2004, 2005), is carried into adulthood, and linked to more advantageous stress responsitivity (Champagne and Meaney, 2007) and future maternal LG of offspring (Champagne, 2008). Maternal LG is inhibited among mothers that experience prenatal stress (Champagne & Meaney, 2006), again highlighting the amplified effects of prenatal stressors through postpartum MCB, hippocampal development, and related epigenetic programming.

C. *Other biopsychosocial pathways linking acute maternal trauma to offspring health*

Psychiatrists have theorized about other distinct pathways linking acute parental trauma (occurring anytime over the life-course) to offspring health postnatally, that may or may not be clearly observable at very early ages. In an influential review focused on Holocaust survivors and their children (born after the Holocaust), Kellerman (2001) summarizes modes of trauma transmission from parents to children as follows: (1) psychodynamic, via interpersonal relations and trauma survivors unconscious displaced emotions; (2) sociocultural, via socialization and survivors' parenting and modeling strategies; (3) family systems, via communication and enmeshment; and (4) biological, via genetically inherited susceptibility to mental disorders, such as post-traumatic stress disorder, or possibly via epigenetic imprinting (Kellermann, 2013). Research on these specific effects focuses on adult children of Holocaust survivors, but it is likely that such pathways work through aspects of MCB and familial relationships that are distinct from maternal depression alone and have tangible effects on child stress, diet and nutrition, and overall growth and development.

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Chapter VII
Aim 3 Analysis
Child Health Impacts of Maternal Histories of Violence & Displacement Contexts at the Thai-Myanmar Border

SUMMARY

Record-high forced displacement constitutes a global humanitarian crisis and public health emergency. Beyond the current focus on immediate needs of war refugees and internally displaced persons (IDPs) in emergency settings—most often temporary camps—the long-term health implications of forced displacement are not well documented or understood, particularly the health impacts of current displacement for future generations. For instance, how much do the negative health effects of war-related trauma over the course of mothers' lives get passed onto their children? And to what degree are these effects mitigated or exacerbated by women's—and consequently children's—post-displacement circumstances, such as long-term settlement in "temporary" camps or migrant worker positions that pose new occupational risks and potential threats of arrest or deportation? In the analysis for this chapter, I find evidence of different domains of child health being influenced by pre- and post-displacement contexts differently in nontrivial ways that make sense given different hypothesized mechanisms.

7.1 Approach

This chapter's analysis follows a very similar approach to the previous study analyses of women's health, but here the primary outcome of interest is the health of each woman's youngest child early in life, including birth outcomes, physical growth and nutritional status, and infectious disease burden. Also similar to the previous analysis is the setup of patterns of displacement as indicative of patterns of psychosocial stress. As reviewed in the preceding background, the pathways highlighted in the current literature linking maternal stress to child health actually involve similarly differentiated stressor types, intensities, and durations. Thus, I will reference the same stress pattern scenarios presented in the prior analysis and setup (Chapter V), but with the interpretation adapted to mother-to-child link biological pathways. As a review, these pathways include the following:

1. *Cumulative Stress/Disadvantage (CS/D) – Non-interactive.* The negative effects of toxic stress presumably accumulate over the life-course based on the duration and intensity of past and ongoing stressors.

2. *Cumulative Stress/Disadvantage (CS/D) – Positive interaction*. Also aligned with the cumulative toxic stress model, a long-term response to pre-displacement stressors could result in an exaggerated physiological stress response to subsequent stress (i.e., post-displacement), possibly due to overstimulation or failed shutdowns.

3. *Post-traumatic shock and legacy effects – More selective effects.* A greater health disadvantage related to the trauma of witnessing or experiencing severe violence, severe deprivation, or both that goes beyond other background stressors.

4. *Resilience: Beneficial Adaptation, or Selection*. There are adaptations to past stressors that

could enhance individual's abilities to respond to subsequently stressful environments, i.e., increase their capacity to withstand future stressors through conscious or subconscious coping strategies.

5. *Resilience: Short-term Stress Memory.* Resilience to historical stress could be considered short-term stress memory, i.e., individuals would be sensitive to immediate stress environments (post-displacement contexts) but would not show long-lasting effects of historical stress environments (pre-displacement contexts).

6. *Maladaptive Predictive Response.* If stressful environments in the past led to predictive adaptive responses that were advantageous in ongoing stressful environments, but disadvantageous in subsequently low-stress environments, a qualitative interaction between pre- and post-displacement stressors could emerge.

For example, the cumulative stress and disadvantage pathway could still underlie associations between maternal displacement stressors and child health via maternal health status or allostatic load during pregnancy. This case, and others, presumes multistep processes that I do not directly measure (including additional aspects of timing of exposure and outcome), but the examination of patterns will still provide valuable insights for hypothesis generating, future study directions, and public health implications for children in this sample that do not necessary depend on identifying specific mechanisms. For example, examining how mother's pre- and post-displacement contexts influence child health and whether maternal post-displacement context modifies the effect of maternal pre-displacement context on the child is interesting from both a biosocial research perspective and in a practical public health sense as well.

I use novel survey data of mothers with different histories of displacement from the Shan State, Myanmar, to Thailand and compare their children's current health at the Thai-Myanmar border in order to elucidate the following:

1) How do different maternal displacement contexts, defined by related stressors, influence their children's health and wellbeing early in life?

2) How do maternal historical patterns of pre- and post-displacement contexts—i.e. interactions between these contexts—influence their children's health and wellbeing early in life?

A. *Data: Maternal and Child Health Survey at the Chiang Mai-Shan State Border*

The final analytical sample for this study is a subset of the entire study sample for whom I have interview data for the mother recruits with child health information, either from the interview or the anthropometric measurements, depending on the outcome. After accounting for mothers with survey components unlinked or completed by a different child guardian, there are 375 women study subjects remaining (46% of total recruits), 261 (70%) for whom I have complete information for the mother. Depending on the given child variables, the models presented have a final sample size between 226 and 252. None of the women in final analytical sample were pregnant when surveyed. Table 7.1 includes descriptive information.

B. *Measures*

1. Histories of displacement and related stress patterns

Maternal patterns of displacement, and related stressors, constitute the study's primary comparison groups of interest and are the same categories used in the Aim 2 analysis, with some categories collapsed due to sample size. The two separate categorical variables are coded

as follows: (1) pre-displacement context (*Migrant – High Military Violence/Exposure* [M-HMV][9]; *Migrant – Low Military Violence* [M-LMV]; *Born in Thailand* [T][10]); and (2) post-displacement contexts (*Low Threat* [LT]; *High Threat* [HT]).

2. Child health outcomes

Maternal reported low birthweight (LBW; below 2,500 grams) is the primary child health outcome I use to reflect fetal development and health at birth. Reported birthweights were typically based on hospital birth records, using comparable scales at hospital facilities.

Child physical health and growth is measured in the study based on constructed age-standardizing z-scores for height-for-age (HFA), weight-for-age (WFA), weight-for-height (WFH), and mid-upper arm circumference (MUAC), based on guidelines provided by the WHO Stata package (2007). I use a binary indicator of stunting or wasting determined by falling below WHO expected values by two standard deviations or more for any of these indicators.

I measure general child health status using maternal reports of fair or poor child health, based on an adaptation of the single, validated subjective health rating scale of very good, good, fair, or poor.

I create a binary indicator for maternal reports of child FPH or any case of child disease or infection as a binary variable to reflect general exposure and susceptibility to infection. Maternal reports of disease were based on a series of questions regarding specific diagnoses, including neonatal diarrhea, neonatal sepsis, malaria, pneumonia or respiratory infection, meningitis, iron-deficiency anemia, thalassemia, measles, intestinal parasites, or another

[9] This is a collapsed category for acute violence/deprivation and military occupation.
[10] This is a collapsed category for Thai or ethnic minority born in Thailand.

specified infection.

3. Other covariates

Models presented adjust for a combination of the following covariates: any reported child health insurance (binary), maternal age at birth, child age in years, and whether the child is the mother's firstborn (binary).

C. *Analysis*

The two-part analysis here parallels the analysis of mothers' health outcomes in the previous analytical chapter. First, I perform staged main effects models with pre- and post-displacement context group membership added sequentially in order to look at average, non-interactive associations between health and pre- and post-displacement stressors. The equation below specifies the fully adjusted logistic regression model for LBW:

$$\text{Log (odds of LBW)} = \beta_0 + \beta_1(\text{M-LMV}) + \beta_2(\text{M-LMV}) + \beta_3\,(\text{HT}) + \beta_4(X_1) + \ldots + \beta_n(X_n)$$

where the β's are logistic regression coefficients, the X_j (j=1 to n) are covariates, and the intercept represents mothers born in Thailand and living in LT post-displacement contexts. Continuous outcomes are modeled using ordinary least squares models, where β's represent estimated mean differences.

Second, I compare subgroups defined jointly by individuals' pre- and post-displacement contexts (i.e., patterns of displacement) to look at their joint impact on health outcomes. For example, the equation below specifies the model used for the LBW subgroup comparisons:

$$\text{Log (odds of LBW)} = \alpha_0 + \alpha_1(\text{M-LMV}) + \alpha_2(\text{M-HMV}) + \alpha_3(\text{HT}) + \alpha_4(\text{M-LMV*HT}) + \alpha_5(\text{M-HMV *HT}) + \alpha_6(X_1) + \ldots + \alpha_n(X_n)$$

where here the α's are logistic regression coefficients and α_4 through α_5 are the interaction terms between pre-displacement contexts and post-displacement context. For subgroup predicted standardized prevalence, I use adjusted predictive margins in Stata 15 (i.e., marginal standardization).

7.2 Results

A. *Low Birth Weight (LBW)*

1. Staged regressions (Table 7.2)

Children of migrant mothers are, on average, at higher odds of experiencing LBW—with low violence migrants at a 30% higher odds, and high violence migrants at a 66% higher odds, of LBW than non-migrants (not statistically significant at the $p<0.05$ level). These differences are completely attenuated after account for living in a HT post-displacement setting. Living in a HT setting post-displacement is associated with an average odds ratio (OR) of 1.77 compared to a LT setting (not statistically significant) in the fully adjusted model.

2. Subgroup comparisons (Figure 7.1)

The single most stressed subgroup stands out with the greatest risk of LBW compared to all other subgroups ($p=0.26$ and 95% confidence interval [CI]=0.12, 0.40, as compared to other estimated probabilities between 0.09 and 0.12).

B. *Child Nutrition and Growth*

1. Staged regressions (Table 7.3)

Children of migrant mothers are at a higher risk of poor nutritional status—either stunting or wasting—on average with minimally adjusted ORs of 1.84 and 2.18 for low and high military violence migrants, respectively, relative to non-migrants (neither OR is statistically significant at the $p<0.05$). These relative odds are only slightly attenuated by adjusted for post-displacement contextual variables. The association between child stunting and wasting and

high-threat post-displacement settings is relatively weak and almost completely attenuated after adjusting for other, more specific contextual factors (unadjusted OR=1.36; fully adjusted OR=1.12; neither statistically significant).

2. Subgroup comparisons (Figure 7.4)

There is a tendency within both groups in HT and LT settings for historical stress (more stressed migrants) having a child with a higher risk of stunting or wasting. The subgroup comparisons suggest there is no clear interaction between pre-and post-displacement stressors, and that pre-displacement stressors are more influential.

C. *Child Overall Health*

1. Staged regressions (Table 7.4)

Migrant mothers are more likely than non-migrant mothers to rate their children's health as fair or poor or report a serious child infection or illness, with ORs of 1.21 and 1.26 for mothers that migrated from high or low violence settings, respectively (neither is statistically significant). This association remains largely unchanged with adjustments for the high military group, but the adjusted OR for LMV migrants is actually larger (1.84, but not statistically significant). This differential risk of child poor health and disease is only partially explained by current contextual factors, which suggests that there are aspects of overall child health and influenced by maternal life histories other pathways beyond current social and physical environments measured. Living in a HT post-displacement context is associated with a greater relative odds of poor rated health related to LT contexts (adjusted OR=1.46, not statistically significant).

2. Subgroup comparisons (Figure 7.5)

When maternal rated child health is compared across subgroups, HT groups tend to experience greater risk of poor child health and post-displacement contexts appear uninfluential. All group risks of poor child health seem high as well, with most group hovering around 0.6.

7.3 Discussion

A. *Evidence of paths linking maternal displacement stressors to child health?*

Interesting, the three domains of child health examined in this study all appear to influenced by pre- and post-displacement contexts differently in nontrivial ways that make sense given hypothesized mechanisms. Low birth weight is the only outcome that seems to be influenced jointly by both contexts (but this is not detectable as statistically significant), with a substantially elevated risk of LBW among mothers that have experienced both high stress migration histories and also have been in HT situations post-displacement. This agrees with a cumulative disadvantage conceptual model of stress, with synergistic or threshold levels for negative effects of stress to kick in.

Child probabilities of stunting and wasting are more closely associated with pre-displacement contexts than post-displacement situations. This could be due to several different factors. This is somewhat surprising for wasting, at least, since wasting is presumably more sensitive to immediate environments. Both indicators of nutritional status and growth could indeed be linked to early life environments, even in utero, in which development and metabolic function can be vulnerable to maternal psychosocial distress. Analyses of wasting and stunting indicators separately (not shown) reveal consistent positive associations with pre-displacement stressors specifically, and wasting also is associated with post-displacement stress when modeled alone.

Maternal rated health of their child as poor and maternal reports of child illness together are more closely associated with post-displacement contexts than pre-displacement contexts. This agrees with the intuition that child subjective health and illness are more vulnerable to immediate environments. It is also possible that being in a currently high-stress environment may cause mothers to report worse health or more illness in their child.

B. *Limitations*

This study is limited by the general limitations suggested in past chapters, related to it being a retrospective, cross-sectional study, and potential selection bias—but these biases would be dominated by factors attenuating measures of association. This specific analysis is also more prone to measurement error that would lead to a further attenuate of the measures of association. Specifically, the collapsing of stressor group categories likely weakens the magnitude of the estimates because they are averaged across more dissimilar contexts. Also, the analytical sample for this chapter is the smallest due to the additional linkages necessary for complete case analysis. In the future, I plan to impute missing data.

Additional limitations to this specific study and analysis is the lack of specificity in the outcomes and proposed mechanisms. The aggregate measures were selected based on similar patterns in separate models, but their interpretation is still slightly more ambiguous with this approach. Even more challenging is the identification of specific pathways between maternal stress and child health when data on the timing of stressors and migration are not yet ready to be added to the analysis. This addition will be very helpful, for instance, in determining whether women were in high-stress environments before, during, or after pregnancy.

C. *Further research*

Given the current global crisis of displacement and the observable maternal and child health risks associated with war exposure, poor living conditions for migrant workers, and other threats to livelihoods among displaced individuals, more research is needed to understand mechanisms through which migrant women and child can achieve better and more equitable health in their host countries. Interventions to address migrants' and refugees' current living situations as well as lasting effects of historical stress should be studied more carefully, such as through cross-national comparisons of policies toward migrants and refugees.

Chapter VII Tables & Figures

Table 7.1. Sample Characteristics

Study socio-demographic characteristics, with means and standard deviations (sd), or percents.

	Mean/ Percent	sd
Child Health Outcomes		
Low Birth Weight	15.7%	
Stunting (WHO; length-for-age)	17.4%	
Underweight (WHO; weight-for-age)	9.3%	
Wasting (WHO; mid-upper arm circumference)	9.3%	
Maternal-reported child health fair/poor	48.3%	
Child infection/illness	16.3%	
Neonatal diarrhea	4.1%	
Migration History (Pre-Displacement Context)		
Born in Thailand	33.1%	
Migrant – Low Military Violence (M-LMV)	44.2%	
Migrant – High Military Exposure (M-MO/ M-SVDE)	22.7%	
Ethnic minority	89.5%	
Thailand (Post-Displacement) Context		
Thailand: Low Threats	48.8%	
Thailand: High Threats	51.2%	
Legal documentation		
Citizen/ Legal resident	55.2%	
Legal documents: Passport/ work permit	30.2%	
Legal documents: None	14.5%	

	Mean/ Percent	sd
Residence Type		
Residence: Village	72.1%	
Residence: Worksite	26.7%	
Residence: Camp	1.2%	
Any Health Insurance	92.4%	
Child Age (years)	1.8	1.4
Maternal Age at Birth	26.7	6.1
Firstborn	38.4%	

Table 7.2. Low Birth Weight (LBW): Staged regression models

Estimated odds ratios based on staged logistic regression models of LBW. *p<0.05, **p<0.01, ***p<0.001

	LBW: Mod1	LBW: Mod2	LBW: Mod3	LBW: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	1.305	1.010	1.039	1.111
Migrant – High Military Exposure (M-MO/M-SVDE)	1.663	1.305	1.349	1.133
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		1.716	1.735	1.773
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			0.991	1.106

	LBW: Mod1	LBW: Mod2	LBW: Mod3	LBW: Mod4
Legal documents: None			0.574	0.642
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			0.943	0.943
Any Health Insurance				0.605
Observations	239	239	239	236

Figure 7.1. Low Birth Weight (LBW): Subgroup Comparisons

Subgroup comparisons for LBW predictive marginal probabilities (point estimates and 95% CI), based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for birth year (continuous), first births (binary), and maternal age (continuous).

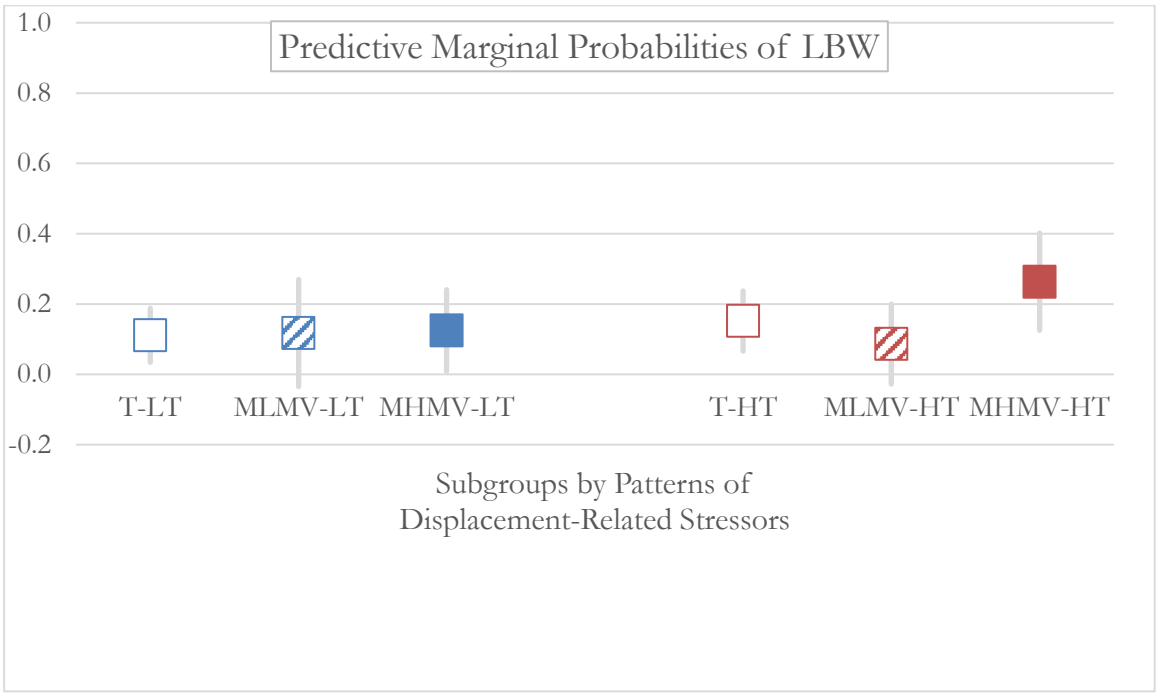


Table 7.3. Any Stunting or Wasting: Staged regression models

Estimated odds ratios based on staged logistic regression models of stunting or wasting. *p<0.05, **p<0.01, ***p<0.001

	Stunt/Wast: Mod1	Stunt/Wast: Mod2	Stunt/Wast: Mod3	Stunt/Wast: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	1.844	1.556	1.651	1.625
Migrant – High Military Exposure (M-MO/M-SVDE)	2.182	1.864	1.962	1.930
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		1.365	1.290	1.124
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/ work permit			0.634	0.710
Legal documents: None			1.288	1.212
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			1.626	1.665
Any Health Insurance				0.875
Observations	232	232	232	226

Figure 7.4. Any Stunting or Wasting: Subgroup Comparisons

Subgroup comparisons for child stunting or wasting, based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for birth year (continuous) and first births (binary).

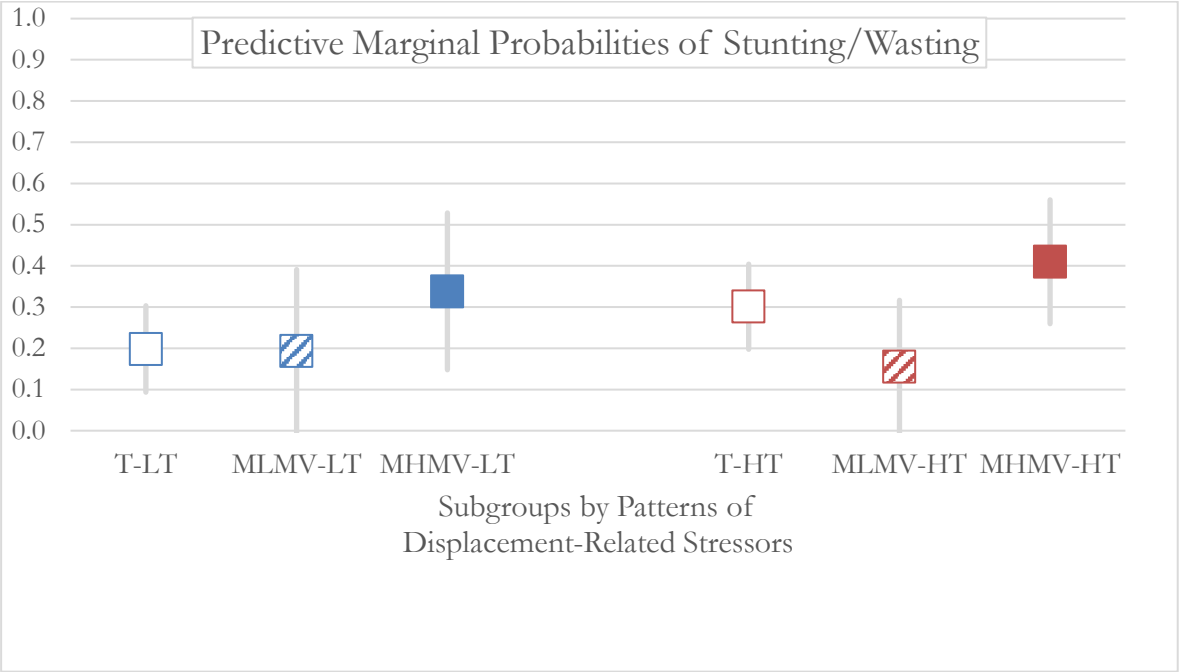


Table 7.4. Maternal-Reported Child Health: Staged regression models

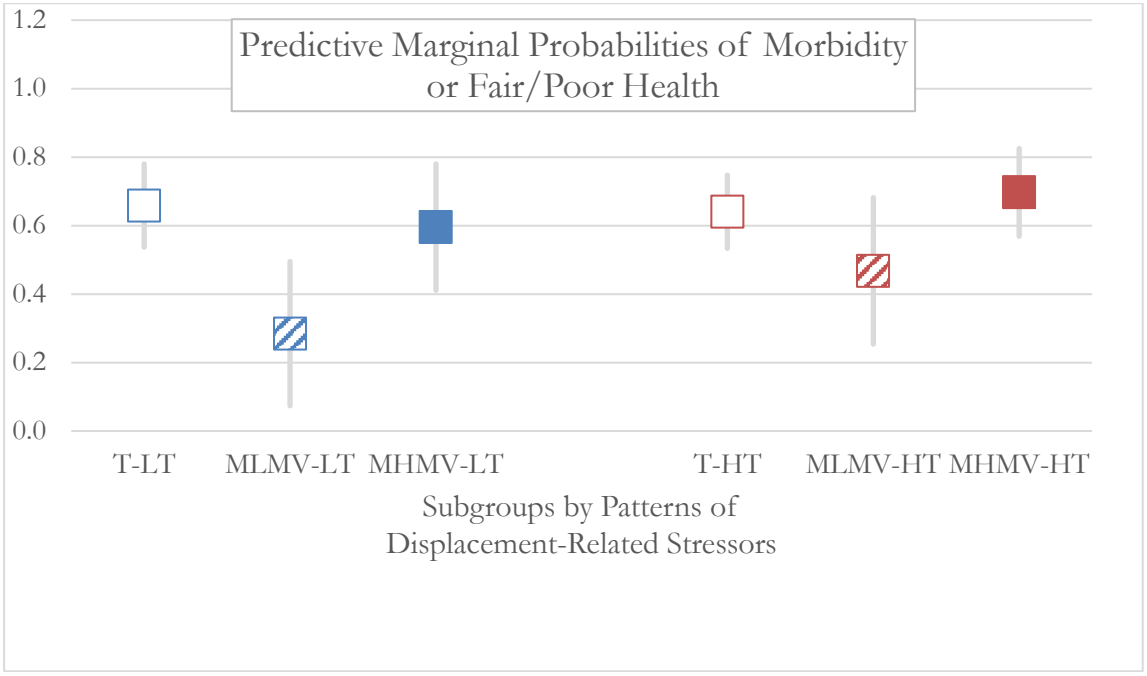
Estimated odds ratios based on staged logistic regression models of binary indicator for child health rated fair or poor by mother or child infection or serious illness reported by mother. *p<0.05, **p<0.01, ***p<0.001

	Morbidity: Mod1	Morbidity: Mod2	Morbidity: Mod3	Morbidity: Mod4
Migration History (Pre-Displacement Context)				
Born in Thailand	(Ref)	(Ref)	(Ref)	(Ref)
Migrant – Low Military Violence (M-LMV)	1.260	1.312	1.808	1.838
Migrant – High Military Exposure (M-MO/M-SVDE)	1.207	1.257	1.520	1.218
Thailand (Post-Displacement) Context				
Thailand: Low Threat		(Ref)	(Ref)	(Ref)
Thailand: High Threat		0.925	1.689	1.456
Legal documentation				
Citizen/ Legal resident			(Ref)	(Ref)
Legal documents: Passport/			0.294**	0.308**

	Morbidity: Mod1	Morbidity: Mod2	Morbidity: Mod3	Morbidity: Mod4
work permit				
Legal documents: None			0.415*	0.359*
Residence Type				
Residence: Village			(Ref)	(Ref)
Residence: Worksite			0.816	0.726
Any Health Insurance				0.414
Observations	252	252	252	247

Figure 7.5. Maternal-Reported Child Health: Subgroup Comparisons

Subgroup comparisons for binary indicator for child health rated fair or poor by mother or child infection or serious illness reported by mother, based on pre-displacement (bar fill patterns) and post-displacement contexts (colors), and adjusted for birth year (continuous), first births (binary), maternal age (continuous), and hospital birth (binary; for 5b only).



Chapter VIII
Conclusion: Maternal and Child Health Implications of Violence and Displacement at the Thai-Myanmar Border

The purpose of studying the health consequences of discrimination is not to prove that oppression is "bad" because it harms health. Unjustly denying people fair treatment, abrogating human rights, and constraining possibilities for living fully expressed, dignified, and loving lives is, by definition, wrong—regardless of effects on health. Rather, the rationale for studying discrimination and health, like that for studying any societal determinant of health, is to render an accounting of who and what drives population patterns of health and health inequities and to generate knowledge useful for guiding policies and actions to prevent and rectify harm and advance health equity.

Nancy Kreiger 2014, p.645

8.1 Summary of Findings

In summary, the major contributions of the research covered in this dissertation are as follows:

A. *Patterns of violence that emerge in women's life histories and current living circumstances at the Thai-Myanmar border.*

Cluster analyses in Chapter III reveal salient configurations of life events and circumstances among women currently residing at the Thailand-Myanmar border, representing pre- and post-displacement contexts. Pre-displacement contexts reveal significant patterns of military-based violence, which can be characterized as either dominated by surveillance and taxation ("Military Occupation"); severe deprivation, evacuation, and forced labor ("Deprivation/Evacuation"); more severe violence associated with military invasion and occupation ("Severe Violence"); or less severe or direct military exposure ("Low Military Violence"). Post-displacement contexts on the Thai side of the border are summarized as high, moderate, and low levels of threat encountered primarily in work, mobility constraints, and encounters with law enforcement. These configurations do not represent the only possible groupings of women's experiences but are particularly meaningful based on existing ethnographic and interview research in this context.

B. *How displacement-related stressors influence women's health and wellbeing, and how personal historical patterns of pre- and post-displacement contexts (i.e. interactions between these contexts) reveal stress-related health processes.*

Patterns of women's elevated blood pressure (EBP) suggest that stressors related to pre- and post-displacement cumulatively contribute too greater health disadvantage. Patterns in self-reported fair/poor are less clear but overall suggest that relatively poor self-rated health, and the high risks of morbidity and mortality implied, are a major public health concern across all migrant subgroups in the study population. An additionally striking health outcome along patterns of displacement is the consistently higher level of general and abdominal fat accumulation among women formerly in more stressful environments, particularly among

women in low-stress post-displacement environments. This pattern agrees most closely with theories of post-traumatic legacy effects via maladaptive predictive responses manifested in metabolic dysregulation, i.e., it agrees with suggested biological pathways through which acute psychosocial stress influences subsequent stress responses via the HPA axis that affect future body fat accumulation.

C. *Child health impacts of maternal displacement and related stressors and how patterns of displacement reveal stress-related health processes across generations.*

Interesting, the three domains of child health examined in this study all appear to influenced by pre- and post-displacement contexts differently in nontrivial ways that make sense given hypothesized mechanisms. Low birth weight is the only outcome that seems to be influenced jointly by both contexts (but this is not detectable as statistically significant), with a substantially elevated risk of LBW specifically among mothers that have experienced both high stress migration histories and also have been in HT situations post-displacement. This agrees with a cumulative disadvantage conceptual model of stress, with synergistic or threshold levels for negative effects of stress to kick in. Child probabilities of stunting and wasting are more closely associated with pre-displacement contexts than post-displacement situations. Both indicators of nutritional status and growth could be linked to early life environments, even in utero, in which development and metabolic function can be vulnerable to maternal psychosocial distress; but analyses of variables with more information on the timing of stressors and child exposures would strengthen the interpretation of this finding. Maternal rated health of their child as poor and maternal reports of child illness are more closely associated with post-displacement contexts than pre-displacement contexts. This agrees with the intuition that child subjective health and illness are more vulnerable to immediate environments.

8.2 **Contributions & Broader Implications**

A. *Health and Human Rights Concerns for Migrants and Displaced Populations*

Reducing risks of mobility- and labor-related threats for refugee, refugee-like, and migrant populations is not only a human rights issue, but also a public health crisis that demands greater attention. Addressing this public health crisis requires both better understanding the relationship between histories of violence, displacement, and current health and taking immediate action regarding human rights protections and social, health, and legal service provisions for migrant populations in vulnerable situations. Such provisions are not only needed among women that legally fit the UNHCR definition of refugee and remain unrecognized, but among migrants in vulnerable situations more broadly defined, including cases of displacement and "survival migrant" (Betts) that do not necessarily fall into the legal definition of refugee.

B. *Multiple correspondence analysis (MCA) and cluster analysis as descriptive and analytical tools for studying structured violence and displacement*

Multiple correspondence analysis (MCA) and cluster analysis (CA) remain underused analytical tools in the social and health sciences despite their exceptional ability to integrate rich description and powerful computational power, including machine learning, to uncover the underlying structure of complex data, including life event histories (Grimmer and King 2011; Sourial et al. 2010). Despite being a powerful way of visualizing and understanding structured social space, as inspired by Bourdieu and others (see Rouanet et al 2000; Lebaron 2009), MCA is still rarely used in the United States. Cluster analysis (CA) has become somewhat more popular and has been an informative tool for examining migrant profiles in other recent studies (see Garip 2012). Future studies should utilize it more to study structured violence and inequalities. Although both approaches are highly researcher- and data-dependent, when supplemented by more contextual information they can produce meaningful categorical groupings of multidimensional social contexts.

C. *What can displacement reveal about stress and health?*

Patterns of displacement reveal significant information regarding the nature, intensity, timing, and duration of stressors over the life-course. Among the women studied, patterns of EBP risk across patterns of displacement tell a striking story reflecting cumulative stress and health disadvantage over time. Patterns of body fat accumulation specific to groups of women that experience high-stress environments pre-displacement and low-stress environments post-displacement additionally strengthen existing evidence for predictive adaptive responses to stress that influence later adult metabolism. Risks of obesity and EBP need to be investigated more thoroughly among displaced populations. Furthermore, obesity risk should be investigated more carefully among populations that have transitioned from high-to-low psychosocial stress environments more generally.

D. *Utilizing and transforming theories of violence in survey and mixed methods research*

In this study, I help to push fields of research forward, particularly social epidemiology and survey research generally, to go beyond the documentation and description of social disparities in health by commonly measured socio-demographic characteristics, such as race, ethnicity, or legal status. I measure actual personal experiences indicative of structural and everyday violence—including forms that are more insidious and difficult-to-measure (especially in a single question or additive scale)—that I hypothesize to actually be embodied and evident in maternal and child health outcomes. This is a multifaceted, mixed methods approach, because it entails: (1) preliminary qualitative interviewing, (2) standardized surveying, and (3) computationally rigorous analysis if multidimensional components.

This methodological tool that I use and develop not only utilizes existing theories of violence that are traditionally concentrated in anthropological research and ethnographic studies, but it also contributes to a greater understanding of how violence is socially structured and how it

shapes population health. How I implement these complimentary, mixed methods it has the potential to transform how violence is studied and used to understand public health. The method can be (and should be) adapted to different contexts in order to map violence in social space and use such mapping to understanding social disparities in health. This type of tool moves the field of social epidemiology further along a path toward understanding the *biosocial* mechanisms behind social disparities in health, particularly through the elucidation of *how* structural violence emerges through multidimensional social structures that pattern health inequalities and social inequities more broadly.

For instance, in the case of maternal and child health at the Thai-Myanmar border, women living in very close proximity—and even women of the same ethnicity and general migrant status—are living in vastly different social spaces, marked not only by varied social identities, such as race, ethnicity, or citizenship status, but also by diverging historical trajectories of discrimination, forced displacement, and trauma. These spaces comprise multiple, interacting dimensions of violence (e.g., physical, everyday, and potential) that have largely been ignored in social and health surveys and related research, locally and globally. In order to understand how such forms of socially structured violence shape health and wellbeing, more mixed methods approaches such as the ones used in this study should be utilized. Furthermore, a wide range of health outcomes should be considered since structural violence and aspects of intensity, timing, and nature, can influence different markers of health and disease (and their underlying biological mechanisms) quite differently—as revealed in this study.

8.3 **Future Research Directions**

A. *The future of this study*

There is still much information from this study's survey data that remains unexplored due to time and funding constraints. Next steps in my line of inquiry with these data that I plan to prioritize include:

1. Refine my measurement of displacement pattern and related stress mechanisms with additional information on the timing and duration of reported life events and more precisely when women migrated from Myanmar to Thailand. This will allow me to specify timing of maternal stressors, which will be particularly important for interpreting their association with child health outcomes (and hypothesized mechanisms).

2. Investigate more specific stress mechanisms linking displacement contexts, women's health, and child health by analyzing the relative mediating roles more proximate determinants of health, including symptoms of maternal depression and anxiety, biomarkers of stress in women and children (e.g., cortisol, other glucocorticoids, and DHEA), and women's health-related behavior.

3. Do a follow-up survey among all women of reproductive age in the study in order to better understand selection into pregnancy and childbearing in order to better understand related selection and how it relates to patterns of displacement and women's health, as both a complimentary contextualization of this research and to better understand how displacement and stress can affect fertility.

One of the limitations of this research is the reliance on retrospective, cross-sectional data, which systematically underestimates the observable relationships between violence, displacement, and health. The stress-related processes underlying women's experiences of displacement unfold over the life-course and they need to be examined more closely in longitudinal studies, as do their implications on future generations. Such research should focus on intervene-able pathways linking displacement, stress, and health, and should prioritize research in protracted displacement settings that currently remain understudied. If made possible, I plan to re-survey women and their children in the future in order to better

understand displacement and health trajectories in this setting.

8.4 **Future Research Needed More Broadly**

The analytic domains proposed for critical areas for future study in the 2017 publication of Demography of Refugees and Forced Migration, by Hugo et al.:

(i) descriptive analysis in order to implement protection and provision for persons in flight and in locations of first asylum; (ii) determination of the consequences of different phases of forced migration –flight, displacement, settlement and repatriation – for migrants and communities, both of origin and destinations; (iii) revelation of the proximate and ultimate consequences of forced and refugee migration; and (iv) formation of evidence-based policy for prevention and programs of response.

This study contributes to these objectives, and additionally poses many new questions and public policy concerns. For instance, more research needs to to bridge research on the health impacts of forced displacement and the social structural factors shaping immigration status as a health determinant more broadly, such as through racial and ethnic discrimination, exclusion from legal protections, and general social reception (Castaneda et al., 2015; Carswell et al., 2011; Sullivan and Rehm, 2005; Yip et al., 2008). Across several political and national contexts, immigrants are at disproportionately high risks of experiencing labor rights abuses (Culp and Umbarger, 2004; De Castro et al., 2006; Tsai and Salazar, 2007) and poor health outcomes among migrant families have been associated with immigration policy enforcement against those lacking legal status, e.g., detention or deportation (Allen et al., 2013; McGuire and Martin, 2007; Suarez-Orozco et al., 2002; Valdez et al., 2013; Ward, 2010).

Challenges in collecting ideal data is no excuse to ignore the critical need to better study displacement, migration, and health. With that said, there are many promising new directions in improving future data collection and analyses (as alluded to above). Further developing these

lines of research should be a priority in the fields of demography and population health moving forward given the reality that forced displacement constitutes one of today's greatest ongoing global crises.

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APPENDIX I: Chapter III

Table A1.1. Migrant Stories

Excerpts from personal accounts of Shan migrants and asylum seekers, taken from a collection of autobiographical essays published by the Mekong Migration Network and Asian Migrant Centre (2012) and select news sources, are included below and organized by pre- and post-displacement contexts.

Pre-Displacement Stressor	**Narrative**	**Source**
Socioeconomic deprivation and survival	"It is very difficult to stay in our hometown (in Myanmar) because our expenditure is not balanced with our income. We cannot survive on our work. There are many ways we have to spend money since we need to pay for everything. Even when we worked for others, we still did not have enough money to buy food."	27-year-old domestic worker in Chiang Mai from Loi Yai village, Nam San Township in Shan State (MMN & AMC 2012)
Military occupancy and oppression, forced labor, and fear	"I didn't want to come and work in Thailand, but I had to do it because our country's political situation is not stable. The military force us to do labor, force us to be porters and force us to be soldiers. There is no safety as well as no development, so my wife and I decided to move to Thailand to look for a better job, even though we didn't know anything about Thailand. We decided to walk to Thailand because we were afraid of the army checkpoints, where we were told that the Burmese soldiers rape the women or arrest the men. We travelled over 10 days and had to pay 500 baht (16 USD) to the smuggler for crossing the border. I think 500 baht for that period was quite expensive. I had to work for at least one month to get 500 baht."	Sai Porn Sak, 38-year-old man Construction worker in Chiang Mai from Mong Pan District, Shan State (MMN & AMC 2012)
Military attack, acute violence, and forced evacuation	"Most of the refugees fled the Burma Army's massive scorched earth campaign in central Shan State during 1996-1998, in which over 300,000 villagers were forced at gunpoint from their homes, and hundreds of villagers were tortured, raped and killed."	Shan State Refugee Committee and Shan Human Rights Foundation August 30, 2017

Post-Displacement Stressor	**Narrative**	**Source**
Immobility	"I had a work permit card but my employer took the original card and I had to use a copy. One time, when I visited with my friends to Sa	Nang Si Wan, 27-year-old

Post-Displacement Stressor	Narrative	Source
	Murng to see my relatives, I ran into some police and they wanted to check my ID card. I showed them the copy but they asked for the original and I replied that my employer keeps it. The police said that the employer don't have the responsibility to keep it, so they arrested me and called my employer to pick me up. My employer said that they couldn't pick me up, so the police took me to stay with them at the checkpoint for five hours then released me."	Domestic worker in Chiang Mai from Loi Yai village, Nam San Township in Shan State (MMN & AMC 2012)
Arrest	"In the past, I was arrested at my work place even though I had my legal documents. If we had legal documents we were told that we would be released and if we didn't, that we would be fined. The authorities said I had to pay even though I had my documents, since I had already been arrested. I paid because I didn't know about the law or my rights then. I was arrested recently, in the past two or three years, because my work permit expired and I was going through the extension process. The authorities said that I didn't give them evidence and that I didn't cooperate. I was arrested and spent 48 days at immigration and two days at the police station."	Sai Porn Sak, 38-year-old man Construction worker in Chiang Mai from Mong Pan District, Shan State (MMN & AMC 2012)
Stuck	"Despite the fact that the NCA [Nationwide Ceasefire Agreement] has been signed, the fighting is still going on. It's impossible to go back home at this time. Also there are landmines around our villages [now occupied by Burmese troops]."	Loong Sai Leng Koung Jor Camp Headman (Shan Herald Agency for News)
Stuck	"Even if we have enough money to visit our hometown it's still difficult. If people see us with money they (the army) will take it. I know of one Kayan person, from Loi Kaw, he worked in Thailand and saved 200,000 baht. He didn't know the exchange rate to Kyat and when the State Peace and Development Council (SPDC) saw it they took it all. In my mind I think I would say to people, 'if possible do not come to Thailand' The situation now is very difficult for migrants. It is difficult to get documents and ID, and to find work. Employers are afraid to hire us if we don't have	Nang Si Wan, 27-year-old Domestic worker in Chiang Mai from Loi Yai village, Nam San Township in Shan State (MMN & AMC 2012)

Post-Displacement Stressor	Narrative	Source
	any documents. So if people borrow money from others to come here they will only be left in debt."	
Ethnic-based stigma and discrimination	"House owners are willing to rent us rooms and the Thai community is not that bad but some families still think that as we are not Thai, we are not educated and worry that we will bring diseases to them even if we have to have a medical check-up every year."	Sai Porn Sak, 38-year-old man Construction worker in Chiang Mai from Mong Pan District, Shan State (MMN & AMC 2012)
Instability and deprivation	"It has been nearly one month since the Thai Burma Border Consortium (TBBC) cut the provisions. So, people from refugee camp are facing difficulties in all matters – food, health and education. No job to work and no food to eat. So, people are downhearted and domestic problems have escalated…We want to live our lives as human beings, so we wish the international community to continue supporting us."	Sai Pang Loi Kaw Wan Camp Manager (Myanmar Times)

Table A1.2. Myanmar Adverse Life Event Questions (English Translations)

The list is sorted by general type of question (not by order in which they were asked). Additional columns specify the question number on the survey instrument, the name of the final analytical variable used in the MCA, and the abbreviated label shown in the MCA plots. Very rare events were consolidated in the final analysis, which can be noted by multiple questions being included in the same analytical variable.

Adverse Life Events in Myanmar	Question number	Analytical variable	Abbreviated label
Being forced to evacuate one's home			
Have you ever had to flee your village because of conflict or because your village was destroyed?	le04e_a	disp_force_1	DF1
Have you ever sleep outside or in a forest because you had to escape something?	le04c_a	disp_force_2	DF2
Direct and indirect exposures to violence			
Have you ever felt oppressed because of your ethnicity or religion	le12	disp_conf_1	DC1

Adverse Life Events in Myanmar	Question number	Analytical variable	Abbreviated label
Did you ever witness a temple or other religious monument of importance to you destroyed or desecrated?	le13a_a	disp_conf_2	DC2
Did you ever witness a Shan military force come into your village?	le13b_a	disp_conf_3	DC3
Did you ever witness a Burmese military force come into your village?	le13c_a	disp_conf_4	DC4
Did you ever have any of your belongings seized or destroyed, such as food, livestock, or crops?	le13d_a	disp_conf_5	DC5
Were you ever forced to work for soldiers?	le13e_a	disp_conf_6	DC6
Was anyone in your family ever forced to serve in combat by military forces?	le13f_a	disp_conf_6	DC6
Did anyone in your family ever get kidnapped, get taken by the military, or disappear?	le13k_a	disp_conf_6	DC6
Did you ever see an explosive go off? (Follow-up: Did you ever hear any go off?)	le13g_a	disp_conf_7	DC7
Did you ever witness fighting or homes being destroyed?	le13h_a	disp_conf_8	DC8
Did you ever witness a corpse of someone who died in battle?	le13i_a	disp_conf_9	DC9
Did you ever witness someone being severely beaten, raped, or killed? (Follow-up: Did do you know of anyone from your village to whom this happened?)	le13l_a	disp_conf_9	DC9
Did you ever witness a violent event in Burma that gave you nightmares?	le13o_a	disp_conf_9	DC9
Were you ever scared that someone would take your life?	le13n_a	disp_conf_9	DC9
Were you ever bound up?	le13m_a	disp_conf_9	DC9
Was your home ever raided by soldiers? (Follow-up: What about a neighbor?)	le13j_a	disp_conf_10	DC10
Critical Resource Deprivation			
Were you ever in a situation in which you lacked food or clean drinking water?	le04a_a	disp_surv_1	DS1
Have you ever slept outside or in the forest because you did not have anywhere else to sleep?	le04b_a	disp_surv_2	DS2
Have you ever been in pain or ill and not receive care or medicine for it?	le04d_a	disp_surv_3	DS3

Table A1.3. Thailand Adverse Life Event Questions (English Translations)

The list is sorted by general type of question (not by order in which they were asked). Additional columns specify the question number on the survey instrument, the name of the final analytical variable used in the MCA, and the abbreviated label shown in the MCA plots. Very rare events were consolidated in the final analysis, which can be noted by multiple questions being included in the same analytical variable.

Adverse Life Events & Living Circumstances in Thailand	Question number	Analytical variable	Abbreviated label
Critical Resource Deprivation			
Were you ever in a situation in which you lacked food or clean drinking water?	le04e_a	cntxt_depr	DP
Have you ever slept outside or in the forest because you did not have anywhere else to sleep?	le04f_a	cntxt_depr	DP
Adverse Life Events			
While in Thailand, has your family ever been without work long enough that you did not have enough to eat or did not have a safe place to live?	le02a_a	cntxt_thrtliv_1	CTL1
Have you ever worked but did not receive your pay as originally agreed upon?	le02b_a	cntxt_thrtliv_2	CTL2
Have you ever worked with an employer who refused to give you the necessary documents for a work permit?	le02c_a	cntxt_thrtliv_3	CTL3
Have you ever felt taken advantage of by an employer/ middleman/ broker?	le02d_a	cntxt_thrtliv_3	CTL3
Have you ever had an employer/ middleman/ broker that you feared would harm you?	le02e_a	cntxt_thrtliv_3	CTL3
Have you ever feared an employer/ middleman/ broker would touch you in a way you don't want to be touched?	le02f_a	cntxt_thrtliv_3	CTL3
Have you ever felt afraid or scared when traveling outside of your village/neighborhood?	le03a_a	cntxt_thrtliv_4	CTL4
Have you ever avoided traveling outside of your village/neighborhood out of fear?	le03b_a	cntxt_thrtliv_5	CTL5
Have you ever hid in order to avoid being arrested?	le03c_a	cntxt_thrtliv_6	CTL6
Have you ever been arrested?	le03d_a	cntxt_thrtliv_6	CTL6
Has anyone else in your family been arrested?	le03e_a	cntxt_thrtliv_6	CTL6

Figure A1.1. Myanmar Event MCA Scree Plot

Based on the scree plot of MCA dimensions and their respective percentages of explained variance (inertia), I chose to keep and interpret three dimensions in the final MCA analysis.

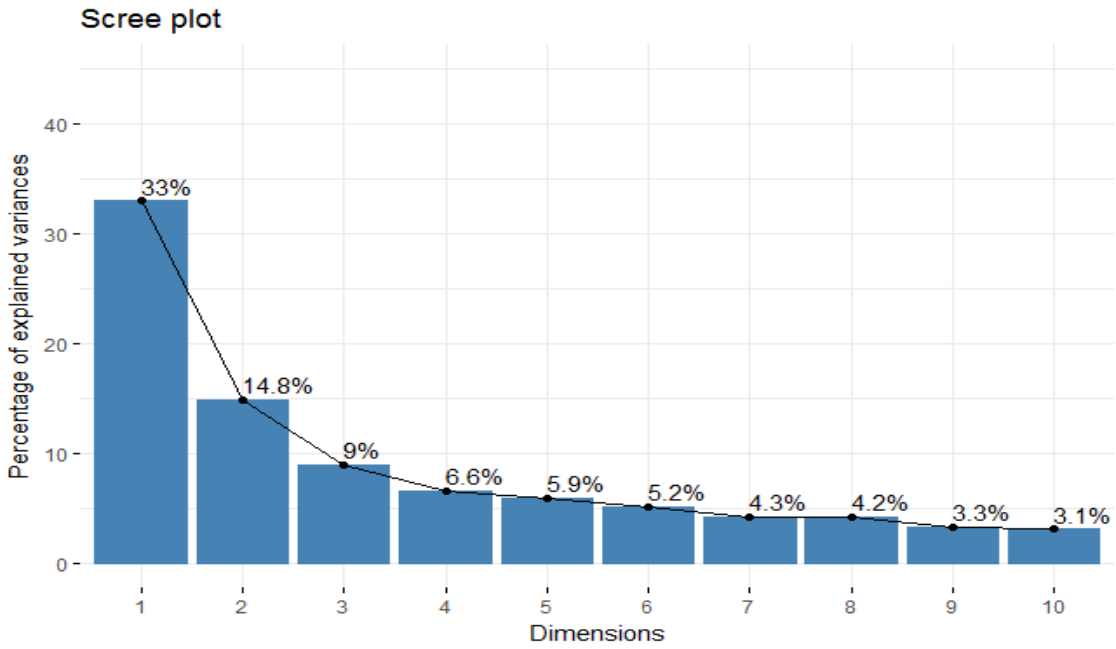
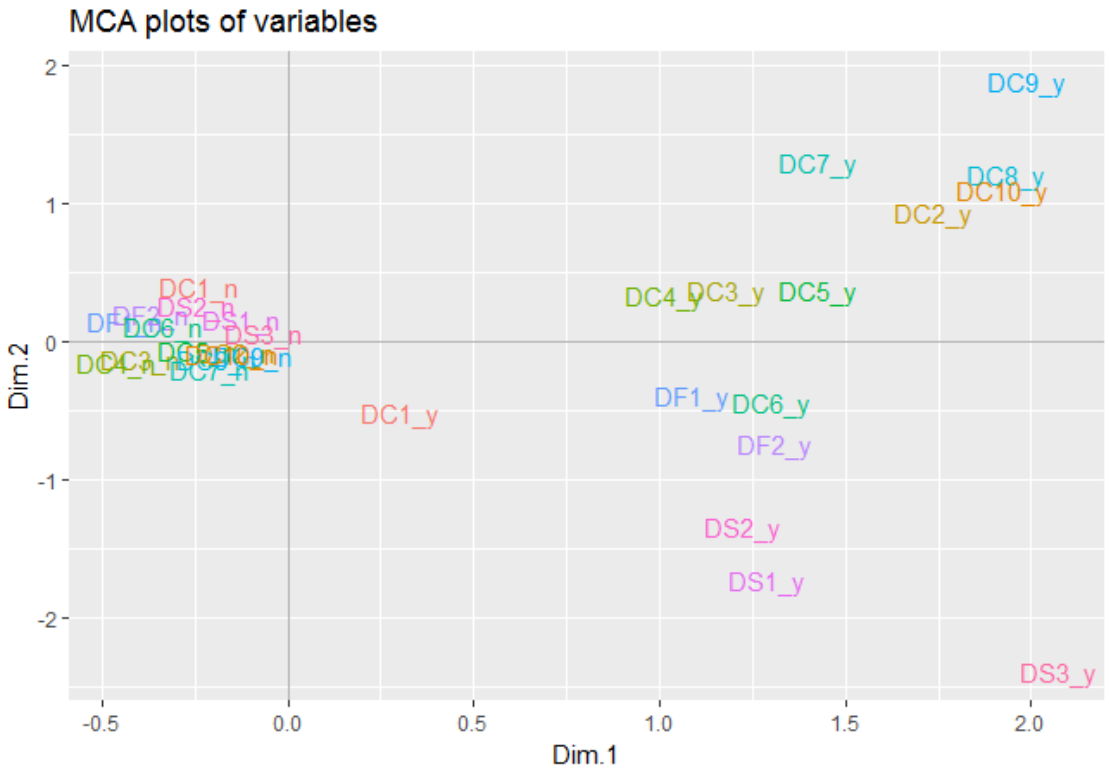


Figure A1.2. Myanmar Event MCA Plots of Variables

The plot below includes the relative positioning of each variable included in the Myanmar/Migration Event MCA, with the x-axis marking positioning on D1 and the y-axis marking space on D2 and D3 in the two figures below, respectively. The variable names follow the analytical variable names listed in Table A1.2, with suffixes "_y" and "_n" indicating responses of "yes" (ever) and "no" (never) for each event/circumstance question.

A. ***D1 x D2***



B. *D1 x D3*

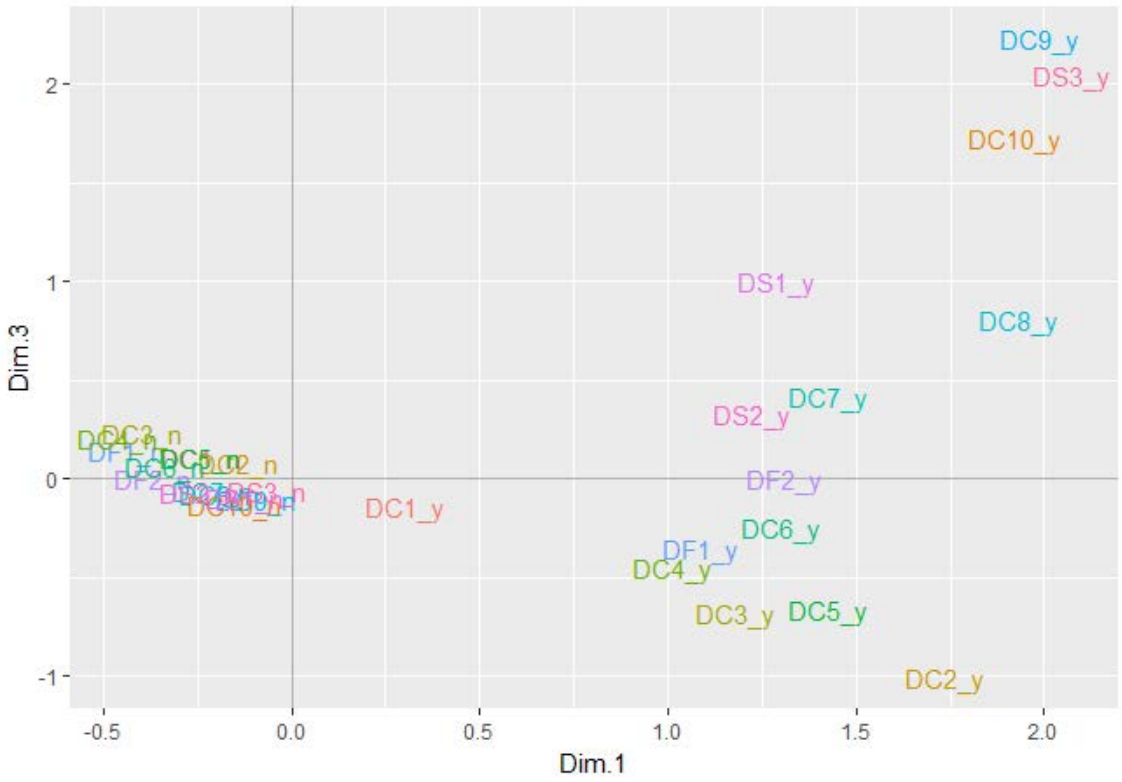


Table A1.4. Myanmar Event MCA: Variable Squared Cosine Values

Listed by variable, the squared cosine (co2) values serve as a unit-less description of the degree of association between variable categories and a given axis. Squared cosine values for each item across all dimensions sum to 1.0, and sums of co2 across the first few dimensions close to 1 indicate a high level of association of the Item with key MCA dimensions. The variable names follow the analytical variable names listed in Table A1.2, with suffixes "_y" and "_n" indicating responses of "yes" (ever) and "no" (never) for each event/circumstance question.

	Dim 1	Dim 2	Dim 3	Sum
DF1_n	0.490	0.061	0.052	0.603
DF1_y	0.490	0.061	0.052	0.603
DF2_n	0.500	0.157	0.000	0.657
DF2_y	0.500	0.157	0.000	0.657
DC1_n	0.079	0.219	0.017	0.315
DC1_y	0.079	0.219	0.017	0.315
DC2_n	0.258	0.076	0.086	0.420
DC2_y	0.258	0.076	0.086	0.420
DC3_n	0.480	0.048	0.160	0.688
DC3_y	0.480	0.048	0.160	0.688
DC4_n	0.481	0.053	0.096	0.630
DC4_y	0.481	0.053	0.096	0.630
DC5_n	0.357	0.024	0.076	0.457
DC5_y	0.357	0.024	0.076	0.457
DC6_n	0.453	0.050	0.016	0.519
DC6_y	0.453	0.050	0.016	0.519
DC7_n	0.328	0.272	0.028	0.628
DC7_y	0.328	0.272	0.028	0.628
DC8_n	0.395	0.157	0.068	0.620
DC8_y	0.395	0.157	0.068	0.620
DC9_n	0.219	0.198	0.275	0.693
DC9_y	0.219	0.198	0.275	0.693
DC10_n	0.296	0.097	0.237	0.630
DC10_y	0.296	0.097	0.237	0.630
DS1_n	0.163	0.293	0.099	0.555
DS1_y	0.163	0.293	0.099	0.555
DS2_n	0.303	0.358	0.022	0.683
DS2_y	0.303	0.358	0.022	0.683
DS3_n	0.127	0.168	0.124	0.419
DS3_y	0.127	0.168	0.124	0.419

Figure A1.3. HCPC: Migrant Cluster Dendrogram

This dendrogram represents the algorithm used in the HCPC, indexed by the gain of within-inertia with each cluster split, the relative distances of which was used to determine the final

number of clusters to retain.

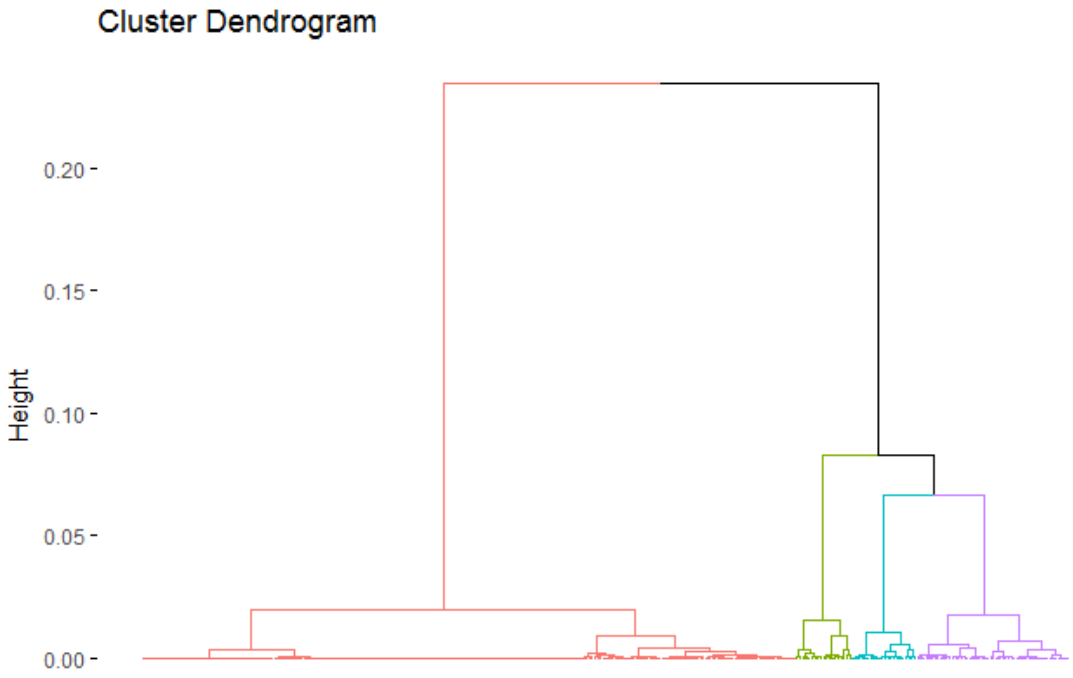


Figure A1.4. HCPC: Migrant Cluster Factor Map

Below is mapped the individual study subjects' positioning on the MCA dimensions 1 and 2, with the clusters color-coded.

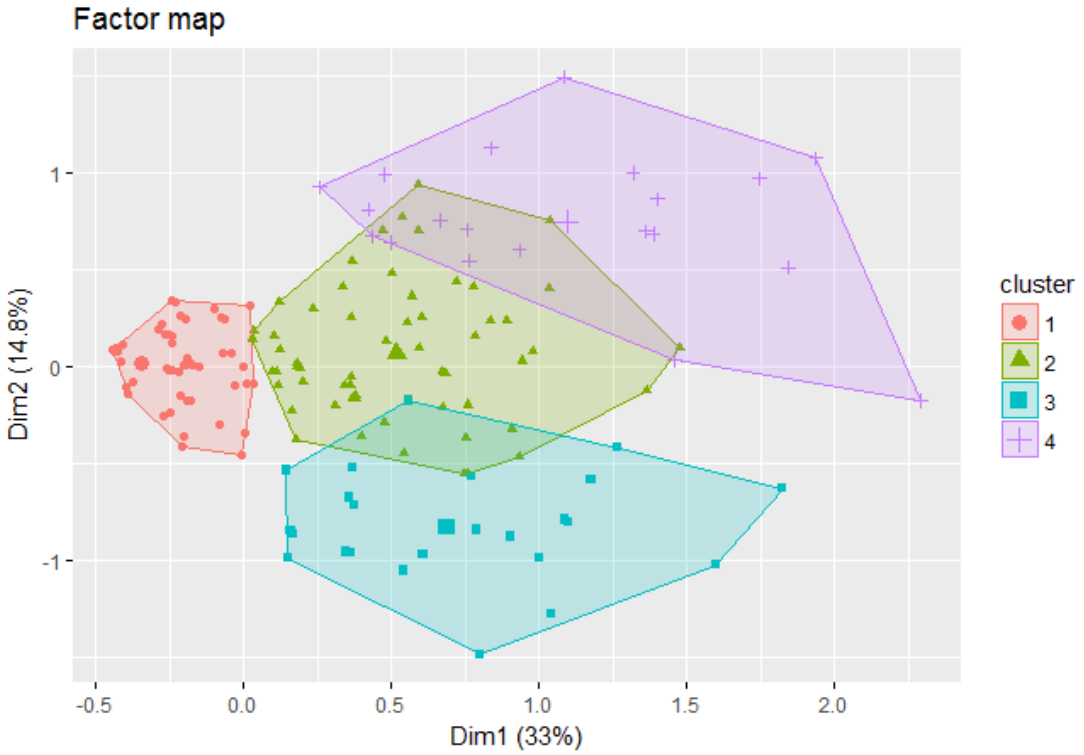


Figure A1.5. Thailand Event MCA Scree Plot

Based on the scree plot of MCA dimensions and their respective percentages of explained variance (inertia), I chose to keep and interpret two dimensions in the final MCA analysis.

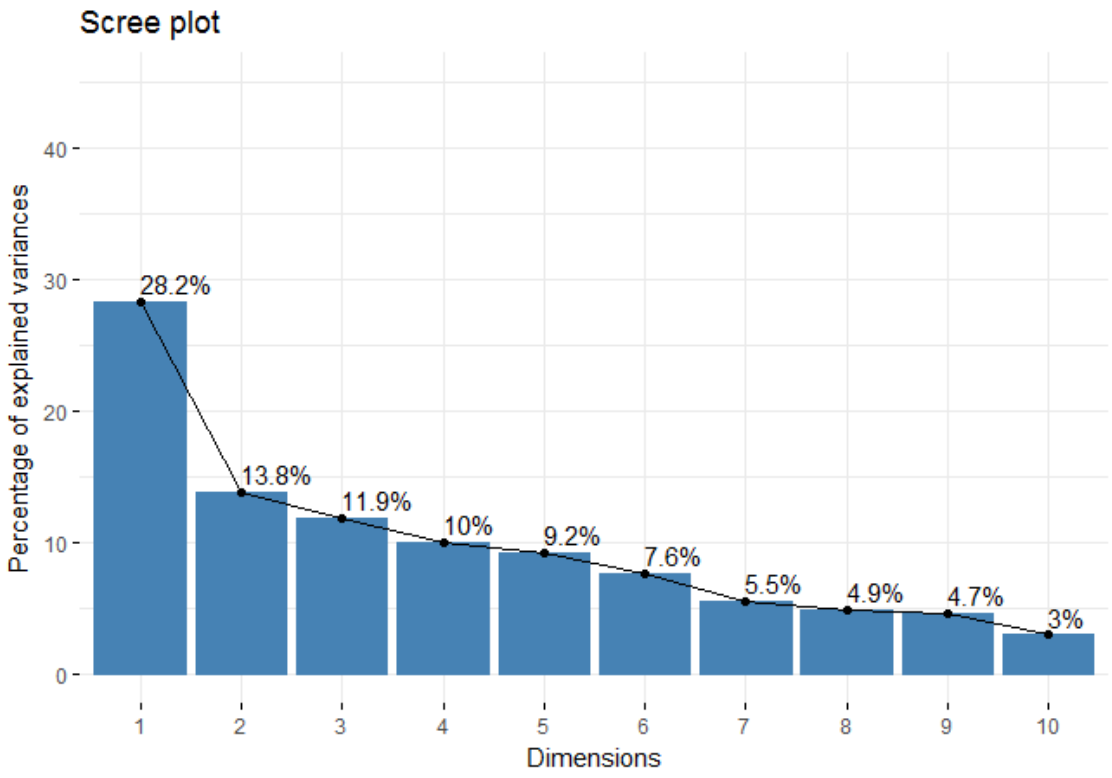


Figure A1.6. Thailand Event MCA Plots of Variables

The plot below includes the relative positioning of each variable included in the Thailand Event MCA, with the x-axis marking positioning on D1 and the y-axis marking space on D2. The variable names follow the analytical variable names listed in Table A1.3, with suffixes "_y" and "_n" indicating responses of "yes" (ever) and "no" (never) for each event/circumstance question.

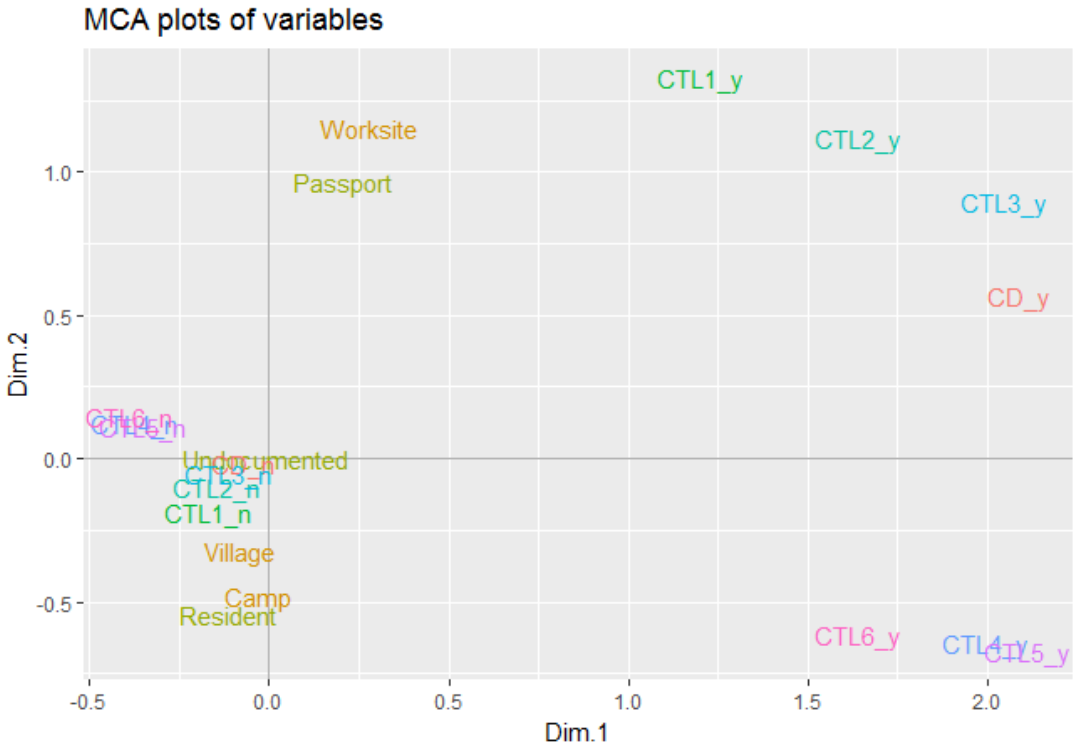


Table A1.5. Thailand Event MCA: Variable Squared Cosine Values

Listed by variable, the squared cosine (co2) values serve as a unit-less description of the degree of association between variable categories and a given axis. Squared cosine values for each item across all dimensions sum to 1.0, and sums of co2 across the first few dimensions close to 1 indicate a high level of association of the Item with key MCA dimensions. The variable names follow the analytical variable names listed in Table A1.3, with suffixes "_y" and "_n" indicating responses of "yes" (ever) and "no" (never) for each event/circumstance question.

	Dim 1	Dim 2	Sum
Resident	0.01	0.33	0.35
Passport	0.02	0.40	0.42
Undocumented	0.00	0.00	0.00
Village	0.02	0.33	0.35
Worksite	0.02	0.42	0.44
Camp	0.00	0.01	0.01
CD_n	0.16	0.01	0.17

	Dim 1	Dim 2	Sum
CD_y	0.16	0.01	0.17
CTL1_n	0.21	0.25	0.46
CTL1_y	0.21	0.25	0.46
CTL2_n	0.25	0.11	0.36
CTL2_y	0.25	0.11	0.36
CTL3_n	0.23	0.04	0.28
CTL3_y	0.23	0.04	0.28
CTL4_n	0.76	0.08	0.84
CTL4_y	0.76	0.08	0.84
CTL5_n	0.75	0.08	0.83
CTL5_y	0.75	0.08	0.83
CTL6_n	0.65	0.09	0.74
CTL6_y	0.65	0.09	0.74

Figure A1.7. Context (Post-Displacement) Cluster Dendrogram

This dendrogram represents the algorithm used in the HCPC, indexed by the gain of within-inertia with each cluster split, the relative distances of which was used to determine the final number of clusters to retain.

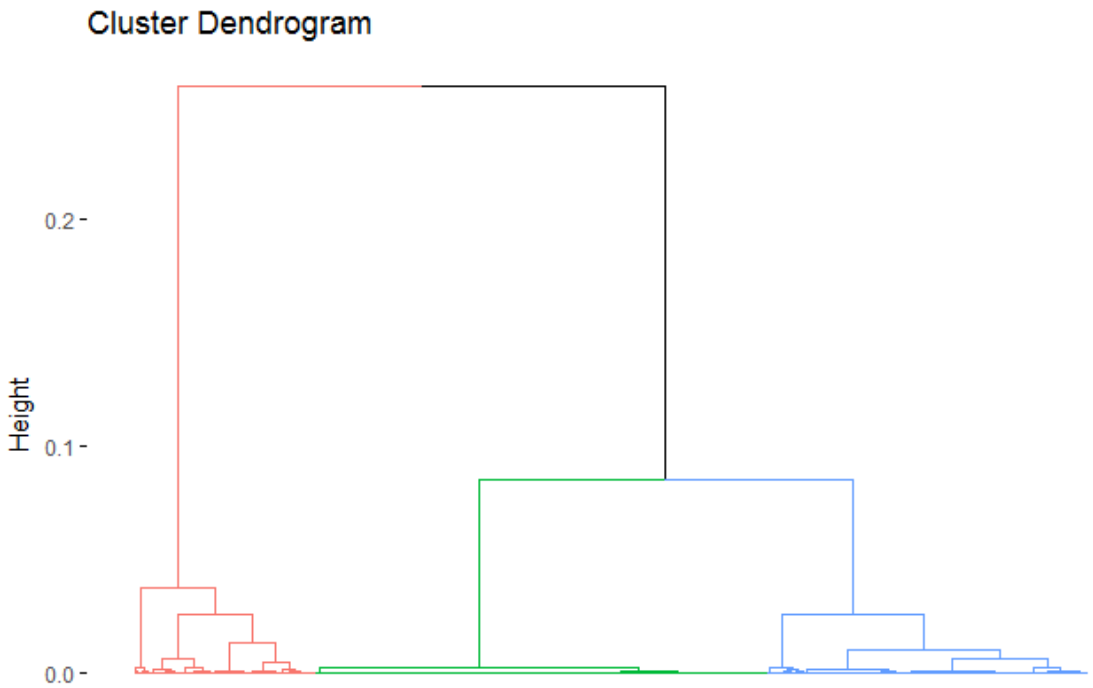
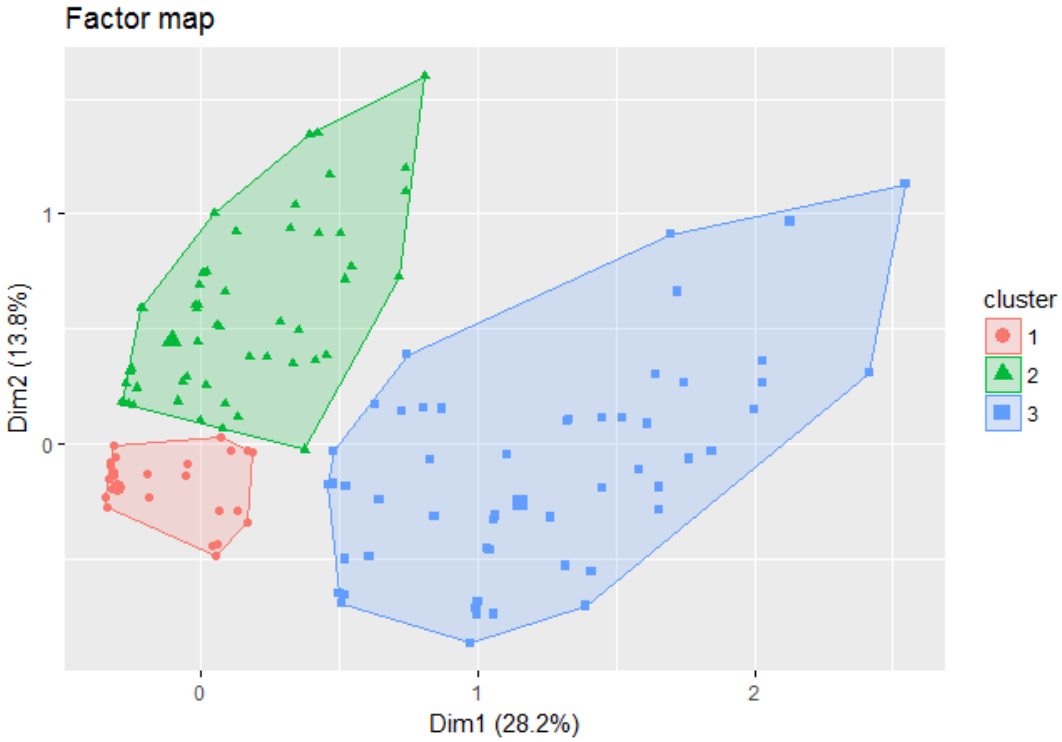


Figure A1.8. Context (Post-Displacement) Cluster Factor Map

Below is mapped the individual study subjects' positioning on the MCA dimensions 1 and 2, with the clusters color-coded.



APPENDIX II: Survey Design

A2.1 Eligibility Criteria

Sample eligibility criteria were based on broader study objectives involving maternal and child health, including that the participant enrolled was either a women who had been pregnant in the previous five years, currently living in one of the study sites, and being between ages 15 and 35 at the time of pregnancy and at least 18 years-old at the time of the study; or a child five years-old or younger whose mother fit this criteria. With informed consent, eligible women and their two youngest children were enrolled in the survey study. Exceptions to this eligibility criteria were made when mother of an eligible child was deceased or unavailable to be interviewed personally. In these cases, we requested to interview one of the child's caretakers, as long as this caregiver was 18 years-old or older and a family member of the child who could serve as a proxy, e.g., the child's father, aunt, uncle, or grandparent.

A2.2 Subject Identification and Recruitment

Women were identified and recruited in two ways: (1) through birth record data and personal assistance from the local public hospitals and healthcare centers, and (2) through contacting women based on referral by village leaders and community workers in all accessible villages. This included village headmen, village health volunteers employed by the government, local school teachers, and community-based organization members. Information was shared via interpersonal communication, phone calls, and village radio announcements informing women about the study. All study subjects enrolled with informed consent and study protocol was approved by the Chiang Mai Provincial Ministry of Public Health and the University of Wisconsin-Madison Institutional Review Boards.

A2.3 Survey Data Collection

Survey data was collected in two parts (typically 2-3 separate encounters): standardized anthropometric measurements and questionnaire-based face-to-face (FTF) interviews at

women's homes or another location she designated as appropriate. Some subjects completed anthropometric measurements upon enrollment and others started with interviews; thus, there are missing linkages between the two survey parts in both direction (some missing measurements and some missing interviews). This, as well as the common completion of one or both parts of the survey by a proxy led to missing data for 55% of the original study recruits (see flowchart in Figure 2).

Both data collection components were completed by trained research assistants who spoke at least one of each study subjects' primarily used languages: Shan, Thai, or Northern Thai. All anthropometric measurements were done using the research team's portable equipment (described in more detail where measurements are discussed) typically at designated meeting times and central areas in women's villages, such as the village temple, village headman's house, or the village health centers. The physical measurements included weight, height or length, arm length, mid-upper arm circumference, head circumference, waist circumference, hip circumference, upper arm skinfold (as measured with a skin caliper), subscapular skinfold (as measured with a skin caliper), and blood pressure. Approximately 50 strands of hair (or hair covering a 3 cm by 3 cm area of the scalp) were collected from near the scalp at the back of the head from the mother and any children 5 or younger. The physical measurements and hair collection for a woman and her children were conducted in a single encounter that lasted approximately 30-45 minutes for each subject. These measurements were conducted over two encounters, however, if measurements were not successfully completed in the first encounter and the respondent agreed to additional meetings to finish this part of the study (this could be because a study team member forgot to complete one or more measurements, the participant did not have time to complete measurements in one visit, or the participant's child(ren) was not present for the first measurement attempt). If an eligible subject was unavailable for measurements, measurements were taken (with informed consent) from another adult that

served as a primary caregiver for the child(ren) of the eligible subject, as well as for the eligible subject's two youngest children.

Interviews were standardized using instruments with questions printed in both Thai and Shan. All questions were developed in Thai or English, translated into Shan, and then back translated into Thai and English for consistency. The questionnaires were then tested in mock interviews with non-study subjects in two waves before study interviews began. The final questionnaires covered detailed information on socio-demographic information, migration and life event histories, and self-reported health information. Interviews lasted on average 1-2 hours and were completed over 1-4 home visits (usually 1-2 visits). Interviews were conducted following the script provided in the questionnaire.

Responses were recorded in the paper questionnaires. The questionnaires cover the topics of maternal pregnancy history, maternal behaviors and health conditions for most recent pregnancy, basic maternal demographic information, child health, cognition, and behavior, child education, maternal work history, maternal migration history, maternal family demographic information, maternal health, maternal mental health, maternal life events, and home environment. If the eligible subject was not available for an interview, but a proxy that served as a primary caregiver for the index child of interest was available, the proxy was enrolled in the study (with informed consent) in order to complete the interview on the mother's behalf.

A2.4 Questionnaire Design

All of the questions used were first developed in English or Thai, translated directly to Shan, and then back translated into English and Thai. After these translation steps, each question was tested in both Thai and Shan, first in focus groups with the research team and volunteer Shan university students, then in cognitive interviews that study team members conducted

with community members that were not in the study population but similar in socio-demographic characteristics to the study population (i.e., Shan women in northern Thailand who had children), and finally in field pretests done among Shan women they did not know in Shan communities outside of Chiang Mai city.

A2.5 Survey & Sample Overview

I collected the survey data collected in 2016-2017 in Chiang Mai Province, Thailand, along the border with the Shan State, Myanmar.[11] Seventy-six communities were surveyed from the two sites, resulting in 824 women study subjects (99% participation rate among eligible women identified).[12] An additional 16 communities were sampled outside of the two primary sub-districts, but from neighboring sub-districts (within 25 kilometers), in order to add under-represented groups to the final study sample in the two primary sites, including villages with very recent migrants, villages with long-established immigrant communities (two or more generations) and worksites, such as factories, fields, and orchards.

Figure A2.1. Below is a chart outlining the study population and sample. The "Selected Sub-District" squares detail the number of total villages in the study population and the total population (not specific to the eligible population, however). The "Added Nearby Sites" are the supplement communities alluded to in the preceding paragraph. "Registered Villages" are the recorded central villages registered with the Thailand Ministry of Interior.

[11] For logistical purposes, I selected a single sub-district from two primary border settlement areas along this border for exhaustive recruitment. These sub-districts were chosen based on ethnic composition (i.e. where there was the highest reported concentration of ethnic Shan and other ethnic minorities that had come more recently from the Shan State) and the diversity of migration histories within those districts. This information was gathered before starting the survey in interviews with local village leaders, community volunteers, and government workers.

[12] In Thailand registered villages are considered "central villages" and each additionally have satellite villages. From the two selected sub-districts, 44 and 16 separate communities (satellite villages) were surveyed from the total 15 and 6 registered central villages for each respective sub-district.

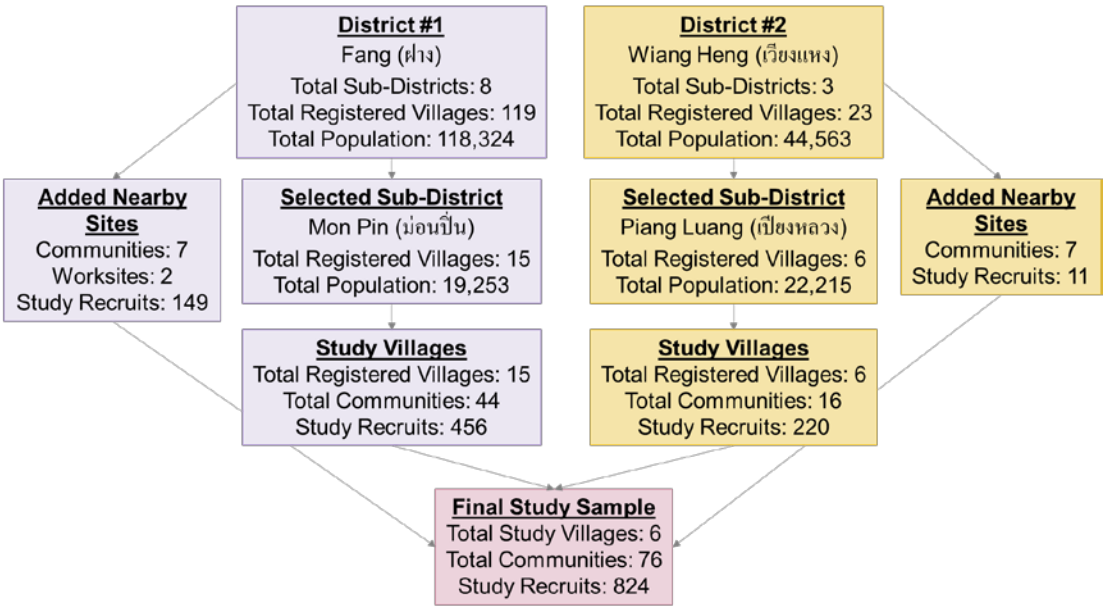
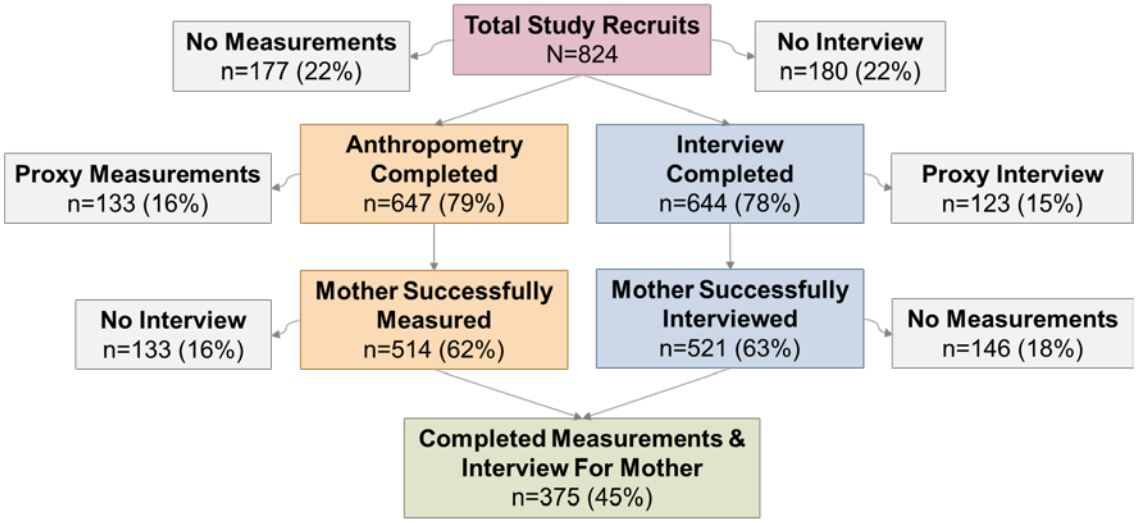


Figure A2.2. The study sample flowchart is below, starting with the total study recruits. All percentages in parentheses use the total number of study recruits as the denominator.



A2.6 Data and Safety Monitoring

Because this is a minimal risk study, the major the primary precautions taken involved preventing breaches of confidentiality and respondents becoming emotionally upset after being interviewed about potentially distressing life events. Potential breeches in confidentiality were handled first and foremost through prevention strategies, elaborated in the discussion of how privacy during interviews were protected and how data were stored (discussed previously).

As stated earlier, data from the interviews and physical measurements with study subjects

conducted by the study team was recorded on paper questionnaires and subsequently entered as coded, electronic data onto the secure SSCC remote server. Study records were stored as discussed earlier in this section and will be kept indefinitely, because they will be used for future studies in the collection of longitudinal data for the study samples (to be determined and reviewed in a separate IRB application).

All electronic data was stored on a password-protected server at the University of Wisconsin, Madison campus, specifically on the Social Science Computing Cooperative (SSCC) server, located in the Sewell Social Science building, on 1180 Observatory Dr, Madison, WI, 53706. Identifying information stored electronically was encrypted. Electronic data were stored separately from identifying information. The study team members were the only individuals able to see and use the data.

Regarding aspects of study participation that could be emotionally distressing, interviewers were trained on how to sensitively ask about potentially emotionally distressing questions and to ensure that the respondent were able to comfortably stop the interview if deemed necessary at any time. Furthermore, each interviewer was able to refer respondents to locally available counseling services that were offered free of charge by community clinics and health centers, so that respondents were able to follow up with professional health care givers regarding any ongoing psychological distress related to issues that surfaced during the interviews.

A2.7 International Research Concerns

This research has been reviewed and approved by the IRB committee for the Chiang Mai Provincial Office for the Thailand Ministry of Public Health (FWA: FWA00001608), which reviews health and medical research for Chiang Mai Province, the province in which the study villages are located. The initial consent documents, as well as the questionnaire material, were translated from English to Thai and from English to Shan by translators in Chiang Mai.

This study was conducted outside of the U.S., because the study objectives were specific to the Shan population in Thailand. This population was chosen because it represents a population that has experienced high levels of stress related to displacement by conflict across multiple generations and study team members have the appropriate experience and expertise to work in this area. The two village cluster locations in Chiang Mai Province that were chosen were chosen because they comprise large resettled Shan and Thai populations, who additionally include an important distribution of first and second generation resettled Shan for the study analyses.

The situation in Thailand did not alter the risk for participants compared to the same research conducted within the U.S. In addition, while some questions related to life events and mental health may have been distressing to respondents, trained mental health care providers that practice in Shan and Thai languages were readily available for referrals as needed, free of charge. The study protocol was thoroughly reviewed and approved by local authorities, researchers, and community members in the local cultural context. This was done through close consultation with health researchers at Mahidol University, Thailand, the Chiang Mai Provincial Office for the Thailand Ministry of Public Health, and local community members that work with women and families in the selected village sites—specifically local community-based organization members (Fortune and SWAN), community leaders, healthcare providers, social workers, and teachers.

A2.8 Consent Process

A *full waiver* was granted specifically for the review of medical records to identify eligible patients, and it was also granted for the collection of medical record data on women who were deceased but whose children and proxy participated. Lastly, a full waiver was granted for the collection of the de-identified medical records from the hospitals and clinics in the field sites for the prenatal and childbirth visits for the entire eligible study population.

The waiver of *signed consent* was granted for all remaining components of the student, which I justified as follows.

For primary data collection: Conducting interviews, taking physical measurements, and collecting and analyzing hair samples.

This research presented minimal risk to participants, including the children enrolled, and acquiring signed consent would be impractical since a large proportion of the study subjects were illiterate in their native languages (or any other language). Furthermore, in the cultural context of the subject population, signed consent is not usually required for the proposed study activities. This was confirmed by local Thai Ministry of Public Health IRB office and by local community leaders and community-based organizations that we have consulted. Thus, informed potential participants about the study objectives, methods, participation components, and related risks verbally in their preferred language, following the consent form script, and obtained verbal consent from individuals for the participation of them and the child(ren) for whom they are the primary care provider. We similarly did not obtain signed consent for children's participation in the study for the same reasons, but we only collected measurements for children with the parent or primary caregiver's permission.

For linking medical records to primary data collected

The justification for waiving the signed consent process for this aspect of the study is the same as for the primary data collection. This study component was explained during the oral informed consent process preceding the interviews and other data collection. The linking and use of the specific medical data for the study analysis additionally presented minimal risk to the mother, child, or any other family members involved in the study.

Oral consent process

The oral consent script for the interview and physical measurement data collection was written to address each component of informed consent that is advised for these forms of data collection. The oral consent script is included in a separate appendix. English-Thai and English-Shan translators prepared scripts in Thai and Shan.

The external personal, or Thailand-based study team members, were included under the Thailand-based IRB approval. I trained them in human subjects research protocols and related protections in two-day training workshops conducted in the Thai language that follow the CITI Human Participants Research Training for both the Social and Behavioral IRB and the Medical Sciences IRB at UW-Madison, as accessed in their online training materials.

The consent process was as follows. A study team member read the consent script included to the potential participant in her or his preferred language. After receiving oral consent, the study team member signed a short form attesting to having received oral consent. Oral consent was not recorded and given to the study subject for this study, because this study posed minimal risks and it would be impractical to capture and distribute audio files to subjects because of the location and the fact that very few subjects had a readily accessible device for storing or playing such electronic information on, such as an audio player or computer.

Participants were provided with local contacts for (1) someone representing the research team who could answer their questions, specifically a study team member living in the general study area, and (2) someone outside the research team who could answer questions about participants' rights as research subjects or to whom they could express concerns or complaints about the research. The second contact was a representative from the IRB office at the Chiang Mai Provincial Office for the Ministry of Public Health—a local authority on the rights of research human subjects which holds a mandate to ensure the health and wellbeing of Thailand residents, regardless of ethnicity, Thai citizenship status, or any other socio-demographic

characteristics of the subjects, which deems it an appropriate and safe contact for all subjects. The study team shared phone numbers for these contacts. The study team member contact listed had email access and was in direct contact with Ms. Koning, who was able to communicate by email, phone, or in-person with other study team investigators and the UW IRB office regarding any issues that could arise.

APPENDIX III: Oral Consent Script

The following oral consent form was approved by the University of Wisconsin-Madison IRB and was read to each participant prior to requesting consent to enroll in the study (actual scripts used were translated into Thai and Shan).

Title of the Study: Chiang Mai Province Maternal and Child Health Study

Principal Investigator: Stephanie Koning (phone: [redacted]

Mailing Address: [redacted]

THE FOLLOWING SCRIPT IS TO BE READ TO THE RESPONDENT IN HER PREFERRED LANGUAGE.

Hello. Thank you for considering participating in this study. Our research looks at how past experiences and related health might affect the current health of mothers, or other caretakers, and children in your community. Because you have been pregnant in the past 5 years, your participation would be very helpful in this study. In total, we plan to recruit 800 mothers, or caregivers. Each person's participation is very important in helping us understand how stress can affect one's health and the health of the child they take care of.

While I explain about the study, please interrupt me if you have any questions or concerns.

There are a few key things that you should know about the study. I can explain this in detail, but firstly none of the personal information for you or your child will be accessible to anyone outside of the research team. We will not discuss it with anyone in your village or community, and we will store it in such a way as to ensure that your story is completely private. That is to say, we will keep the majority of the information that we collect separate from specific

information that could identify you or your children.

Second, will share with you the physical information that we measure for you and the general findings of the study. The main benefit to participating in the study is to help us understand level of stress and the maternal and child health situation in your community, so that more can be done to improve public health your community, in Thailand, and in other parts of the world. In addition, for your time we have small gifts for you and your children.

Third, you can choose to participate or withdraw from the study at any time without any penalty. You can also tell us if you do not wish to answer any question, or participate in any sub-set of the questionnaire. It takes a long time to do this kind of research, so we are likely to be analyzing the data for a number of years. There is a chance that we would try to contact you in the future for follow-up information or for clarification of statements, but in these instances, you can choose to refuse to participate.

There are relatively few risks to participating. We will not disclose your family members' legal status to any authorities under any circumstances. We will ask some questions about your wellbeing and past events in your life that could be distressing to talk about. You can decide which questions to answer. Members of our study team who are trained in mental health services and counseling will also be available to meet with you or refer you to someone else who you can talk to about any distress you feel during or after the interview. If you inform us of severe symptoms of depression or of a potentially dangerous situation for you or your family members, a study team member will follow-up with you about counseling services in order to assist you in handling this type of situation.

Beyond collecting this kind of information, there is likely nothing that we will study that could harm you or your family. There is a small chance that other villagers might overhear the

interview, or that someone you know is involved in the research, but we will work very hard to eliminate and minimize risks of such disclosures to you and your family. To ensure your privacy, once we have completed your measurements and interview, your individual information that we collect will be stored separately from your full name, family member names, birthdate, and address. This will be done with your hardcopy information and when we enter your information electronically. Only our study team will be able to link this information, using a number we assign your information.

We would like to meet with you twice over the next few months and collect three kinds of data:

1) We would like to measure your and your two youngest children's weight, height or length, arm length, mid-upper arm circumference, head circumference, waist circumference, hip circumference, upper arm skinfold (as measured with a skin caliper), and subscapular skinfold (as measured with a skin caliper). We would also like to measure your blood pressure, and we would like to collect small samples of your and the youngest child's hair, because biological markers in your hair can tell us information about current stress. Do you have any questions or concerns about this? (Pause and wait for response).

2) We would like to meet with you a second time in order to ask you questions about your background, health, wellbeing, pregnancy and birth history, and information about your children's health and wellbeing. Do you have any questions or concerns about this? (Pause and wait for response).

3) Lastly, we would like to supplement these data with the health records available from the Thai Ministry of Public Health, at the public hospital and health centers where you received antenatal and childbirth care. This includes your and your child's reported ethnicity, physical

exam measurements, age or birthdate, admission and discharge dates, reported complications, birthing procedures, blood test results, vaccinations, health insurance used, and any additional notes related to your or your child's health or wellbeing at that time by an attending health center staff person.. Do you have any questions or concerns about this? (Pause and wait for response).

These two meetings will take a bit of time. We expect that the measurements today will take 30 minutes. We estimate that our next visit will last about 1-2 hours, and if it is longer than you have time for, we will ask to visit you again in order to complete the survey.

Please take as much time as you need to think over whether or not you wish to participate. If you have any questions about this study at any time, feel free to ask me, and/or contact the lead researcher, Stephanie Koning, at +[redacted]. If you have any questions about your rights as a research subject or complaints about the research study that you could not resolve with the study team, you can also contact a research ethics officer at the Chiang Mai Province Public Health Office, [redacted].

HAND THE SUBJECT A CONTACT INFORMATION CARD WITH THE FOLLOWING:

(For Fang:

Chiang Mai Province Maternal and Child Health Study

Principal Investigator: Stephanie Koning (phone: [redacted])

Email: [redacted]

Mailing Address: [redacted]

Chiang Mai Province Public Health Office: [redacted]

Community contact, [redacted])

(For Wieng Heng:

Chiang Mai Province Maternal and Child Health Study

Principal Investigator: Stephanie Koning (phone: [redacted])

Email: [redacted]

Mailing Address: [redacted]

Chiang Mai Province Public Health Office: [redacted]

Community contact, [redacted])