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Rebecca S. Altman April 12, 2010

Exploring Food Quality in Vietnam: Nutrition, Culture, and Social Change

by

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Abstract

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Nutrition, Culture, and Social Change
By Rebecca S. Altman

The purpose of this thesis is to enhance governmental programs aiming to reduce micronutrient deficiencies in the Vietnamese population. This thesis explores the historical, cultural, and social development of Vietnam in relation to food and nutrition.

This thesis will first present an overview of the political, public health, and economic reform history of Vietnam. Once this foundation is established, three interconnected issues provide the overarching structure: 1) development and social change, 2) cross-cultural aspects of nutritional behavior, and 3) individual nutritional beliefs based on the results of a series of interviews with Vietnamese women of different socioeconomic and rural-urban groups. These interviews provide an ethnographic window into the traditional importance of a specific food item – fish sauce – and how local perspectives on this food's quality shift as a result of government efforts at micronutrient fortification.

The implementation of nutritional programs requires ideas from theories of international development and food and nutrition as cultural phenomena. This research illustrates the need for increased attention to local perspectives of food quality in Vietnam's fish sauce fortification program. Whereas the traditional public health definition of food quality implies quantitative measurements of a food's constituent parts, the Vietnamese perspective supports a more holistic idea. Interviews with Vietnamese women indicate that food quality is inspired by cultural ideas of taste, gastronomic acceptability, and affordability, not individual nutrients.

Based on the results of archival and interview data, increasingly comprehensive, yet contextually appropriate policies are needed in global micronutrient programs. This thesis presents a series of evidence-based recommendations to improve Vietnam's iron fortification program - both at the large-scale political, social, and economic levels and also at the grassroots level. These recommendations include:

1. Advocate for the role of the anthropologist and food ethnography;
2. Design and implement mandatory fortification legislation;
3. Enhance stakeholder collaboration and private sector investment;
4. Build fish sauce fortification into a broader, multi-dimensional intervention package;
5. Invest in rural-low income women.

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First, I would like to thank those who assisted me with my fieldwork in Vietnam. Co Thanh, Academic Director for my study abroad program, is the heart behind the original conception of this project. During my study abroad experience, she pushed me to expand my horizons and challenge the status quo. Dr. Van of the National Institute of Nutrition is the stamina behind my fieldwork. She immediately opened herself to me, in addition to her time, contacts, and resources. With Dr. Van's guidance, resourcefulness, and translation assistance, I was able to conduct the majority of my interviews. I am also incredibly grateful to my dear friend Nguyen Tien Manh. Despite her busy schedule, she accompanied me on all of my market interviews. Her genuine interest in my topic inspired my curiosity and allowed me to more fully grasp the cultural traditions behind fish sauce consumption. Lastly, I am thankful to the National Institute of Nutrition in Ha Noi for their hospitality and support and to the Institute for Developing Nations and Emory's Center for International Programs Abroad for funding this research.

Almost immediately following my return to the United States, Dr. Joanna Davidson became my mentor, role model, and teacher. In this process, she reawakened my passion for my research topic. She equipped me intellectually to dig deeper, probe further, and recognize the nuances of food and culture that are so central to my thesis. My grandfather, Dr. Irwin Altman, envisioned the spade that facilitated my deeper intellectual digging. His careful eye, rich research and writing knowledge, everlasting commitment to my intellectual development, and sense of humor are infinitely more valuable to me than a written acknowledgment can communicate. His rich academic life has intrigued me since my childhood when I pretended to teach classes in his empty classrooms on the weekends at the University of Utah. Today, his inspiration in my life is more concrete than ever - I look forward to where it leads me in years to come.

Finally, I want to acknowledge my advisor, Dr. Arri Eisen, for his continuous support and guidance on this project. In addition, thank you to Dr. Peter Brown and Dr. Peter Little for their close reading and insightful feedback. Lastly, I want to acknowledge the many wonderful Emilys in my life, Sara, Ilana, Rebecca, Grandma, Bubbie, Em, Mom, and Dad for their unwavering encouragement. Thank you for putting up with ceaseless conversations about the production of fermented fish, even at the dinner table.

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LIST OF ACRONYMS

CDC	Centers for Disease Control
DALY	Disability Adjusted Life Years
DD	Dietary Diversity
FAO	Food and Agriculture Organization
FANTA	Food and Nutrition Technical Assistance
FCS	Food Consumption Score
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
HDDS	Household Dietary Diversity Score
IDA	Iron Deficiency Anemia
IDDS	Individual Dietary Diversity Score
IEC	Information, Education, and Communication
NFA	National Fortification Alliance
NGO	Non-Governmental Organization
NIN	National Institute of Nutrition
PAMM	Program Against Micronutrient Malnutrition
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	Presidential Malaria Initiatives
UNICEF	United Nations Children's Fund
VND	Vietnamese National Dong (Vietnamese national currency)
VLSS	Vietnamese Living Standard Surveys
WHO	World Health Organization

AUTHOR'S NOTE

In many ways, this thesis embodies the culmination of my four years at Emory University as an undergraduate student. My Emory experience has been steeped in experiences that have both inspired and reinforced my interests in interdisciplinary and cross-cultural issues. During my junior year, I had the opportunity to study abroad in Vietnam as part of a semester-long Culture and Development program through the School for International Training (SIT). During my time in Vietnam, I became intrigued by the interaction of Vietnamese culture, its nutritional status, and its experience with social change. The actions of individuals seemed to me to be intrinsically linked to the cultural, historical, and even economic context. Through this process, I began to craft ideas and build a greater understanding of a country's development as a socially and culturally constructed phenomenon, comprised of complex patterns of individual, familial, community, regional, and national components. The underlying foundation of this thesis resonates with these academic and professional interests with the goal of conveying the idea that social change must remain aligned with the particulars of time, place, and people.

In addition to my time in Vietnam, I realize there is much more than my education at Emory and the experiences it has offered me that have motivated this thesis. Over the years, my personal life has come to revolve around issues of nutrition, culture, and attempts at social betterment. My extended travels abroad in both Moldova and Israel have whet my palette with a curiosity for cultural immersion and serving those in need. Throughout my childhood and early

adulthood, food and its cultural practices were central to my family traditions, patterns of daily life, and religion. Perhaps the most unique and enduring component of my interest in nutrition stems from my experience with Crohn's Disease. Since my diagnosis at age nine, I have come to realize that great care to nutrition and diet is the most effective way to manage my disease and live a productive, healthy life. Taken together, these aspects of my personal history – family, religion, cultural traditions, and my own disease experience – have contributed to my personal and academic growth. As a reflection of my intellectual and personal history, the perspective adopted in this thesis is likely to continue guiding me in the future.

INTRODUCTION

The purpose of this research is to facilitate and improve governmental programs aiming to improve the micronutrient status of a population. This process requires a deep understanding of how a country's political economy, social development, and cultural context interact at both macrocosmic and microcosmic levels. Indeed, our nutritional needs and preferences are not merely products of biology, but of social and cultural influences too (Anderson, 2005, p. 4). A holistic approach should be applied to improving food quality and reducing the burdens of micronutrient malnutrition around the world. That is, individual preferences must be considered in light of particular economic, political, social, and cultural circumstances. As a model, we will apply this biocultural approach to micronutrient malnutrition within a particular context: the Socialist Republic of Vietnam (Anderson, 2005).

In a 1991 Micronutrient Malnutrition Symposium, micronutrient malnutrition was deemed to be the world's "hidden hunger," especially in areas with little or low economic resources. This "hidden hunger," resulting from human deficiencies in vitamin A, iron, and iodine, "damages health; causes death; harms reproduction; reduces intelligence, educability, and academic achievement; and lowers work productivity and occupational choices…interfere[ing] with child growth and development, sometimes permanently" (Hunt, 2000, p. 116). Other consequences of insufficient vitamins and minerals include effects on brain development and immune functioning, reproduction, and energy metabolism (Horton, Begin, Greig, & Lakshman, 2008). Damage caused by malnutrition in

the early years of life permanently harms health and human capital, potentially impacting future generations (Victora, Adair, Fall, Hallal, Martorell, Richter, & Sachdev, 2008).

In order to promote long-term health, these vitamins must be ingested in small amounts (e.g., micrograms or milligrams) since the human body does not naturally manufacture them. Even the smallest of deficiencies can cause learning disabilities, damage work capacity, and lead to illness and death. Unfortunately, the typical diet of most developing countries has a deficiency in vitamin A, iodine, or iron large enough to represent a public health problem. Recent meta-analysis indicates that iron deficiency anemia (IDA) is linked to 22 percent of maternal deaths and 24 percent of neonatal deaths annually around the world. According to these new data, reducing anemia of any severity reduces risk of mortality, which is different from prior research that indicated that only severe anemia is associated with mortality (USAID A2Z Micronutrient and Child Blindness Project, Food and Nutrition Technical Assistance Project, & ACCESS Program, 2006).

Many developing countries such as Vietnam have multiple dietary deficiencies. In addition, economic development and improvements in familial income do not always or instantaneously translate into improvements in micronutrient malnutrition status of a population; these nutrients do not exist in all foods and people do not necessarily crave them. Micronutrient malnutrition is most devastating for pre-school children and pregnant women, but has debilitating effects on people of all ages (The World Bank, 1994). A recent global

improvement report indicates that 35 percent of the people in the world are deficient in iodine, 40 percent of the people in the developing world are deficient in iron, and over 40 percent of children are deficient in vitamin A (The World Bank, 2006, p. 7)

The effect of sufficient micronutrient nutrition affects more than individual health, however. According to the World Bank, Vietnam's malnutrition will annually reduce gross domestic product (GDP) growth by 2.4 percent due to reduced physical labor ability. The World Bank also estimates that protein energy malnutrition (PEM), IDA, and nutritional anemia reduce GDP by 0.3 percent, 1 percent, and 1.1 percent respectively (Hunt, 2000). Elimination of these deficiencies with sustainable programs costs less than 0.3 percent of a developing country's GDP. Good nutrition, "…a basic building block of human capital," stimulates economic development by allowing for both poverty reduction and improvements in individual productivity (The World Bank, 2006, p. 22). Without attention to its citizens' nutritional wellbeing, countries will inevitably suffer both lower GDP and higher budget expenditures. Thus, the benefits gained through micronutrient malnutrition alleviation programs may well compensate for the additional monetary costs they oblige.

Vietnam provides an important model for these issues - its history, culture, and economic circumstances provide a foundation for future governmental programs aiming to improve the quality of foods consumed by the population. Because interpretation of the term food quality varies between development discourse and local Vietnamese conceptions, this research explores both

government attempts at public health and also the microcosm of local perspectives on iron fortification of fish sauce in Vietnam. In particular, the results of this pilot study of selected dietary and nutritional beliefs and practices of a small sample of present day Vietnamese citizens has the long-range goal of recommending public and private programs to facilitate the health and wellbeing of the Vietnamese people. This ethnographic study focuses on iron deficiency anemia in Vietnam and the attitudes and practices of the Vietnamese people with respect to iron-fortified fish sauce as a form of iron supplementation. Vietnam began an initial trial of iron fortification of fish sauce in 2005 after the Global Alliance for Improved Nutrition (GAIN) provided the Government of Vietnam's National Institute of Nutrition U.S. $3 million in support of this effort (Global Alliance for Improved Nutrition, 2009b).

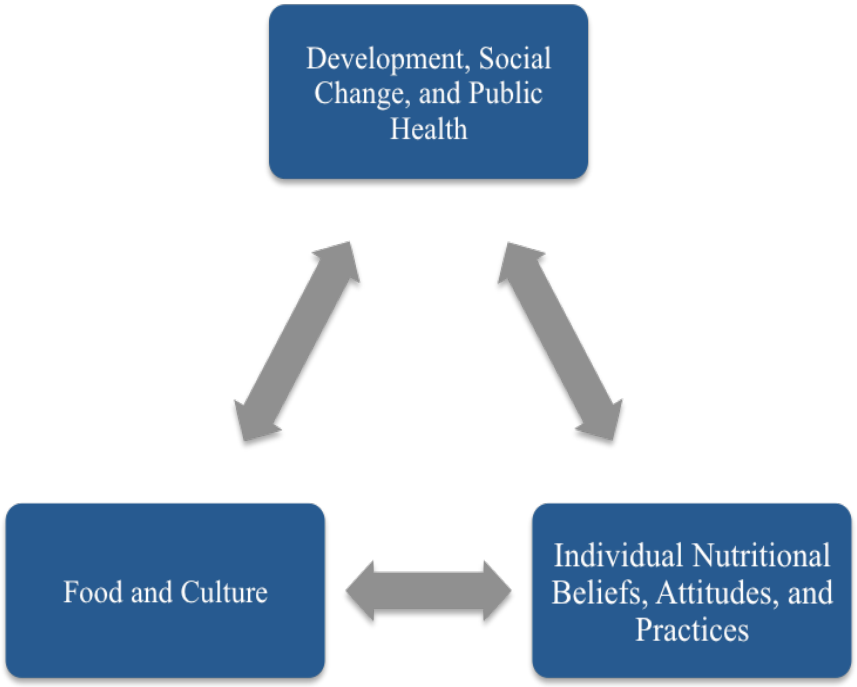
Because this research exists at the intersection of academic disciplines, including history, public health, and anthropology, it is uniquely situated to observe both the pieces and patterns of Vietnam's micronutrient malnutrition burden. Based on the results of the interviews, Vietnamese perspectives on food quality (specifically in terms of fish sauce) imply a complex social activity shaped by the implicit meanings of taste, food identity, and culture (Beardsworth & Keil, 1997, pp. 47-56). Given these findings, attention to such meaning systems must be addressed in Vietnam's public health fortification programs. The Vietnamese culture of 'incorporation,' the movement of food between the 'outside' world and 'inside' the body is more complex than can be captured by a physiologically-specific definition of food quality (Beardsworth & Keil, 1997, p. 53). Perhaps,

increased attention to the complexity of food quality can improve and sustain fish sauce fortification in Vietnam, and ultimately the health status of those most at risk for anemia in the population.

To explore this interaction between nutrition, culture, and social change, the structure of this thesis corresponds to the organizational framework shown in Figure 1:

Figure 1

Organizational Framework



The three components of this organizational framework include: 1) Development, Social Change, and Public Health, 2) Food and Culture, and 3) Individual Nutritional Beliefs, Attitudes, and Practices. Although we explore each of these three issues separately, the organizational framework acknowledges that the three components are linked and must interact with one another. This thesis does not

focus on a causal relationship among these three constituent parts; instead, it explores the need for increased communication and collaboration among social change programs, local cultural beliefs, the biology of nutrition, and social scientific research on food and culture. There is a need for an improved connection among development, social change, and public health programs and individual nutritional beliefs and practices. Nonetheless, our organizational framework illustrates how these components are conceived as aspects of a unified whole.

Guiding the organizational framework are two questions we address: First, given the disparities in perspectives on food quality between Vietnamese communities and traditional development approaches to public health, how would an improved conception of food quality, one that is increasingly comprehensive and contextual, operate in the Vietnamese context and improve public health interventions? Second, what would this improved model of food quality look like when applied to Vietnam's nutritional fortification programs? Based on this research's contextual analysis and ethnographic support, it aims to facilitate more sustainable solutions to Vietnam's fortification efforts; this research moves beyond mere observation of the differing conceptions of food quality according to development discourse and local Vietnamese perspectives. A natural outgrowth of such an investigation is its call for change. Based on evidentiary support, we conclude with a set of evidence-based recommendations for Vietnam's fish sauce fortification program, which will make clear how the organizational framework can operate in practice.

ORGANIZATION OF THE REPORT

Before addressing the specifics of this framework, we summarize Vietnam's history and economic reform, as well as the present Vietnamese government's attempts at reducing iron deficiency anemia in the population. This background lays the groundwork for subsequent chapters devoted to the three distinct aspects of the organizational framework. Similar to the structure of this report, issues of food, culture, and social change cannot be considered without proper attention to a country's historical, economic, and political context. Following this background, we examine the first item in the organizational framework, namely, "Development, Social Change, and Public Health." This chapter deals with the controversy over strategies for promoting social change and development in emerging nations in addition to devoting specific attention to the role of food quality in this development discourse. This chapter is followed by a discussion of the second aspect of the organizational framework: "Food and Culture." In this section, we discuss more general cross-cultural aspects of food habits and traditions as well as the cultural importance of food traditions in Vietnam.

The next chapter of the thesis addresses the third aspect of the organizational framework: "Individual Nutritional Beliefs and Practices." Specifically, this section includes the methodology and results of interviews with Vietnamese women of different socioeconomic and rural-urban groups with respect to their knowledge, attitudes, and practices regarding iron-fortified fish sauce. We follow this microcosmic perspective on development, culture, and food

with a final section of evidence-based recommendations for Vietnam's nutritional fortification program. These recommendations illustrate the importance of conceiving of the organizational framework as a unified whole in order for it to effectively and sustainably guide public health programs. Recognition of the complex interaction among these parts is critical to the future of public health for Vietnam.

CHAPTER ONE

VIETNAM HISTORY, ECONOMICS, AND PUBLIC HEALTH

The present chapter serves as background for exploring the three major components of our organizational framework in subsequent sections. The discussion includes a summary of Vietnam's political and economic history, its current nutritional status, public health and nutritional context, and recent government attempts at improving nutrition. The presentation illustrates that a country's development and attempts at social change are best conceived of in light of its historical, economic, and public health background.

VIETNAM'S HISTORY AND ECONOMIC CONTEXT

The Socialist Republic of Vietnam is approximately the size of Ohio, Kentucky, and Tennessee combined. Vietnam has a tropical monsoon climate and varied coastal and mountainous terrain and is comprised of a population of 85.79 million. Vietnam's "single-party constitutional republic," known as the Communist Party, declared independence on September 2, 1945 (U.S. Department of State, 2009). The country's 2008 gross-domestic product reached U.S. $84.98 billion with a per capita income average of U.S. $1,024 in 2008, making it one of the best performing economies in the world during the past decade (The World Bank, 2008).

Vietnam has experienced persistent internal and foreign conflict throughout its history. Over two millennia ago, the Vietnamese people moved south from current day China into northern Vietnam to inhabit the entire eastern coast of the Indochinese peninsula. As early as 111 BCE, China's Han dynasty

overthrew the Red River Delta in northern Vietnam in order to gain access to the abundance of rice-growing fields, which instigated a 1,000-year period of Chinese control over Vietnam. In 1858, the French began acquisition of Vietnam and by 1885 had annexed the entire country (Luong, 2003, pp. 2-6; Steinberg, 1970, p. 154).

From 1946 to 1989, Vietnam endured bouts of warfare, both on its own soil and in Cambodia. Between 1946 and 1954, Vietnam fought a war of national emancipation from eight decades of French colonialism, resulting in a temporary division of the country into two parts. The north allied with China and the Soviet Union, while the U.S. became a strong ally for the south. After the French military withdrew in 1954, conflict escalated in southern Vietnam (Luong, 2003). In December 1961, President Kennedy increased U.S. military support in South Vietnam to protect Saigon against southern guerillas armed by the north. On January 27, 1973, after years of clandestine warfare and military action by large numbers of American troops allied with South Vietnam, the U.S. government, North and South Vietnamese governments, and the Viet Cong signed the Paris Accords, which made official the withdrawal of U.S. troops (Harrison, 1982; Masina, 2009, p. 54).

With the decrease in U.S. support after the Paris Accords, the Saigon government fell in 1975. In 1976, Ho Chi Minh and his indigenous communist Viet Cong allies took Saigon in an attempt to reunify the country. Although the country was united politically, there followed a period of economic stagnation,

increased poverty, and widespread food insecurity[1] in the country (Masina, 2009). The socioeconomic disparities that triggered poverty in the broadest sense also impacted the quality and quantity of nutrition prior to and following the conflict of the 1960s. That is, until the 1940s, more than 90 percent of the Vietnamese population lived in rural areas and nearly 60 percent of peasant households were landless. The landlord class and French plantation owners had disproportional control over the fertile farmland. These land ownership patterns set in motion trends of the landless peasant dependency on the landowning class, which became exacerbated during the country's reunification decades later (Luong, 2003).

The complex task of integration of the country during reunification led to severe economic difficulties and a "systemic crisis" that ravaged individual communities with agricultural failure and widespread hunger (Fforde, 1996, p. 12). Between 1976 and 1980, Vietnam imported 5.6 million tons of food, which heightened its subsistence dependency on other nations. Furthermore, the socialist government introduced a cooperative system that eventually "encroached on the principles of voluntarism, democratic management, and mutual benefits of the civilized cooperatives [and] violated the most important motivation for production development, that is it worked against the working peoples' vital vested interests" (Boothroyd & Nam, 2000, p. 15). As Vietnam's dependency on foreign imports

[1] Food insecurity is a term that is often debated in development discourse. International development agencies, non-governmental organizations (NGOs), and anthropological scholars of development have historically defined the term differently. These definitions reflect differing ideas of the role of food entitlement, purchasing power, domestic food supply, food prices, and import dependency within countries around the world. The USAID basic definition of food security states, "When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life." Within this definition, three specific variables are necessary for ensuring food security. These include: availability, access, and utilization (FAO, 2008; Food and Agriculture Organization of the United Nations, 2008; Sen, 1981; USAID, 1992).

increased and the tension caused by the collective system intensified, the economic and social situation became increasingly critical at both the local and governmental level.

Vietnam's history of war and conflict, combined with socioeconomic disparities within the country, is replete with attempts at growth through policy. These policies, which became widespread following the Vietnam War, varied in the extent to which they effectively trickled down to the population level. As a result, Vietnam has navigated through periods of economic, political, and social growth, combined with the constant struggle to reduce the burdens of poverty and food insecurity (Luong, 2003). Indeed, between 1946 and 1979, nearly three generations of Vietnamese underwent persistent conflict resulting from French, American, and Chinese military influence, in addition to military conflict with Cambodia from 1978 to 1989.

GOVERNMENT ATTEMPTS AT IMPROVING VIETNAMESE NUTRITIONAL STATUS

In the past ten years, Vietnam's national reform efforts - the *doi moi* - have allowed for tremendous improvements in human development, community health, and living standards in the country. In particular, the percentage of poor households has decreased, domestic resources needed for development have improved, international economic opportunities have expanded, and the political and social situation is unwavering. For example, Vietnam experienced an economic growth rate of 8.5 percent in 2007 (Basu Das & Lal Shrestha, 2009).

Indeed, since the late 1970s, Asia as a whole underwent a period of economic growth unmatched in any other region (Southgate, Graham, & Tweeten, 2006, p. 228). By the last two decades of the twentieth century, the region's economic expansion resulted in an overall reduction in inequality between socioeconomic statuses. Although disparities between rich and poor continued to exist, improved health, sanitation, and nutrition improved for large segments of the population throughout Asia and in Vietnam (Bourguignon & Morrission, 2002, pp. 727-744).

Even though gradual reforms were introduced prior to the *doi moi,* this was Vietnam's first attempt at the official transition from central planning to a market economy that both "implied a new start … [yet also] a process of reinvention" (Turley, 1993, p. 1). This strategy of economic growth called for changes in definitions of ownership and management through its establishment of the private sector and market, decentralization of management, and extension of economic ties beyond the socialist world. Unlike reform attempts in other post-socialist countries, the *doi moi*'s gradual reformist measures prioritized economic restructuring and stabilization over privatization (Turley, 1993, p. 2). These policies allowed for macroeconomic stabilization, export growth, agricultural productivity, and expansion of the manufacturing sector.

The *doi moi* reforms initially targeted the agriculture sector, which increased rice production and expanded other forms of agriculture. A direct result of this agricultural reform was significant improvements in the amount and diversity of food for the population. In addition, the price of food decreased,

household incomes increased, and the rate of inflation dropped significantly. Combined with these agricultural and economic realities, Vietnam had a reduction in poverty, although only minimal improvements occurred in malnutrition (Thang & Popkin, 2004, pp. 145-153). On the other hand, research indicates that, despite improvements in living standards, inequality between the rich and the poor increased following the *doi moi* in respect to health and education (Bhushan, Bloom, & Minh Trang, 2002).

Vietnam faced a large increase in interprovincial quantitative inequality between 1987 and 1993, attributable to local industries collapsing due to withdrawn subsidies, disproportional distribution of foreign direct investment to provinces, and a widening gap between the rich and the poor in southern Vietnam. By 1993, industrial output normalized at the provincial level according to data from Vietnam's General Statistical Office, although GDP data from the 1990s indicated that the divergence continued at a national level (Luong, 2003, p. 69). In the past two decades, Vietnam has made significant progress in expanding agricultural production and raising the incomes of its citizens. The Vietnam Development Goals state as aims for the future the following: reduce the percentage of poor and hungry households, improve the quality of education, reduce childhood mortality, and reduce ethnic inequality (World Health Organization, 2009).

Despite such social stratification and overlooked instances of poverty and food insecurity, the *doi moi* began to yield improvements in food quantity and quality in the first half of the 1990s. By the end of the decade, poor and non-poor

households consumed more protein and fat-rich foods than prior to the 1990s (Thoburn, 2009). However, for many Vietnamese who live in poor rural settings and engage in physically demanding labor, these improvements in protein and fat consumption did not ensure adequate micronutrient intake.

PUBLIC HEALTH AND NUTRITIONAL CONTEXT

The first 1,000 days of a child's life represent a window of opportunity for proper nutritional intake, affecting a child's long-term health (Barker, 2007). Exclusive breastfeeding during the first six months of life, followed by nutrient-rich solid foods after that period, is important for preventing deficiencies in critical vitamins and minerals. In children, these deficiencies contribute to increased risk for infection and irreversible damage to mental capacity. As adults, vitamin and mineral deficiencies reduce physical and mental capacity, and productivity levels as well (Flour Fortification Initiative, Global Alliance for Improved Nutrition, Micronutrient Initiative, USAID, The World Bank, & UNICEF, 2009).

The public health significance of micronutrient malnutrition relates to its prevalence and health effects on populations, in particular for women of childbearing age and young children. Proper levels of intake of micronutrients including iodine, vitamin A, and iron, impacts fetal and child growth, cognitive development, and the course of global development (Maberly, Trowbridge, Yip, Sullivan, & West, 1994). More than two billion people suffer from micronutrient deficiencies worldwide, 90 percent of whom live in developing countries, with 600 million living in Southeast Asia (Nguyen, Nguyen, Le, Nguyen, Ha, Bern,

Flores, & Martorell, 2006). According to recent estimates, 20 percent of the world's population suffers from iodine deficiency, 25 percent of children have sub-clinical vitamin A deficiency, and 40 to 60 percent of children suffer from anemia worldwide (Flour Fortification Initiative, et al., 2009).

Micronutrient malnutrition is also a risk factor for disease, contributing to global rates of morbidity and mortality. For example, 7.3 percent of the world's total disease burden is a result of micronutrient malnutrition. In addition, iron and vitamin A deficiencies are among the 15 leading causes of the global burden of disease. WHO mortality data attribute iron deficiency to 0.8 million deaths and 25 million disability-adjusted life years (DALYs) lost each year (World Health Organization & Food and Agriculture Organization of the United Nations, 2006, pp. 1-5).

CURRENT NUTRITIONAL SITUATION IN VIETNAM

In Vietnam, there are multiple, interconnected factors that contribute to the prevalence of iron deficiency anemia. Even though women who farm and live in areas where hookworm is common are at the greatest risk, women in all parts of the country share a common set of risk factors for IDA. These include: inadequate dietary iron, nutritional requirements of menstruation, recurring pregnancies, and lactation. Women struggle to maintain their iron stores due to these factors, increasing their propensity for iron deficiency and eventually IDA (Nguyen, et al., 2006).

On a promising note, Vietnam's maternal and infant under-five mortality rates have decreased significantly in the past decade and are among the lowest in

Southeast Asia. The World Health Organization (WHO) also indicates that stunting in Vietnamese children has been steadily declining in the last twenty years (Thi Le, Brouwer, Burema, Cong Khan, & Kok, 2006). The percentage of children whose height is more than two standard deviations below the norm for age has declined from 59.7 percent in 1983 to 1984 to 38.7 percent in 1999. Nonetheless, more than 9.5 million children under age 15 exhibit stunted growth and development in Vietnam (Pham, Berger, Nakanishi, Cong Khan, Lynch, & Dixon, 2005).

Despite these significant improvements in health, economics, and social well being, consumption of protein-rich and micronutrient-rich foods for many Vietnamese people remains a challenge. Because a large percentage of the population earns an income that hovers near the poverty line (less than U.S. $8.00 per month in urban areas and less than U.S. $6.00 in rural areas), many Vietnamese are particularly vulnerable to ordinary health problems considered minor in the developed world (Centre for International Economics, 2002). In many cases, low family income prevents sufficient nutritional intake of food, resulting in micronutrient malnutrition (Thang & Popkin, 2004). Over the last decade, Vietnam's hidden hunger has become an increasingly pressing and widespread problem in many areas of the country, especially in the rural Central Highlands and Mekong Delta regions. Women are most at risk (Gill, Farrington, Anderson, Luttrell, Conway, Saxena, & Slater, 2003). According to the National Institute of Nutrition and General Statistics Office of Vietnam, between 2009 and 2015, iron deficiency anemia will result in more than 19,000 maternal and child

deaths in Vietnam (Flour Fortification Initiative, 2009b).

THE STATUS OF MICRONUTRIENT PROGRAMS IN VIETNAM

Despite improvements in overall health in Vietnam since the *doi moi*, iron deficiency anemia still remains a significant public health burden for a large proportion of Vietnam's poorest (Thang & Popkin, 2004). In terms of the specific etiology of IDA in Vietnam, two noteworthy studies exist. The 1995 National Anemia and Nutrition Risk Factor Survey conducted by the NIN in Ha Noi, in partnership with United Nations Children's Fund (UNICEF), Centers for Disease Control (CDC), and the Program Against Micronutrient Malnutrition (PAMM) reported a 40 to 50 percent prevalence rate for iron deficiency anemia in young children and adult women (pregnant and non-pregnant women). IDA prevalence rate for infants between six and 24 months of age was 60 percent. Forty-five percent of children up to five years old were found to have the same incidence rate. The prevalence of IDA among Vietnamese men was found to be only 15.7 percent (National Institute of Nutrition, United Nations Children's Fund, Centers for Disease Control, & Program Against Micronutrient Malnutrition, 1995). It was around the time of the 1995 NIN study that IDA was recognized as a major public health problem in Vietnam, resulting in Vietnam's National Plan of Action for Nutrition 1995-2000 to achieve a 30 percent reduction in anemia in certain intervention regions (National Institute of Nutrition, et al., 1995).

As a result of governmental programs, the 2000 Nutrition Risk Factor Survey compared to the 1995 National Anemia Risk Factor Survey showed a decrease in anemia prevalence from 60 percent to 51 percent in children between

6 and 24 months old, 45 percent to 34.1 percent in children under five, 40.2 percent to 24.3 percent for women of childbearing age, and 52.7 percent to 34.1 percent for pregnant women. Prevalence for men dropped to 9.4 percent (National Institute of Nutrition, 2003, p. 6). Improvements in the dietary habits of the average Vietnamese person can be attributed to these improvement rates. The 2000 survey indicated that the diet of the Vietnamese people incorporated more meat since the 1995 survey, which coupled with economic growth, contributed to an increase in health and nutrition program expenditures. In addition, the National Iron Deficiency Control Program of 1982 was historically significant because it provided women in more than 10,000 communes with iron supplements and nutrition education, causing IDA prevalence rates to drop by 50 percent in program implemented areas (National Institute of Nutrition, 2001, pp. 13-22; Nguyen, et al., 2006).

Between 1997 and 2004, Vietnam had significant improvements in quantity and quality of foods consumption, resulting in large decreases in undernourishment. Unlike the early *doi moi* period (1992-1997), the major decreases in poverty and undernourishment occurred in the late 1990s and into the next decade. Thus, Vietnam is gradually reducing the gap between expenditure-based poverty on the one hand, and food security, calorie intake, and malnutrition measures on the other, thereby "converg[ing] the alternative measures of deprivation" (Mishra & Ray, 2009, p. 245).

Another major improvement in food consumption in Vietnam during the late 1990s involved dietary diversity. In many socioeconomic strata above the

very poor there was reduced dependence on rice as a major source of calories and increased consumption of meat, fish, and dairy products. Thus, calorie intake increased as "calories [being] qualitatively superior to those consumed earlier" (Mishra & Ray, 2009). Unlike countries such as India where economic growth has not always been associated with improvements in calorie intake or dietary diversity, Vietnam's experience suggests that policy interventions like the *doi moi* accelerate improvements in both the quality and quantity of diets (Thang & Popkin, 2004).

Despite an increase in meat consumption levels between 1995 and 2000, the foundation of the Vietnamese diet is still vegetables and cereals - foods high in phytic acid concentrations that inhibit iron absorption and therefore contribute to iron deficiency anemia (Thi Le, et al., 2006). It should be noted, however, that IDA is a result of multiple etiologies, including insufficient iron intake from foods, low iron bioavailability from the diet, helminth infections, and folate, vitamin A and vitamin B12 deficiencies (Kraemer & Zimmermann, 2007). Therefore, IDA can most effectively be reduced through a combined strategy of dietary diversification, food fortification, prophylactic iron supplementation[2], and disease control and other public health measures. Food iron fortification and dietary diversification may be especially effective ways to increase the micronutrient well being of the Vietnamese population (Global Alliance for Improved Nutrition, 2009b; Mishra & Ray, 2009).

[2] Despite the benefits of iron supplementation, evidence indicates that supplementation may complicate a child's risk for more severe infections. The results of two community-based randomized controlled trials with iron and zinc supplementation in Zanzibar (malaria endemic area) and Nepal (low malaria area) indicate that iron supplementation may be problematic in areas with high malaria or other infectious disease prevalence (World Health Organization, 2006).

IRON FORTIFICATION OF FISH SAUCE

Fish sauce is an essential component in the diet of the Vietnamese people and a historical reflection of Vietnam's past: "Vietnamese people are no strangers to fish sauce (*nuoc mam*). It is enjoyed at every meal. Fish sauce is a traditional heritage, a national treasure" ("Fish Sauce - A Favorite Specialty," 2005). Even the Vietnamese words for fish sauce, *nuoc mam*, are of the oldest Vietnamese words, and refer to a biochemical reaction occurring in water. This essential condiment is made from the extract of small fish, often anchovies, through hydrolysis and fermentation with high concentrations of salt. Recognition of the cultural importance of fish sauce dates back to the fifteenth and sixteenth centuries when missionaries and merchants arrived in Vietnam and recorded their amazement with this food item in their diary entries ("Fish Sauce - A Favorite Specialty," 2005, p. 3).

In a process lasting six to seven months, fish sauce is produced as a result of a biochemical chain reaction of enzymes. The reaction is unusual because it does not require any external source of chemical heat. At the beginning of this process, the fish are caught, mixed with salt, and piled into large wooden barrels, either by layering salt and fish or by mixing salt and fish prior to placement in the barrels. Fish are then covered with leaves and sometimes stones to increase the pressure on the fish. Upon sealing the barrel, the fish are appropriately positioned for the subsequent fermentation process. Liquid from the fermented fish seeps through small holes at the bottom of the barrel into a collecting barrel known as the *thung tro*. Once the *thung tro* is full, the liquid is again filtered through the

main barrel. The finished product falls into three categories: *nuoc boi* (rough sauce), *nuoc duc* (unclear sauce), and *nuoc nhi* (pure sauce). *Nuoc boi* is simply a combination of salt and water added to the fish before fermentation. *Nuoc duc* is the first press sauce taken from the initial filtering cycle, which explains its darker color and pungent smell. Finally, *nuoc nhi* is the sauce collected after multiple filtering cycles. It is translucent, yellowish-brown, and contains high levels of protein ("Fish Sauce - A Favorite Specialty," 2005, p. 10).

In July 2005, the Vietnamese government began a national program of iron fortification of fish sauce, which will expand gradually as additional manufacturing facilities come on line. By 2010, the Vietnamese government aims to provide 30 percent of the micronutrient requirements for the population through food fortification, which will be reinforced by education programs and the support of the Ministry of Fishery that manages the network of fish sauce factories (Global Alliance for Improved Nutrition, 2009b). This goal will be aided by the national iron fortification fish sauce effort, along with general efforts to reduce poverty, improve the health care system, and create productive food and agriculture policies. And, most important, the private sector's investment and involvement in this effort will be critical to this fight against micronutrient malnutrition (The World Bank, 1994, p. 3).

From a public health perspective, fish sauce is an ideal food vehicle for fortification as roughly 80 percent of the population consumes fish sauce at a rate of 10-16 milliliters per person per day (M. G. Mannar, 2002). Iron fortification of fish sauce can occur before bottling the product with only small adaptations to

production, amounting to a cost of U.S. $ 0.02 per liter. Because the largest 30 fish sauce factories in Vietnam make up 70 percent of the market of normal quality fish sauce, widespread fortification efforts are particularly feasible at the production level. In addition, the NaFeEDTA fortificant is a water-soluble type of iron that is highly bioavailable and considered by the United Nations Food and Agriculture Organization (FAO) and World Health Organization (WHO) to be "safe when used in supervised fortification programs" (Bothwell, 2004).

NaFeEDTA is a fortificant that does not oxidize the lipids or precipitate the peptides in the fish sauce and remains stable for more than 12 months, if kept out of direct sunlight. A study by Pham et al. indicated that consumption of NaFeEDTA-fortified fish sauce at 10 milliliters for six days per week over the course of six months was highly effective at reducing iron deficiency in a group of women of childbearing age suffering from IDA (Pham, et al., 2005). In addition, NaFeEDTA has been proven effective for fortification of sugar in Guatemala, fish sauce in Thailand, and curry powder in South Africa (Bothwell, 2004). Because it does not cause major changes to the physical state of the fortified food, it is a particularly viable fortificant for fish sauce. It is also useful when added to low bioavailability diets because the structure of NaFeEDTA ensures iron absorption, despite the high phytate content of the diet (Pham, et al., 2005).

The National Fortification Alliance (NFA) has decided to fortify normal quality fish sauce with four milligrams of iron per 10 milliliters of fish sauce. Ideally, this program will enable the low income and the most IDA vulnerable

population living in rural areas to have access to the fortified product. Also, due to the high bioavailability of NaFeEDTA, the average consumption of fish sauce by adult women at reproductive age will provide 46 percent of daily-absorbed iron requirements. If successfully implemented, this method of fortification will reach a majority of the 42 million individuals who are the most susceptible to IDA in the Vietnamese population. It will also ensure these individuals can purchase the fortified product for a reasonable cost (Global Alliance for Improved Nutrition, 2009b).

The national program has already begun its marketing and education efforts in 30 rural provinces, where low iron intake is most prevalent. According to Dr. Tran Khanh Van of the NIN, these efforts include collaboration with the Vietnam Women's Union in multiple high risk provinces to help sell the fortified product, promotional posters, and multiple daily loudspeaker announcements (Tran Khanh Van, 2008). A shift toward marketing and distribution in urban areas will follow. The government of Vietnam in addition to the Ministry of Fisheries, Ministry of Health, and fish sauce producers (Cat Hai Fish Sauce in the north, Nghe An Fish Sauce in the central, and Phan Thiet Fish Sauce in the south), have all joined a team to form policies and guidelines. This team, Vietnam's National Fortification Alliance, will be in charge of the social marketing, project evaluation, and spreading of knowledge about the fortified product's benefits.

In summary, Vietnam's improvements in poverty and nutritional outcomes and current micronutrient programs are inextricably linked to its history of war, conflict, and economic reform. Indeed, the future course of development and

social change in Vietnam must be grounded in its historical and economic context. As illustrated by the organizational framework, this macro perspective on change ultimately impacts individual behaviors and cultural conceptions of food quality at the citizen level – topics to be discussed in subsequent chapters. The next chapter deals with social change and development – a macro-level aspect of the tri-partite organizational framework. We continue to explore the interactions among development, social change, and nutritional programs of the past, while also suggesting opportunities for improving the current system in Vietnam.

CHAPTER TWO

DEVELOPMENT, SOCIAL CHANGE, AND FOOD QUALITY

Pressing human problems are at issue, and the question remains whether we can appreciate the complexity of social processes and the elusiveness of our categories for analyzing them without becoming paralyzed
(Edelman & Haugerud, 2005, p. 6).

The anthropology of development is both complex and controversial, comprised of a spectrum of conflicting opinions (Edelman & Haugerud, 2005). For the purposes of this research, development theories and applications must be addressed contextually to ensure they remain relevant and applicable to Vietnam's experience with social change. The multifaceted nature of development discourse[3] explored in this chapter suggests that Vietnam and other nations seek an approach to social change that examines food as a cultural phenomenon that is distinctive to a culture and that considers its unique history and political-economic circumstances. The first section explores the theoretical underpinnings of development discourse, as a foundation for understanding approaches in social change programs that deal with systems for measuring and improving food quality that follow. So doing highlights the parallel controversies within debates about both development and food quality systems, which suggests that similar improvements are needed in both fields. Development theories and food quality systems could be improved through more attention to and integration of the particulars of place, culture, and history, especially for Vietnam's nutrient fortification program.

[3] This thesis will universally apply the phrase " development discourse" to refer to the range of positions on development today, which will ensure sensitivity to the subject's controversial nature, while also recognizing its constant fluctuation and change over time.

DEVELOPMENT DISCOURSE: A BACKGROUND

Development, aid, and social change programs are designed to foster the life and well-being of people, especially in emerging societies (McGillivray & Clarke, 2006). This conventional interpretation, however, is criticized by some for its ahistorical, apolitical, and acultural assumptions of growth and social change (Edelman & Haugerud, 2005, p. 1; Escobar, 1995). In addition, this conventional definition locates development within the historical process of "commoditization, industrialization, modernization, or globalization…[although development's] ambiguity lends itself to discourses of citizen entitlement as well as state control" (Edelman & Haugerud, 2005, p. 1). However, there is no broad consensus on what should be included in development or social change programs:

> Whether analysts focus on 'development' as discourse, as policy or project blueprint, as historical process, or as self-propelled evolutionary process, the concept has become increasingly contentious, and it has attracted attention from an astonishing array of scholars…the topic of development is no less theory-worthy or theory-laden than any other in anthropology (Edelman & Haugerud, 2005, p. 2).

Because of this theoretical foundation, the anthropology of development as a field is comprised of scholars and practitioners from diverse backgrounds and academic orientations. Anthropologists interested in interdisciplinary development studies criticize the field's oversimplification of culture. On the other hand, political scientists or economists take issue with the field's tendency to overlook the political and economic issues, such as the forces behind globalization (Edelman & Haugerud, 2005, pp. 1-3). What development or social change programs need, therefore, are blends of these currently separate intellectual tracks: "culture, economy, discourse, power, institutions, and history"

must become interconnected aspects of development, rather than separate ones (Cochrane, 1976; Edelman & Haugerud, 2005, p. 1).

Even though development theories are often confined to separate disciplines, new models are emerging, with development programs conceived of as dealing with 'quality of life' as a holistic goal, rather than being bound, for example, to the traditional quantitative economic calculations favored by neoclassical economists (e.g., GDP growth or economic rates of return). The first World Summit for Social Development, in Copenhagen in 1995, epitomized the beginning of this shift, as it highlighted environmental sustainability, poverty alleviation, literacy, empowerment, and cultural identity (Edelman & Haugerud, 2005, p. 1). Soon after, the United Nations Development Program created the Human Development Index, which merges multiple indicators of development, including health, life expectancy, literacy, formal education, political involvement, and access to resources (Adler, 1999).

Almost simultaneously with this trend toward broad social goals in development studies, an emergent group of scholars discarded the appeal of development altogether. This group of scholars believes that development perpetuates the cycle of poverty: it is an unjustifiable consequence of bureaucracy and the work of aid organizations (Edelman & Haugerud, 2005, p. 2). Some of these scholars and activists envision a "post-development" period during which community and local knowledge inform and inspire alternatives to development (Escobar, 1995; Sachs, 2005). These perspectives, known as alternatives-to-

development or "alternative development," forsake the subject of postwar development altogether.

In contrast to alternatives-to-development, some scholars recommend alternatives *in* development. According to these approaches, social change must take place within the already existing mechanisms for development (Little & Painter, 1995, pp. 602-616). Although the field of development displays some "conceptual chaos," these differing approaches do share a mutual "faith in progress" (Edelman & Haugerud, 2005; Shaffer, 1997, p. 2). The debate over what this "faith in progress" assumes of a particular culture, society, or nation, however, has been the subject of continued discussion over the last two centuries. If all countries are expected to follow a "single development trajectory" towards improved quality of life and economic wellbeing of its citizens, how can one reconcile cultural variation or political and economic agency throughout history? (Edelman & Haugerud, 2005, p. 2). The present thesis is guided by the need to view development programs in Vietnam, especially in relation to iron and micronutrient food fortification, as requiring public health policies that are comprehensive and that pay attention to the unique historical, cultural, and economic circumstances of the country.

DEVELOPMENT DISCOURSE: ADDRESSING FOOD QUALITY

Food quality as a unit of measurement and analysis in public health programs has become increasingly complex, due in particular to the world's burgeoning population and the large number of food quality measurement systems applied in practice. The specifics of food quality are central to this thesis because,

like general development discourse, they suggest that increased attention to the historical, cultural, and political context will ensure social betterment and sustainable change. Food quality issues in development discourse provide a good example of how the historical, political, and cultural context can be overlooked in standardized public health programs, which are not often enough a reflection of local conceptions of food quality. According to interviews conducted with Vietnamese women about iron-fortified fish sauce described in greater detail in subsequent chapters, these food quality measurement systems do not universally resonate with local Vietnamese conceptions of food quality.

Indeed, the quest for good quality food has been the primary task of human beings since the beginning of time. Food quality is both a survival mechanism and a cultural phenomenon. The German aphorism, *man ist was man isst,* or "You are what you eat," illustrates the inherent link between good quality food and human nutrition, health, and mental well-being (Food and Agriculture Organization, 1999, p. 13). A correlation exists between the human's large brain size and the human consumption of a high quality and nutrient filled diet (Leonard & Robertson, 1994).

> Our humanness imposes certain nutritional imperatives upon us, making us omnivores with a need for a high-quality diet, but these imperatives do not determine human nutritional endeavors and choices, rather they set a framework within which they are played out. Within that framework there is the scope for enormous variation, since human ingenuity is capable of generating an apparently infinite variety of solutions within an impressive range of cultural and ecological settings (Beardsworth & Keil, 1997, p. 16).

Thus, humans have the physiological need to consume a variety of foods, which is regulated by constant human interaction with their environment and the role of

social, cultural, and political control of systems of food production and distribution (Beardsworth & Keil, 1997, p. 33).

In addition to the physiological dependency on high quality food, population growth will place continued pressures on food quality globally. The world's population is expected to reach 7.6 billion people by 2020, with approximately 98 percent of the projected growth occurring in urban areas in developing countries. This will pose major challenges to the world's food system and will require effective responses to prevent serious quality and safety breaches (Food and Agriculture Organization, 1999). Indeed, the unforeseen consequences of our modern food system leave many with "serious doubts about the extent and moral acceptability of our control over the natural environment" (Beardsworth & Keil, 1997, p. 32). Improving the food systems in the developing world will facilitate better access of locals to nutritious foods, will increase confidence in the 'quality' of exported foods from emerging nations, and will improve other factors, including organoleptic properties (appearance, color, texture) and the functional properties of food (Food and Agriculture Organization, 1999, p. 32).

Given the human dependency on high quality food combined with the demographic shifts due to population growth, food quality and dietary diversity are of particular relevance to Vietnam. In particular, food quality is central to this thesis and its focus on the interaction of history, culture, and politics, on local perspectives and nutritional beliefs. Public health proxy indicators such as dietary diversity scores illustrate how the cultural and historical dimensions of this interaction can be overlooked in nutrition fortification programs. Dietary diversity

indicators are used at both the national and local levels to quantitatively assess the diversity of food groups consumed over a period of time and then recommend public health nutrition interventions. Although they offer more than simple, universal calculations of how many foods are consumed, they fail to consider the belief systems and conceptions of food that underlie these standard categories of analysis (Hoddinott & Yogannes, 2002).

Moreover, dietary diversity has become an index used in public health programs and research to assess nutrient adequacy at the household level. Dietary diversity is often measured by the Household Dietary Diversity Score (HDDS) or by a Food Consumption Score (FCS), whereas at the individual level, the Individual Dietary Diversity Score (IDDS) is utilized (Kennedy, Pedro, Seghieri, Nantel, & Brouwer, 2007). Dietary diversity (DD) indices utilized in public health programs most often refer to the number of different foods or food groups consumed over a given period of time. Dietary diversity typically refers to two primary elements of diet quality: nutrient adequacy/allocation of basic needs (within the spectrum of micronutrients and macronutrients) and diet variety/balance. Most dietary guidelines, both domestically and internationally, recommend an increased consumption of a variety of foods from different food groups (Food and Agriculture Organization & World Health Organization, 1996; United States Department of Agriculture & Center for Nutrition Policy and Promotion). This dietary diversity approach recommends increasing one's intake of essential nutrients, promotes better health, and reduces intake of certain nutrients, such as fat, refined sugars, and salt, which has become increasingly

important in countries in transition like Vietnam.

Recent studies indicate that consumption of micronutrient and protein dense animal source foods correlates to improved nutritional status, more so than energy consumption (Hoddinott & Yogannes, 2002). Data on women's micronutrient status and diet quality, however, are lacking (Ruel, 2003). Although many indicators exist for measuring food quality in development practice around the world, humanitarian agencies and non-governmental organizations (NGOs) routinely express the need for an even more consistent and universally applicable approach to food quality in developing countries (Arimond, Torheim, Wiesmann, Joseph, & Carriquiry, 2009). According to Food and Nutrition Technical Assistance (FANTA), there is an urgent need for even simpler indicators to measure a woman's diet quality and central diet problems, which includes consumption of animal source foods, fruits, or vegetables (Arimond, et al., 2009).

In Vietnam specifically, improvements in dietary diversity have altered food consumption patterns, which in turn lessened the dietary dependency on rice as the primary source of calorie intake. According to one study based on the two Vietnamese Living Standard Surveys (VLSS) conducted in 1992/1993 and 1997/1998, Vietnam experienced a moderate increase in dietary diversity and calorie intake during the 1993/1994-1997/1998 period, whereas it saw a significant improvement in the 1997/1998-2004 period (Mishra & Ray, 2009). In summary, debates about development and food quality systems demonstrate a need to address these complex issues contextually and through a perspective that treats food as a culturally-bound phenomenon. Although humans consume food to

satisfy a particular biological requirement, food-related behavior is also a facet of social and cultural processes (Macbeth & MacClancy, 2004, p. 15). The next chapter will delve deeper into these social and cultural influences on foodways. This resonates with our organizational framework that emphasizes how the interaction of politics, economics, history, and culture inspire individual nutritional beliefs and practices.

CHAPTER THREE

FOOD AND CULTURE

> *Food and eating habits are banal practices of everyday life; we all, as living beings, just eat to survive. This apparent banality, however, is deceptive. Food and eating habits and preferences are not simply matters of 'fueling' ourselves, alleviating hunger pangs, or taking enjoyment in gustatory sensations…[but] are central to our subjectivity, our sense of self, and our experience of embodiment, or the ways that we live in and through our bodies, which itself is inextricably linked with subjectivity* (Lupton, 1996, p. 1).

The socio-cultural meanings of food are intertwined in an individual's daily life to the point of becoming routine (Korsmeyer, 2005, p. 317). In response to the complexity of these meaning systems, this chapter deals with the second aspect of our organizational framework – food and culture. Understanding this tacit relationship between food and culture requires an understanding of food as more than simply the product of biological or physiological functions, but of social and cultural functions as well. More specifically, this process involves in-depth cultural analysis, interpretation, and observation (Korsmeyer, 2005). The majority of literature about food and eating is the product of "social anthropologists, social historians, social nutritionists so-called and other social commentators" (Murcott, 1983, p. 1). This intellectual concern for food studies is important because it deals with a universal life necessity and because it sheds light on the political-economic circumstances, value systems, and collective memory of particular places around the world (Mintz & Du Bois, 2002). The field's "theoretical pluralism" has become a basis for disputes between structuralist/symbolic descriptions of human behavior and cultural/historical materialism (Mintz & Du Bois, 2002; Wood, 1995, pp. 3-5)

In order to better understand the interaction between food and culture, this section first provides an overview of the key concepts and theoretical foundations of this field. We then review specific food ethnographies that are of the "richest, most extensive anthropological work" (Mintz & Du Bois, 2002, p. 99). These ethnographies deal with food insecurity and food as ritual. The chapter concludes with a collection of first-hand participant observations we made in Vietnam that illustrate the tacit and explicit relationship between food and culture. When juxtaposed with one another, discussions of social change and food and culture help to solidify our findings from the interview study on Vietnamese fish sauce described in the following chapter.

KEY CONCEPTS OF FLAVOR, CUISINE, AND TASTE

Similar to chili peppers of Mexico, West Africa, and parts of India or the *sofrito* of the Hispanic Americas, fish sauce is a supplementary taste or "flavor principle" that is important in Vietnam because of its unique ability to make basic starches more interesting. Such flavoring methods vary from the use of one ingredient (e.g., coconut in Oceania) to complex blends of ingredients (combinations of spices in North Africa or India). Although flavoring customs exist in many cultures, they are most prevalent in tropical or semitropical climates or in vegetable-based diets – such as Africa, India, the Mediterranean, South and Central America, and Southeast Asia (E. Rozin & Rozin, 2005).

Flavoring food has become a unique pattern of human behavior that is ingrained in the knowledge and cultural values of people around the world. At an individual level, humans decipher which foods to eat and which ones to avoid.

The value of traditional flavorings and food preferences are often known without verbal articulation. At the population level, humans rely on cuisine - a cultural phenomenon that facilitates food choices, preparation, and eating patterns. Paul Rozin explains that cuisines allow social groups with communal knowledge and value systems to navigate through their biological and nutritional needs (Trevathan, Smith, & McKenna, 2008, p. 63). Because humans typically prioritize traditional flavors over novel ones, cuisine also reduces neophobia by ensuring that novel foods and flavors are modified to become more familiar (Farb & Armelagos, 1980). Thus, even though cuisines are highly adaptive, they are also regimented and complex: humans are "remarkably conservative in their food habits…ancient flavoring traditions, many of them thousands of years old, persist unchanged to this day" (E. Rozin & Rozin, 2005, p. 35). Humans notice and react to changes in cuisine – whether these changes pertain to foods from the environment, food preparation methods, flavor principles, or rules for eating (E. Rozin, 1982). Public health interventions aiming to inspire nutritional behavior change must contend with the complex nature of cuisines and flavoring practices around the world.

Analysis of food and culture is particularly relevant because it highlights the theme that the interaction between traditions of a staple food item and public health interventions are complex. That is, transformations of diet require "profound alterations in people's images of themselves, their notions of the contrasting virtues of tradition and change, the fabric of their daily social life" (Mintz, 1986, p. 13). Thus food consumption and conceptions of food that guide

eating rituals are not merely about ingesting nutrients, but also about "consuming gustatory (i.e., taste-related) experiences and…meanings and symbols" (Beardsworth & Keil, 1997). Indeed, our organizational framework is a reminder that issues of food and culture, social change and development, and individual nutritional beliefs and practices are interconnected and inextricably linked.

THEORIES ON FOOD AND EATING

Structuralist and materialist theories of food have been proposed since the mid-20th century (Mennell, Murcott, & Otterloo, 1992). These two types of theories of food and eating address the social construction of food behavior and, in particular, the cultural conceptions of a food item's quality – that is, how a particular culture's political, social, and economic circumstances impact and inspire the food behavior of individuals.

In the middle of the 1960s, anthropologists Claude Levi-Strauss and Mary Douglas first proposed a structuralist perspective on food and eating. Structural anthropologists consider food to be a subject worthy of exploration, although their focus is on the symbolic meaning of food, rather than its objective qualities (Macbeth & MacClancy, 2004, p. 17). For example, Levi-Strauss argued that all humans are aware of the inherent link between nature and culture (Lévi-Strauss, 1983). His study of the oppositions between food and cooking methods guide his social analysis. Indeed, this dialectical approach "see[s] the cultural significance of natural and social phenomena as deriving from the relationships among such phenomena, relationships which are normally established by convention as a result of human social action: such phenomena 'signify' meaning to social actors,

and such meaning is mutable" (Wood, 1995, p. 5). The structuralist approach explores patterns of symbolism and the ways in which these symbolic relationships contribute to culture and society.

Unlike structuralists who often focus on contemporary food behavior in their studies, historical and cultural materialist writers focus on the historical development of food preferences and behavior. Since the early 1980's, historical materialist scholars examined a broad array of problems using an increasingly diverse range of methodologies (Mintz & Du Bois, 2002). In particular, historical materialist scholars began to study how present-day food behaviors are linked to their historical contexts. For example, Mintz argued that a single food item – sugar – shaped the history and destiny of four continents and was the impetus for new productive and economic systems in Europe, North and South America, and Asia (Mintz, 1986). As such, the study of food systems can facilitate a greater understanding of a particular place's social, economic, and political context.

ETHNOGRAPHIES OF FOOD AND CULTURE

Anthropologists often study food insecurity to better understand specific aspects of food and culture. That is, food insecurity often exposes the complexity of food-culture relationships and reveals its social, historical, and political roots. In Johan Pottier's review of anthropological work on food insecurity, for example, he explores the social roots and global attempts to reduce food insecurity. Through investigation of issues such as gender inequality, impacts of the Green Revolution, indigenous knowledge of agriculture, challenges faced by small-scale markets, and risk management for peasants, Pottier challenges the

conventional assumption of food insecurity as simply a problem of resource scarcity (Pottier, 1999). Instead, anthropologists highlight additional factors that contribute to food insecurity, including political-economic disparities, the role of ethnic conflict, disease, and structural adjustment programs in Africa (De Waal, 1989; Gladwin, 1991; Macrae & Zwi, 1994; Scheper-Hughes, 1993). In summary, structuralist and historical materialist perspectives illustrate how the study of food systems can illuminate the richness and complexity of food and eating practices in a specific culture.

Food and eating rituals also provide an important window into understanding the relationship among food, culture, and the socio-political circumstances of a place. According to ethnographic research, ritual meals have diverse meanings. For example, they allow people to recreate stories of the past, connect to supernatural and invisible powers, bond with other human beings, strengthen ethnic or religious ties, and ensure ecological stability (Harris & Ross, 1987; Mintz & Du Bois, 2002). A key question posed by scholars is: "How do rituals define culturally what suffices as acceptable food?" For example, Frederick Simoons has conducted a range of studies on food taboos, attributing these taboos to particular cultures' belief systems and related rituals (Simoons, 1994). In addition, Elisa Sobo is known for her ethnophysiology of food. She argued that the concept of food and what counts as food is culturally-bound. That is, how food manifests on the body (thinness versus plumpness) is an indication of different cultural and social values. Food in and of itself does not have quality without recognition of these larger social systems (Sobo, 1997).

As these examples of structuralist and historical materialist viewpoints illustrate, a broad range of perspectives comprise and enhance the study of food. The most fruitful of these perspectives are those that recognize the complex interaction among a culture's food preferences, political economy, and nutritional beliefs and practices.

COLLECTION OF FOOD-BASED OBSERVATIONS

As mentioned, structuralist and historical materialist conceptions of food and culture call for research that addresses the unique circumstance of a particular culture and its subcultures. Consistent with that principle, we took on the role of participant observer during this research in Vietnam. We recorded field notes on a variety of topics, including food behavior, food rituals, and other aspects of eating for the Vietnamese people. The following observations we made in Vietnam reflect the organizational framework on the interaction of social change, food, culture, and individual food behavior. The following section presents some of these first-hand observations and reactions to Vietnamese culture and food behavior. These observations reinforce the idea that knowledge of a specific context, time, and place enhance the understanding of food consumption and even suggest possible ways to improve nutrition.

Food as Ritual

The following example illustrates how food making involves all family members on a regular basis, how each family member has a role, how food preparation fits into an economic system, and even involves symbolic associations with ancestors. In this excerpt, we describe a rice noodle cottage industry in a rural village in the

Mekong River Delta. Rice noodle production at this cottage industry recruits labor from all generations of the family. The operations are completed with ease, yet are technically complex. Nonetheless, ritual traditions associated with deceased family members are still incorporated into this production process:

> "…After walking along a dirt road for about ten minutes, we reached a very modest, delicate house at the end of a path. In the backyard of this house is a cottage industry for rice paper. It is a family industry, in fact, with members of all generations working in tandem with one another to make rice paste, which they then spread over a hot canvas to cook. After it cooks, they lift the rice paper 'pancake' with bamboo sticks onto large straw drying racks where they dry for 3-4 hours, and then place the pancake-like sheets into machines that cut them into rice noodles. Finally, the 500 kilos a day of rice noodles that are made here are packaged into large sacks and sold to a 'middle man,' who comes through the village periodically and sells the noodles to various markets in the main city of Can Tho. The simplicity of this operation was absolutely astounding, even though the actual process is technically complex…It was also interesting to see how in this very rural setting, families maintain their rituals and traditions: they bury their deceased family members in their backyard so that their spirits will never die and they will be alongside them during their days spent working to produce the rice noodles."
> --September 21, 2008
> Village nearby Can Tho, Vietnam

Food as Family

The following example demonstrates the importance of communal eating in Vietnam, the role of a family's history on food preparation, and the way in which fish sauce manifests in a meal. In this excerpt, we describe the dinner ritual in a working class family in Ho Chi Minh City. Each night, the family sits down to dinner at an early hour to ensure that all members of the family are present for the meal. The food is served communally and shared between all members of the family. This nightly meal ensures a routine gathering time for the family, a time comprised of both food and conversation:

> "…I have dinner with my home-stay family each night at 5:30 PM. My host dad teaches night classes and my host sister has an extra English class each night, so we eat fairly early to ensure that we can all sit down together for the meal. Tonight's dinner was fairly typical northern Vietnamese food, meaning: fewer flavors, less spice. We had small bowls of white rice, boiled shrimp, green beans, small balls of chicken meat, a marble-looking pork substance, fish sauce, and a soup filled with pork stuffed pumpkin flowers. For dessert we had segments of tangerines and dragon fruit, which is a neon pink fruit with tentacle-like pieces on the outside and black and white soft, juicy fruit inside."
> --September 30, 2008
> Ho Chi Minh City, Vietnam

Food as Hospitality

The following example illustrates the role of food as a natural resource, a social gesture of gratitude and camaraderie, and a means to experience the freshest tastes and flavors. In this excerpt, we describe the gratitude of a farmer in the rural Mekong River Delta. During our stay in this village, we built a biodigester for this farm, which had immediate benefits for this farmer: he now saves money in manual labor, energy, and fuel costs for his kitchen. He expressed his gratitude by catching the largest fish he could find in his pond and preparing it with the freshest ingredients he could afford for our lunch:

> "…The whole community in the first village where we built the biodigester was so grateful to us. They flooded us with food, the best fruits I have ever had (definitely the best pineapple in my entire life), coconut milk, smiles, rice wine, and just a general sense of gratitude for our work. One farmer was so excited by our work in his village that he literally ran into his fish pond from the pit of mud where we were digging and caught a gigantic tilapia for us to put in our hot pot for lunch that day. He ran out of his pond after catching this huge fish, which was probably a good 17-20 inches long and still alive and flapping everywhere. This farmer, with water still dripping down his bare back, smiled wide to show us the fish he caught for us. That day for lunch we had the freshest and most delicious fish I have ever eaten…In fact, all food in this area was pretty unique due to its freshness. Nearly every tree in the Mekong Delta is a fruit tree, so fruit is the most abundant aspect of Mekong Delta culture."
> --September 28, 2008

My Khanh Village, Vietnam

Food as Culture

The following example demonstrates how a fusion of cultures contributes to Vietnamese foodways. Vietnam's historical context and the remnants of decades of colonialism trickle down to present-day culture. In this excerpt, we describe the setting and landscape of Dalat, a small city located north of Ho Chi Minh City. This city is significantly cooler in temperature than other southern cities and has strong European influences on its food and culture that are unique from other cities in Vietnam:

> "…Little European-like coffee shops are everywhere in Dalat, as it is known as the coffee and tea capital of Vietnam. Even the food has a more French feel to it – rice almost consistently is replaced in the diet in Dalat by French baguettes. Dalat is also known as the flower and vegetable capital of Vietnam. Wild flowers, flower farms, and vegetable gardens are everywhere."
> –September 15, 2008
> Dalat, Vietnam

Food as Simplicity and Subsistence

The following example illustrates the complex relationship between food and culture and how eating patterns satisfy more than biological needs, but social and cultural ones too. In this excerpt, we describe an organic shrimp farm in rural southern Vietnam. The actual farm is located far from a developed city or village, which means that this farmer's family must subsist on what they grow and farm from the sea. This process of subsistence for this farmer is strikingly simple – it involves the most basic human instincts and behaviors:

> "…We visited an all-organic shrimp farmer in the quietest place on earth I have ever visited. It was literally silent, and thus, so peaceful. I managed to get no mosquito bites, although everyone else in my group was literally

> eaten alive…We trekked through hornet nests and pockets of forest to get there because our boat had some technical difficulties, but it was so worth it. We ate a meal entirely on the floor of this farmer's home with our muddy feet and all. It was so simplistic, so peaceful. Just us, our chopsticks, and the most basic, just-from-the-ground-and-sea food. This farmer lives so far away from civilization that his children and wife moved to the nearest village so that his children can go to school. He stays back at this farm to harvest the shrimp and make the family living."
> --September 8, 2008
> Can Gio, Vietnam

Food as Socio-Economic Status

The following example illustrates how food is a vehicle for communicating messages, group solidarity, status, and identity. In this excerpt, we describe a lecture by a doctoral student studying socio-economic spaces in Vietnam. In the lecture, this doctoral student explained the division between food spaces for middle class and working class patrons. These differences in food spaces are evident from aesthetics, foods served, restaurants' names, and their locations:

> "…I found the most fascinating part of the lecture to be the part when he talked about middle class spaces. For example, he showed us various pictures from his fieldwork of food spaces that are designed for certain classes. A common example is 'Com Binh Dan,' which is a restaurant specifically serving and advertising 'food for ordinary people' (literal translation). We were introduced to this type of food during our first week in Vietnam. It usually implies eating on little blue stools on the side of the road or in an open-to-the-street structure that is usually not clean or particularly fancy. There are also 'office lunch restaurants,' where strictly middle class people eat. The stools are silver instead of plastic, the bowls often match the chopsticks, and the food is still reasonably priced for middle class patrons."
> --October 22, 2008
> Ho Chi Minh City, Vietnam

Food as Taste

The following example indicates how conceptions of food quality relate to taste, brand preference, and rituals associated with food choice. In this excerpt, we describe a routine grocery-shopping trip with a working class Ho Chi Minh City woman buying groceries for her family of five. This process involved a hectic commute in motorbike traffic to arrive at the grocery store and methodical choices within the grocery store for the freshest and most economical ingredients for the week:

> "…At breakfast, my host mom asked me if I like grocery shopping. Realizing she was probably asking me if I wanted to accompany her on her grocery trip, I jumped on it. We left after breakfast and hopped on her motorbike in the already insane heat and traffic, both of which are routine parts of daily life in the city. As we drove through multiple traffic circles swarming with motorbikes and down busy streets and alleyways, I kept thinking to myself that I did not know how all the groceries were going to fit on this small bike already full with two people. Images of Costco and the weekly shopping trips many Americans make came to mind, but this world of excess and overconsumption was so opposite and foreign to the situation I was in that this comparison was almost impossible to make. We spent nearly two hours in the jam-packed grocery store pushing our way through people with our cart…We went up and down every aisle and talked about all the types of foods and ways to prepare them. My home-stay mom showed me her favorite brands, her favorite vegetables and fruits, how to find the ripest fruits, what the best flavors of Vietnamese cuisine entail. We chose between different dish soaps and brands of cheese and spent a fair amount of time in the lotion and sunscreen aisle, making note of the differences between Vietnam and America... After packing up our motorbike and balancing our feet over the bags of groceries (only two bags filled 75% with produce and 25% cheese, meats, and noodles), we headed home and cooked a huge feast for lunch of fish, rice, and Ha Noi sour soup."
> --October 15, 2008
> Ho Chi Minh City, Vietnam

Food as Identity

The following example illustrates how food becomes intertwined with the collective memory of a place, its people, and its history. In this excerpt, we describe the old quarter of Ha Noi, structured by winding streets compartmentalized by items sold. Many of the street vendors in the old quarter have remained in the same location for decades, acquiring reputations for the food items sold and memorable relationships with patrons:

> "…On this walk, we saw so many exciting things - from clothing stores, street vendors, pharmacies, and hotels. All the streets in Ha Noi are compartmentalized by item sold – there are streets entirely devoted to shoes, to cups of fresh fruit with yogurt, to scarves, to pharmacies. Unlike in Ho Chi Minh City, the sidewalk in Ha Noi is an actual sidewalk on which people walk. There are even spray-painted lines structuring the rows of parked motorbikes in some parts of the city. In the middle of our walk, Co Thanh (my academic director) quickly crossed the street and told us she would be right back. We saw her talking with a street-vendor woman selling sticky rice. Co Thanh came back to our side of the street with two bags full of sticky rice, each ball individually wrapped in newspaper and feeling hot to the touch. This is the same street-vendor woman who sold Co Thanh sticky rice as a child growing up in Ha Noi. Looking back at this small food vendor, nestled away on the sidewalk of this ancient Ha Noi street, I realized how appreciative I am of Co Thanh and her desire for us to see Vietnam through her eyes."
> --November 23, 2008
> Ha Noi, Vietnam

As this section illustrates, foodways are not often self-explanatory, uniform, or transparent. The various opinions incorporated in this chapter - including ideas of cuisine and flavor, structuralist and historical materialist perspectives, and participant observation from Vietnam - together illustrate attempts to understand foodways in terms of a location's political economy, historical context, and cultural constructs. Such a holistic approach to understanding food systems is important. The following chapter narrows these

perspectives even further through an ethnographic study on fish sauce in Vietnam. Once again, our organizational framework is a reminder of the many factors that influence individual food choices – the need for nutrients, health, subsistence, social life, ritual, taste, and community.

CHAPTER FOUR

INDIVIDUAL NUTRITIONAL BELIEFS: ETHNOGRAPHIC RESEARCH IN VIETNAM

The preceding chapters dealt with two components of the organizational framework: 1) public health and the role of development and social change and 2) food and culture. In this chapter, we proceed to a micro level of analysis that explores the attitudes, knowledge, and food practices of individual Vietnamese citizens. More specifically, this food ethnography explores the cultural influences on iron fortification of fish sauce. Fish sauce – a culturally important food in Vietnam – becomes an important point of entry for this research due to recent iron fortification efforts. Consumption of iron-fortified fish sauce represents a real life application of our organizational framework: public health interventions, social change, food, and culture interact at the macrocosmic level, but also trickle down into individual nutritional beliefs and practices.

In order to provide this micro level perspective on food quality, this chapter includes the results of a series of interviews with Vietnamese women from various socio-economic and urban-rural backgrounds. The structure, methodology, and results of this food ethnography combined with the observations and arguments from previous chapters illustrate that conventional food quality measurement systems applied in development contexts like Vietnam do not sufficiently acknowledge local conceptions of food quality.

METHODOLOGY

In order to obtain data about Vietnamese citizen knowledge, attitudes, and

practices regarding iron fortified fish sauce program, the researcher incorporated semi-structured in depth interviews and primary source research (nutritional data and studies) at the NIN Library. After receiving approval from the Emory University Institutional Review Board, the researcher conducted a total of 17 semi-structured qualitative interviews in central Ha Noi and surrounding provinces as follows: 1) four rural low-income women in Thon Dong Ba Village in Thuong Cat Commune in the Tu Liem District of Ha Noi were each interviewed for one hour, 2) three urban working-class women in Co Nhue Precinct in Cau Giay District, Ha Noi were each interviewed for a half hour, and 3) ten urban middle-class women shopping in Ha Noi supermarkets and open-air markets were each interviewed for fifteen minutes. The specific questions comprising the interviews are presented in Tables 1 and 2.

Table 1

Rural and Urban Ha Noi Interviews

- How many people are in your family?
- What are their occupations?
- How old are your children?
- What do you want your children to know about health?
- What do you feed your children most often?
- What does an average breakfast, lunch, and dinner consist of for you and your children?
- What do you want your children to know about nutrition?
- What does it mean to be healthy?
- Are there any foods that you believe your children eat to be healthy?
- How much of the family budget is allocated for purchasing meat from the market?
- Is meat expensive for your family to buy?
- What kind of meat do you buy most often?
- How often do you go to the market and/or supermarket?
- Do you often eat fish sauce?
- Why is fish sauce important to Vietnamese culture?

- What brand of fish sauce do you prefer?
- When buying fish sauce, which of the following do you consider most: brand, taste, price, and/or color? Why?
- Do you use fish sauce for cooking, dipping, or both?
- Do you have memories of eating fish sauce as a child and was it still important to your food choices when money was limited?
- Have you ever heard of iron-deficiency? If so, do you know what causes it?
- Do you seek a solution for this problem if you feel at risk?
- What are your symptoms if you feel at risk or have been clinically diagnosed with anemia?
- Did you take iron tablets before and during your pregnancy?
- Do you know of foods with high iron content?
- Have you ever heard of fortified foods?
- Have you ever heard of iron-fortified fish sauce? If so, where have you heard of it?
- Would you buy iron-fortified fish sauce for your family if it were to cost more than the average fish sauce you now purchase?
- Which of the following would encourage you to buy iron-fortified fish sauce most: promotions, television commercials, radio broadcasts, and/or other?

Table 2

Market Interviews

- What fish sauce brand do you prefer and buy most often?
- How often do you buy fish sauce?
- When buying fish sauce, which of the following do you consider most: brand, taste, price, and/or color? Why?
- Do you use fish sauce for cooking, dipping, or both?
- Have you ever heard of iron-fortified fish sauce? If so, where have you heard of it?
- Would you buy iron-fortified fish sauce for your family if it were to cost more than the average fish sauce you now purchase?
- Why is fish sauce important to Vietnamese culture?

All the women interviewed were within child-bearing age range (the most vulnerable age group for IDA) and from similarly sized families. Categorization of a woman's economic status was based on her stated job. The following are the interview procedures for each group:

Rural Low-Income Interviews. Dr. Tran Khanh Van of the National Institute of Nutrition facilitated recruitment of participants for the four rural interviews in Thon Dong Ba Village. Dr. Van contacted Nguyen Thi Lan, the head nurse of the Thuong Cat Commune Health Center, who provided the names of four women (ages 28-32) who recently visited the health facility and received diagnosis of IDA. On Ms. Lan invitation, all agreed to participate in the interviews, which were conducted on November 15, 2008 at Ms. Lan's home in Thon Dong Ba Village. Interviewees were from very low economic backgrounds, worked manual labor jobs, and had at least two children between one and 12 years of age. All interviews began with an introduction by Dr. Van, who served as interpreter, outlined the purpose of the research, and told interviewees that cooperation was completely voluntary and that their answers would not jeopardize their relationship with the Commune Health Center. Interviews were tape recorded to ensure adequacy of subsequent analysis and translation. Although not informed at the outset, the women were given small sums of money following the interview – a traditional gesture of appreciation in Vietnam.

Each interviewee was probed about basic background information, food behavior and expenditures, conceptions of health, consumption of fish sauce, awareness of fortified foods, and experience with IDA. See interview schedule in Table 1. These questions served only as a flexible framework, not a rigid interview procedure. Following the day of interviews in Thon Dong Ba Village, we provided a six month supply of iron tablets to the Commune Health Center for these four women who suffered from IDA – none of whom could afford to

purchase the supplements.

Urban Working-Class Interviews. Using a similar approach Dr. Van contacted a medical professional colleague at the Health Center of the Co Nhue Precinct in Cau Giay District in Ha Noi. Three women who had been diagnosed with IDA and who sought treatment at the clinic were recruited for the study. The three working class women were of child-bearing age and were either pregnant or had children between one and five years of age.

On November 25, 2008 the researcher and Dr. Van conducted three half-hour interviews in Dr. Van's home in Ha Noi using the questions in Table 1. As before, the women were told that their participation was voluntary, and that any personal information disclosed would remain anonymous and would not affect their relationship with the Health Center. We also gave each woman a small sum of money upon completion of the interview.

Urban Middle-Class Interviews. A total of ten interviews were conducted with middle-class women in markets in Ha Noi. Nguyen Tien Manh, a student from the Faculty of International Studies Program at Ha Noi University, served as the interpreter for all market interviews, using a standardized format out of respect for participants' time constraints. See Table 2 for a list of questions. Questions dealt with conceptions of health, fish sauce preferences, fish sauce food behavior, and awareness of fortified fish sauce and anemia. Translation was completed following each interview. On average, market interviews were fifteen minutes long.

The first five of the market interviews took place in the Intamix

Supermarket and the Trang Tien Plaza Supermarket in central Ha Noi on November 19, 2008. The majority of interviewees were supermarket shelving employees in the fish sauce aisle because they were most familiar with clientele preferences, purchasing patterns, and the fish sauce products themselves. Three of these five interviews were customers purchasing fish sauce, although the researcher found the sellers to be the most willing to share information and personal opinions.

The final five market interviews were conducted at Cho Hom and Cho Nguyen Cong Tru in Ha Noi on November 25, 2008 - two traditional open-air markets in Ha Noi outside of tourist areas. The researcher and Nguyen Tien Manh conducted the interviews in the early morning, which is a common time for daily shopping. These interviews targeted vendors, since prior interviews indicated that these people were the most willing to participate. We recruited vendors who appeared to sell the greatest variety of fish sauce, and followed similar procedures of introductions and interviewing. See Table 2 for a detailed list of questions.

In addition to rural and urban in-depth interviews and market interviews, the researcher utilized a question email survey shown in Table 3 for Ha Noi University female students.

Table 3

Nutrition Questionnaire for Ha Noi University Students

- What does an average breakfast, lunch and dinner consist of? If you do not eat the same foods every day, please provide a few average food types or categories for each meal (example: sticky rice, pho bo, bread with jam).
- In how many meals each day do you eat meat?
- What kind of meat do you eat most often (beef, pork, chicken, shrimp,

fish etc)
- Do you ever skip breakfast? If so, why?
- What do you think is most important to know about nutrition?
- Are there any foods that you eat to be healthy?
- How important is fish sauce in Vietnamese cuisine?
- Which of the two kinds of fish sauce (cooking or dipping fish sauce) do you like the most?
- Which of the two kinds of fish sauce (cooking or dipping fish sauce) do you eat most often?
- What dishes does fish sauce accompany in your diet most often?
- Have you ever bought fish sauce?
- Which kind of fish sauce is considered good fish sauce and which one is considered bad?
- Do you consider fish sauce to be healthy? If yes, why?
- Are there ways that fish sauce could be made healthier?
- Is it important for babies and children to eat fish sauce? Why?
- Do you have memories of eating fish sauce during your childhood? Were there any times in your life when fish sauce was not present in your mother's cooking?
- Have you ever heard of iron-deficiency? If yes, what does it mean to you?
- Do you know about the causes of iron-deficiency?
- Do you know of foods with high iron content? If yes, which foods?
- Have you ever heard of fortified foods?
- Do you think that you are at risk for iron-deficiency? Do you seek a solution for these problems if you feel at risk?

These questions provided additional information about the cultural importance of fish sauce and the specific ways in which Vietnamese young women incorporated it into their diet. This set of interviews also posed questions relating to IDA awareness. Although not a primary focus of the research, we sought this preliminary information from younger, educated Vietnamese women.

RESULTS

Interview results are presented separately for each set of participants: rural-low income women, urban working-class women, and urban middle-class women. Results from the Ha Noi University questionnaire are incorporated in the

urban middle-income women section. Within each economic group we present four subsections of results: family information, food preparation behavior, fish sauce consumption, and micronutrient malnutrition. Because the data are based on very small samples, our results are presented as qualitative descriptions.

Rural Low-Income Women.

Family Information

The first set of interviews took place in Thon Dong Ba Village in Thuong Cat Commune, Tu Liem District, Ha Noi on November 15, 2008. The average age of the women interviewed was 30. The average age of their children was 5.7 and their family size averaged four. Interviewees held manual labor jobs such as rice farmers, soybean farmers, or goods sellers. A majority of the women said that they worked additional jobs off-season, such as selling vegetables in the market or tailoring clothing.

Food Behavior

When asked about the typical content of breakfast, lunch, and dinner for their families, the majority of women reported preparing high carbohydrate foods (low in nutritional value), such as instant noodles or rice noodles. For breakfast, most children ate rice porridge and sticky rice. For lunch, the majority of women reported that their family ate “simple foods,” (i.e., high carbohydrates), but they attempted to include protein, rice and vegetables. In reality, the most typical lunch foods were rice, eggs, and vegetables with the occasional inclusion of tofu. Dinner meals were similar to lunch although they were somewhat more varied. For example, one woman prepared vegetable soup daily and meat once a week for

dinner, whereas another women and her family frequently ate vegetable soup, fried vegetables or potatoes, and protein such as pork, fish, or egg, and rice.

Women usually made daily visits to the market, with the most common protein purchase being eggs or tofu (which are lower in price than beef, fish, and pork). All rural women admitted that meat is expensive, but important to buy. The majority of women stated that they encouraged their children to eat before the adults because children have nutrition priority. One woman said that she often made "routine sacrifices" in her food intake for the sake of her children. Most interviewees reported that fish was the healthiest food item they served their children. Another woman, who faced particular economic hardship, explained that she had "heard about nutrition before, but there is usually not enough money for food," so she cannot prioritize nutrition when making food choices for her family.

Fish Sauce Consumption

The majority of women were not sure if fish sauce was healthy; they simply knew that it "makes foods taste better" and that their "children like it." Only one woman stated that fish sauce might be healthy because "other people said that children should eat fish sauce." When asked, "How do you use fish sauce?" the most common response was as a condiment for dipping. In order to cut costs, most women explained they "just use salt" as a substitute for fish sauce. Although all the women explained that they attempted to have fish sauce in the kitchen at all times, it was not always possible in hard economic times. One woman said, "sometimes when there is no money for fish sauce, I must borrow money to buy it or just use salt instead."

In general, the costs of purchased fish sauce brands varied widely. Popular fish sauce brands include Nam Hai (5,000 VND per liter), Nam Ngu (14,000-15,000 VND per liter), and Chin Su (26,000 VND per liter). The average rate of consumption across all interviewees was two liters of fish sauce per month. The most common factor considered when purchasing fish sauce was price, although taste was also important. The importance of taste in the decision to purchase was key, assuming that women had money to purchase fish sauce. In addition, all women had memories of eating fish sauce as children. One woman said, "I ate what my parents ate when I was growing up…and that meant fish sauce."

Micronutrient Malnutrition

The majority of women had "heard about iron-fortified fish sauce from word of mouth or by television advertisements," but many had not yet seen it in the market. The women with little or no discretionary income tended to have less awareness of fortified foods and nutrition than those women with slightly more income. One woman with less income said, "I don't have time to watch TV or know about foods with iron." Women previously unaware of iron fortified fish sauce prior to the interview expressed willingness to spend more on purchasing it for their children. For example, "if it still tastes good and if the price is not one-third higher than it is now." It is important to note that the majority of women interviewed were clinically anemic with symptoms including dizziness, exhaustion, body shakes, and feelings of collapsing – symptoms they all admitted suffering from daily. One woman said, "I must stop working" until the dizziness subsides.

Although all four women had been tested for anemia at the Thuong Cat Commune Health Center, most did not know what tests were performed. They were given a prescription for iron tablets and advised to increase the iron content of their diets. However, as noted, they were either not able to afford the tablets or used them only until they felt a little better. Many women stated that they used pain medication to mask symptoms of anemia.

These women knew that they lacked sufficient iron, but felt that they could not afford to purchase supplements. They said, "I need to improve my income to add more iron to meals" or "I do not eat enough nutritious foods because they are expensive and my income is not enough." One woman indicated that she would like to return to the clinic for iron tablets but could not do so because of costs associated with feeding her children.

In summary, the rural, low-income women we interviewed were aware of iron fortified fish sauce, yet were financially unable to improve their family's nutritional intake. They simply had to prioritize the price of food over its quality, sacrifice food for their children on a routine basis, and live with symptoms of IDA because treatment was too expensive. For the most economically strained women, they expressed that with increased funds, they would be able to return to the clinic for iron tablets "and other recommendations," but because of their children's needs for food and the costs associated with feeding their children, they could not.

Urban Working-Class Interviews.

Family Information

The majority of women interviewed were of childbearing age, with an

average family size of three, and children averaging two years of age. The most common occupation was factory worker.

Food Behavior

In response to what they believed to be the healthiest foods, the most common responses were fish, milk, and vegetables. On average, the women's children ate rice porridge or bread and milk for breakfast. During the women's daily visits to the market, pork was the most common meat purchased. Although they occasionally bought beef, one interviewee said pork was cheaper and "still tasted good and is feasible with a low worker's salary."

Fish Sauce Consumption

When asked to describe the cultural importance of fish sauce, answers included "fish sauce is necessary…my family uses it every day" and "we cannot eat without it." All women had memories of eating fish sauce as children. In addition, these women primarily used good quality fish sauce for dipping and used a lower quality, cheaper, and mass-produced version for cooking. The most popular brand to purchase was Chin Su, primarily because the women trusted the brand's reputation. When purchasing fish sauce, the majority of women explained that both taste and price were the most important factors to consider. The women with less discretionary income prioritized price over taste, although taste remained a factor of consideration for all women.

Micronutrient Malnutrition

The majority of the women in this economic bracket were not aware of iron fortified fish sauce, but recognized the threat of IDA in Vietnam. When

asked why IDA was a problem in Vietnam, the majority of women were unsure of the causes. Upon learning about iron fortified fish sauce, most women reported that they would buy the fortified fish sauce "if the price were not too high and the taste remained the same." In addition, the IDA status of the women interviewed varied. Some had been diagnosed with IDA, some had been diagnosed as normal, while others were unsure about their iron status. When asked about any preventive interventions being taken, the majority of women explained that they could not afford iron tablets. As one woman explained, "I would go to the doctor, but she knows he will just prescribe iron tablets, and they are too expensive."

In general, the urban, working-class women also experienced symptoms of IDA and had knowledge of its prevalence in Vietnam, but were unaware of iron fortified fish sauce prior to the interview. Because of economic constraints, the majority of women interviewed could not routinely buy iron tablets for their IDA, but would be willing to buy iron fortified fish sauce for a minimally increased cost, assuming the taste of this traditional Vietnamese condiment remained the same.

Urban Middle-Class Interviews.

Family Information

Because of the time constraints on the women shoppers and sellers in the market, questions relating to personal information of the interviewees such as age and family size were not asked. The students interviewed by questionnaire were all females between the ages of 18 and 21.

Fish Sauce Consumption

When asked which brand of fish sauce they most prefer, the majority of women answered “Chin Su.” They explained that although they may change brands periodically, they return to Chin Su because of its rich taste. The majority of fish sauce sellers and market customers explained that fish sauce is most often used for cooking and dipping, although choosing a high quality fish sauce, such as Chin Su, is more important for dipping than for cooking. The average consumption rate for the middle-class bracket was two liters per month. When buying fish sauce, the majority of women explained that they consider both taste and brand. As one woman explained, “it is important to consider taste, but brand is also important to guarantee food safety.” The cultural importance of fish sauce was most often related to its taste and traditional value. One seller explained the cultural importance and centrality of fish sauce in the Vietnamese diet by saying that “Americans feed their babies butter and milk. Vietnamese people feed their children fish sauce.”

Many women also expressed that no kitchen is complete without fish sauce on the shelf. Another said that, “Vietnamese dishes are suitable for foods flavored with fish sauce, such as boiled vegetables.” Most women emphasized that fish sauce adds saltiness or sweetness when necessary and complements certain Vietnamese dishes. The majority of women interviewed in the markets and through the questionnaire also had memories of fish sauce consumption as children. In fact, the older sellers made note of the shift in fish sauce brand name popularity since market reform policy began in the 1980s: “…fish sauce companies before the shift to the market economy from central planning were

controlled by the government and were much fewer in number. Families were more self-sufficient and made their own fish sauce. Now there is competition among fish sauce companies and they add preservatives too." Although the production, consumption, and distribution surrounding fish sauce have shifted over time, the centrality it plays in the Vietnamese diet has not.

Micronutrient Malnutrition

Although no women interviewed in the markets or through the Ha Noi University questionnaire were aware of iron fortified fish sauce, they recognized the prevalence of IDA in Vietnam, especially for child-bearing women. The majority of women, however, did not believe they were at risk. Upon learning about the benefits of iron fortified fish sauce from the interview, the majority of women expressed willingness to purchase it for a minimally increased cost, as long as the taste remained the same.

In general, the middle-class women bracket emphasized the importance and traditions of fish sauce, in particular its presence in both cooking and dipping. This income bracket of women had fewer first-hand experiences with IDA than the working-class or low-income women, although the majority recognized it does pose a threat to Vietnamese society. Most had not heard of iron fortified fish sauce, but would be willing to buy it if the taste remained the same.

DISCUSSION

A general finding from this study is that fish sauce consumption in Vietnam is extremely important because of its taste, cultural traditions, and quality – not its nutritional value. Despite differences in the specific familial

traditions, preferred brands, and income, fish sauce is routinely incorporated into the typical Vietnamese diet. At the same time, our interviews and questionnaire data suggest that income is a determining factor in fish sauce consumption, nutritional content of foods eaten, awareness of iron fortified foods, and vulnerability to IDA. Our interviews also suggest that IDA is associated with socio-economic status. Even though the majority of women from all economic backgrounds recognized the prevalence and threat of IDA in Vietnam, the majority could not accurately explain its etiology and did not consider IDA when purchasing fish sauce.

A surprising distinction that emerged from the data is that women from rural areas were more aware of the benefits of iron fortified fish sauce than women from urban areas. Furthermore, those newly learning about the benefits of iron fortified fish sauce expressed a willingness to buy it as long as the price did not exceed three times the current price. And the majority of women admitted they would buy the fortified product as long as the taste remained the same.

Following is a brief discussion of the research results for each group of women from rural and urban areas followed by a discussion of the limitations of this research. The final chapter makes a series of recommendations for improving the national Vietnamese iron fortified fish sauce program based on our tripartite framework and archival and research findings.

Rural Low-Income Interviews. For women whose income leaves little to no room for extra expenditures, the price of the fish sauce product played the most significant role in the decision on which fish sauce to buy, if any. Awareness of

iron fortified fish sauce, however, was higher in rural areas. Despite a lower education level compared to urban women, the rural women's agrarian lifestyle was more conducive to exposure to television advertisements and loudspeaker announcements during the day, which could be used to deliver health education and iron fortified fish sauce advertisements.

In addition, the success of the rural Health Volunteer Network, which goes door-to-door delivering health warnings and information, may have contributed to this increased exposure. In contrast, the Health Volunteer Network in urban areas was less trusted by the general population. Despite increased knowledge about IDA in rural areas, based on the results of the interviews, experiences with IDA in rural low-income areas was also more widespread. Although the majority of women were anemic, they could not afford iron capsules or increased iron-rich foods in their diets. At the same time, low-income women expressed strong interest in buying iron-fortified fish sauce if the price was not more than three times the current price and as long as the taste remained the same.

Urban Working-Class Interviews. For working-class women, taste and price were the most important considerations when buying fish sauce. Even though some working-class women prioritized price over taste, taste remained an underlying consideration for all women in this economic bracket. Also, most working-class women did not associate fish sauce with health, but incorporated fish sauce into every meal because of its traditional value, the food quality it provides, and its taste. Moreover, for financial reasons, working class women used good quality fish sauce, such as Chin Su brand, exclusively for dipping and

used a low quality fish sauce or salt for cooking.

Similar to urban middle-class and rural low-income interviewees, working class women recognized that IDA is a burgeoning health problem in Vietnam; however, most had not known of the nutritional value of iron fortified fish sauce or purchased it for that reason – perhaps because of their busy schedules and minimal exposure to television and radio advertisements.

Urban Middle-Class Interviews. Like other groups, taste and brand – not price or its relations to health – were the most important reasons urban middle class women bought fish sauce. For higher income women, fish sauce was used for both dipping and cooking. Similar to urban working-class women, most higher income women had not heard of iron fortified fish sauce or its nutritional value. However, on learning of its benefits for IDA, they expressed a desire to purchase fortified fish sauce as long as the taste and price were satisfactory. The Ha Noi University women interviewed through the questionnaire were all women between the ages 18-21. The majority of women had strong memories of consuming fish sauce throughout their childhoods and believed fish sauce to be an important component of every meal because of its taste and role in the meal. Although the majority of women recognized the prevalence of IDA for women of childbearing age, in particular, they were not aware of the iron-fortified product.

The interview data highlight 1) the integral role of fish sauce in Vietnamese traditions rather than its nutritional value, 2) the importance of cost as a factor in its use, 3) the differential knowledge about its nutritional value in different populations subgroups, and 4) the interaction of these results with

socioeconomic status. However, these findings and conclusions can only be considered tentative and limited. We were only able to conduct a limited set of interviews within each economic bracket because of time and resource constraints. For example, fieldwork was conducted entirely in and around Ha Noi, in areas where iron fortified fish sauce is not yet widely used. In the future it would be important to explore cultural influences on fish sauce fortification in communities where the iron supplement is widely available. Thus, a larger and more systematic sampling from different groups and regions is necessary to ensure representative data and to enable quantitative analyses. A summary of findings is outlined in Table 4.

Table 4

Summary Chart of Interviews

	Rural Low-Income Women	Urban Working-Class Women	Urban Middle-Class Women
Family Information	Average age of women: 30; average family size 4; average age of children: 5.7; agriculture-based jobs in addition to off-season work for additional income.	Women all of childbearing age; average family size: 3; average age of children: 2.	Women all of childbearing age (no age specifications).
Awareness of Iron-Fortified Fish Sauce	Majority aware of the fortified product through social marketing (TV, loudspeaker announcements in rural areas).	Majority not aware of the fortified product, although recognized and experienced the threat of IDA in Vietnam (unsure of its causes).	Majority not aware of the fortified product, although willing to purchase if the taste remains and cost increase minimal.
Fish Sauce Consumption	Price prioritized in purchase; Nam Hai, Nam Ngu, and	Taste and price prioritized in purchase; Chin Su	Taste prioritized in purchase; Chin Su most common

	Chin Su most common brands; salt supplemented for fish sauce when money is limited; fish sauce used primarily for dipping; memories of fish sauce as children.	most common brand; fish sauce used for dipping and cooking; memories of fish sauce as children	brand; consumption rate: 2 liters per month; fish sauce used for dipping and cooking; memories of fish sauce as children.
Micronutrient Malnutrition	Majority of women were clinically anemic with symptoms that limit productivity; all women tested for IDA at local health center; unable to afford iron supplementation treatment.	Some diagnosed with IDA, some diagnosed as normal, others unsure of their iron status; iron tablets too expensive for the majority.	Recognition of prevalence, although the majority did not believe they were at risk.
Food Behavior	Fish sauce considered healthiest food, although 'nutrition' not considered in food purchases; high carbohydrate-based diet (instant noodles and rice noodles); daily visits to the market; tofu and eggs most consumed and least expensive protein; children's food prioritized over mothers' food.	Fish, milk, and vegetables considered healthiest foods; pork most consumed protein because it is less expensive than beef, fish, and chicken but better 'quality' than eggs and tofu.	Diet consists of meat (e.g., beef, pork, fish, tofu, eggs), protein, and carbohydrates; fish sauce integral to meal because of taste (not 'nutrition').

CHAPTER FIVE

RECOMMENDATIONS

Ultimately, the better we understand why people eat what they eat, the better we can feed the world (Anderson, 2005, p. 9).

The 2008 *Lancet* series on Maternal and Child Undernutrition identified micronutrient interventions as major contributors to reducing mortality and morbidity in developing countries. This key publication reported that vitamin A and zinc deficiencies result in 0.4 million-child deaths each year, and, that iron deficiency represents a primary risk factor for maternal mortality, responsible for an additional 115,000 maternal deaths (Bhutta, Ahmed, Black, Cousens, Dewey, Giugliani, Haider, Kirkwood, Morris, Sachdev, & Shekar, 2008). The Copenhagen Consensus 2008 emphasized the importance of micronutrient interventions, citing vitamin A and zinc supplementation as the first priority and iron fortification and salt iodization as the third priority (*Copenhagen Consensus 2008 - Results*, 2008).

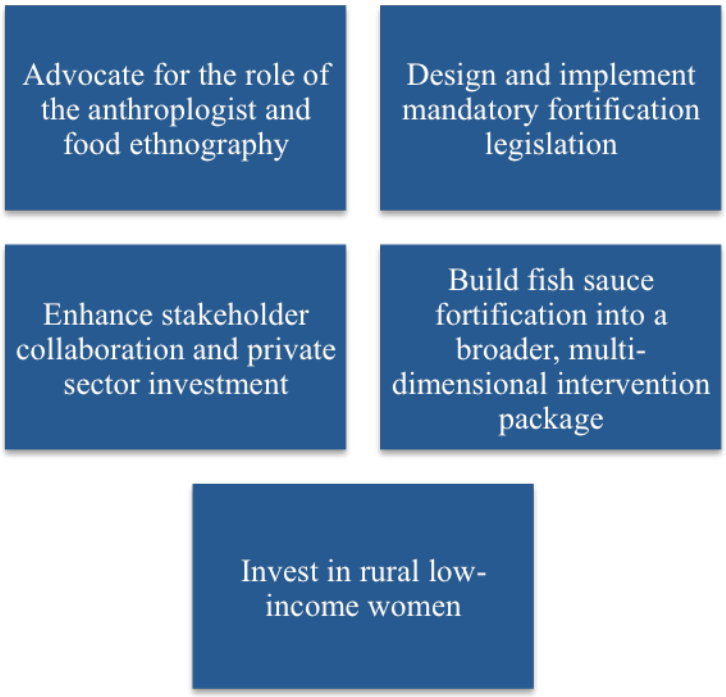
In spite of scientific evidence supporting the use of micronutrient interventions, significant challenges involving multi-sector collaboration, cultural acceptability, program scale up, and sustainability still exist (Ian Darnton-Hill, 2002). Our research in Vietnam provides a case study of some major obstacles and requirements regarding "'how' to transform interventions of known efficacy in controlled settings into programs delivered at scale in a variety of country-specific contexts" (Klemm, Harvey, Wainwright, Faillace, & Wasantwisut, 2009). For Vietnam, attention to a broader conception of food quality will help the country navigate through its unique circumstances.

The following section presents a series of recommendations for programs in Vietnam to facilitate an iron fortification program using fish sauce. The recommendations are based on our tri-partite organizational framework as applied to the specific circumstances of contemporary Vietnamese culture. Our recommendations adopt an interdisciplinary approach to improving nutrition, and rely on information from food ethnography studies in anthropology and sociological literature on food, best practices in public health, tailoring development concepts to Vietnam, and results of interviews with Vietnamese women about fish sauce consumption. Each recommendation will be followed with a description of its implications for Vietnam's fish sauce fortification program.

Although cost benefit analysis is beyond the scope of this study, we believe that our recommendations are relatively low-cost and high-benefit improvements to the current fortification program. In order to ensure the cultural awareness, cost effectiveness, and sustainability of this fortification program, our recommendations also suggest that the Vietnamese government collaborate with the private sector to develop a multi-faceted communication and intervention strategy. These recommendations require a commitment at national and local levels, and thus involve both top-down and grassroots level interventions. Our recommendations are outlined in Figure 2 and are fully described in subsequent sections of the chapter.

Figure 2

Recommendations for Vietnam's Nutrient Fortification Programs



RECOMMENDATION 1. ADVOCATE FOR THE ROLE OF THE ANTHROPOLOGIST AND FOOD ETHNOGRAPHY

Each of the disciplines we have explored thus far is a culture in and of itself – sociology of food, anthropology of development, and political economics. We need to convert the tacit knowledge that exists within these disciplines into explicit knowledge, communicate across disciplines in similar ways that we communicate across cultures, and bring to bear the tacit and explicit facets of a variety of fields. The overarching organizational point of this recommendation is that we should increase sensitivity to the joint contribution of a variety of disciplines. The remaining recommendations are intended to guide this multi-disciplinary approach. This process of sensitizing those responsible for food policy and programs requires considering the contribution of a number of

disciplines, each of which has gone its own separate way for too long. Food, public health, and nutrition are not "just" matters of biology, economics, culture, or political science, but require the perspectives of all of these disciplines. This thesis is a testimony to the need for increased input and communication across disciplines – the remaining recommendations are amplifications of this point.

As indicated by our interviews and organizational framework, "the understanding of society as interaction, and of culture as the knowledge that dynamically flows from that interaction" can improve public health programs (Anderson, 2005, p. 5). Indeed, the relationship between culture and food behaviors has become the subject of continued research in anthropology, sociology, and interdisciplinary cultural studies. Although this relationship is difficult to articulate and thus often debated, it is important because it guides behavior and beliefs at individual and community levels. If public health programs can share and communicate this tacit, local knowledge that exists in the minds of individuals, the actual interventions are more likely to become part of cultural practice and eventually incorporated into "foodways or, more broadly, 'knowledge and culture'" (Anderson, 2005, p. 5)

The preceding recommendation is based on strategies and practices of knowledge management, which divide knowledge into two primary categories: tacit and explicit. The primary quality of tacit knowledge is that it originates from the minds of individuals, thus making it difficult to articulate. People must become "knowledge carriers" of this information, which requires moving across disciplines and organizations to facilitate articulation of this knowledge. In this

model, fostering environments for idea sharing and knowledge transfer become increasingly important. In addition, proper leadership ensures that existing knowledge is surveyed and that individuals possessing these different types of knowledge communicate with one another (Sanchez, 2004).

Unlike the tacit knowledge approach, explicit knowledge implies that individuals can explain and articulate that knowledge, especially if provided with an environment conducive for communication. This approach assumes that certain types of organizational structures can help manage existing knowledge (e.g., best practice manuals, documents, literature). These forms of information systems not only assist in the management of explicit knowledge, but can also help to create new knowledge (Sanchez, 2004).

Our organizational framework illustrates the interaction between a particular place's political economy, culture, and individual nutritional beliefs and practices. Underlying this interaction, however, is a wealth of tacit and explicit knowledge. To improve public health, accessing tacit knowledge about food and culture and incorporating this knowledge into an intervention is important. Our interviews illustrate that converting tacit knowledge into explicit knowledge is challenging and requires ethnographic research. This process illuminates and contextualizes cultural beliefs and patterns.

ROLE OF THE ANTHROPOLOGIST AND FOOD ETHNOGRAPHY

Anthropologists are in a position to help develop policy in regard to health, nutrition, food inspection, relation of food to specific cultures, and world hunger, although they often do not sufficiently take on this role (Edelman &

Haugerud, 2005). In fact, anthropology is considered among the most unique of the social sciences (Cochrane, 1976). In Vietnam's fish sauce fortification program, for example, anthropological research can inform policy prior to implementation of a fortification effort by assessing the 'fit' of an intervention program to local cultural values and practices – a key aspect of our organizational framework. Ideally anthropological research will inform policy prior to implementation of a fortification effort. In the case of fish sauce, however, food ethnography can become a knowledge sharing mechanism and a means to integrate disparate conceptions of food quality, even though the program has already begun. In this process, anthropologists must expand their academic horizons beyond the study of local movements in order to explore the relationships between people and the foods they consume (particularly through food ethnography). [4] Ultimately, food ethnography will provide this fortification

[4] Food ethnography is a form of descriptive analysis that broadens the understanding of the causes of a nutritional problem. In doing so, it looks at how people utilize and interact with food, including the cultural and socio-economic circumstances followed by more contextual methods of problem-solving. Policy makers, nutrition program staff, and field research consistently rely on nutritional data about the problem they are targeting. Insight and information about how people deal with their food is equally important, however. Since the 1930's, a number of anthropologists have paid increased attention to food culture, food habits, and food ethnography. The early anthropologists in this field were Audrey Richards and Margaret Mead. By 1978, the International Commission on the Anthropology of Food and Nutrition (ICAF) was created and began to organize workshops that brought experts together from the fields of anthropology, ethnography, and the nutritional sciences.

Audrey Richards describes the challenges of this growing field of interdisciplinary food and nutrition research: "What pleases the anthropologist, displeases the nutritionist and the other way round, what pleases the nutritionist, displeases the anthropologist." Indeed, ethnographic food data at first glance do not always correlate with the hard data of nutritional science. Those who advocate for the food ethnography approach, however, argue that while such hard nutritional data do reveal information about the complexity of the problem, including energy and nutrient deficiencies, this information is only a component of the entire nutritional problem.

In doing so, food ethnography offers an explanatory analysis of food systems and food habits, including ways people choose, prepare, and eat foods, which then provides a complement to the hard nutritional data. Nutritional data combined with food ethnography provides a more meaningful analysis of the nutritional problem (Hartog, Staveren, & Brouwer, 2006, p. 224).

effort with an anthropological foundation that has potential to connect the beneficiaries of this program.

Our interview data suggest that future fortification programs in Vietnam should rely on ethnographic research regarding the beliefs and practices of citizens in different regions and from different socioeconomic levels before preceding with intervention programs. This will better enable a) building cultural awareness of the program, b) incentivizing knowledge about the fortification program, c) spreading awareness about the potential fortification effort within targeted population groups, and d) bridging the gaps between disparate conceptions of food quality. Such research may also assess whether or not fortification of a particular staple food item clashes with local conceptions of that food item's quality or that the food item is not consumed because of cultural practices and beliefs. Although this recommendation offers great potential for future fortification programs in Vietnam, its limitations must also be considered in moving forward.

Because an iron supplement fortification program has already begun in Vietnam, application of ethnographic research retrospectively will be a logistical challenge. This recommendation will be most effective when integrated into the early period of a fortification program, at which point the explanatory analysis derived from food ethnography can inform the design of programs and policies, rather than simply complement them.

RECOMMENDATION 2. DESIGN AND IMPLEMENT MANDATORY FORTIFICATION LEGISLATION:

Once anthropologists and other specialty disciplines have completed necessary baseline research, fortification programs can be implemented via governmental legislation or central decision-making, coupled with possible international aid. Laws and regulations may have to be developed that initiate and enforce programs, specify fortification standards, packaging requirements, standards for labeling, and means of enforcement (MOST: The USAID Micronutrient Program, 2001).

Although there is a general consensus regarding the importance of reducing micronutrient malnutrition in Vietnam, such commitments must be accelerated and solidified in a mandatory fortification policy. There is encouraging progress along the proceeding lines. On February 10, 2009, Vietnam's national workshop on mandatory flour fortification verified an initial commitment to address issues of micronutrient malnutrition in Vietnam. At this meeting, Vice Minister of Health Dr. Cao Minh Quang explained that in order to control and prevent micronutrient deficiencies through programs like fish sauce or flour fortification, Vietnam "needs a comprehensive strategy which requires measures and interventions to be taken simultaneously" (Flour Fortification Initiative, 2009b). Similar to Vietnam's experience with flour fortification in 2003, however, "it is clear that a voluntary standard along with advocacy…will not succeed" – supporting our call for mandatory policies and enforcement mechanisms (Flour Fortification Initiative, 2009a).

Our research also suggests that a mandatory fortification program, assuming possible price controls, will enable Vietnamese of all socio-economic classes to maintain cultural practices of fish sauce. If fortification remains optional for fish sauce producers, Vietnamese consumers will have to alter their food behaviors in order to purchase the fortified product: the iron-fortified fish sauce may not be a brand they would otherwise prefer to purchase.

Similar nutrition programs have been effective in other cases when a government mandated nutrient production, especially when the nutrient was consumed regularly by the population (Klemm, et al., 2009). For example, because of widespread consumption of sugar in Guatemala and Nicaragua, a mandatory program to fortify sugar with vitamin A achieved a program coverage rate of 75 percent, providing approximately 150 percent of the estimated average requirement of vitamin A (Dary, Harvey, Houston, & Rah, 2008). This program reduced xerophthalmia in Guatemala, a condition in which the eyes cease to form tears due to vitamin A deficiency. It also reduced low serum retinol in pre-school age children in both Guatemala and Nicaragua (Arroyave, Mejia, & Aguilar, 1981).

Another key component of this program's success in Central America was the creation of a national commission for food fortification, which mandated sugar fortification and ensured program stability. This commission also required Guatemalan Ministries of Health, Agriculture, and Finance to collect data on the program's effectiveness. Therefore, for Vietnam we recommend that the Vietnamese government establish a mandatory iron fortification program.

RECOMMENDATION 2.1 MANDATORY IRON FORTIFICATION PROGRAM AT THE NATIONAL LEVEL

- Establish a national commission for food fortification: This national commission will oversee the production process of fortified fish sauce and ensure that the public sector remains committed to implementing the program. This commission should work closely with the Ministry of Health and could be a building block for future fortification programs in Vietnam.
- Develop government seal of approval: Research on fortification indicates that a government seal or formal approval helps in the promotion of fortified foods among citizens and generally can help a program achieve its goals (MOST: The USAID Micronutrient Program, 2001).
- Ensure quality assurance and control in production*:* A quality assurance and control system will help to ensure consistency in product taste and appeal, and may also test ingredients on a regular basis (MOST: The USAID Micronutrient Program, 2001). This stipulation must be universally implemented so that the consumer remains confident in the quality and taste of the fortified fish sauce during both the food purchase and consumption phases.
- Develop a system of governmental monitoring and evaluation: Monitoring and evaluation will strengthen consumer confidence and ensure that standards and legislation remain as effective as possible (MOST: The USAID Micronutrient Program, 2001). This stipulation will require ongoing research in the population to assess whether or not people are using fortified fish sauce,

like it, and are getting healthier. Unlike quality assurance and control that addresses fish sauce production, this recommendation ensures that fortificant levels are appropriate at the point of fish sauce consumption. This step will require Vietnam to improve its design of systems to monitor, evaluate, and document the impacts of micronutrient programs, which resonates with the Micronutrient Forum's recommendations that address the most significant barriers to micronutrient programs' success (Klemm, et al., 2009).

RECOMMENDATION 2.2 PROGRAMS FOR TARGETING AND EDUCATING CITIZENS

Key to an effective fortification program in Vietnam will be an ongoing governmental effort to ensure that citizens are made aware of the fortification program and its benefits to them, even once it becomes mandated by the government. This can be achieved as follows:

- Strengthen social marketing campaigns: Although the current social marketing techniques vary in rural and urban settings, they need strengthening. For example, the information, education, and communication programs in urban settings must be accelerated to keep up with the rural areas, where loudspeaker and television campaigns have been effective – as reported by a number of our rural low-income interviewees. In urban settings, increased use of promotions within supermarkets, which are a typical means for promoting products, may be useful in promoting the fish sauce program. An enhanced information, education, and communication approach in all regions can assist in creating demand well into the future (Klemm, et al., 2009).

RECOMMENDATION 3. ENHANCE STAKEHOLDER COLLABORATION AND PRIVATE SECTOR INVESTMENT

We urge genuine collaboration among the Vietnamese government, the private sector, and non-governmental organizations as a critical aspect of an effective iron fortification effort in Vietnam. According to a 2009 Report of the Micronutrient Program, one of the overarching problems in implementing a micronutrient program implementation is, "The micronutrient community has not harnessed the full potential of private sector resources, expertise, and delivery mechanisms to improve micronutrient products, services, and delivery platforms" (Klemm, et al., 2009). Ensuring the proper marriage between business, the Vietnamese government, and the social sector will require special efforts - effective public-private collaborations are the product of mutually understood institutional missions and partner influences, a shared agenda, and strong regulation and enforcement. Without these stipulations, however, the private sector cannot develop ideas and solutions, and Vietnam's public sector will not benefit from the potential expertise of the private sector. Continuity in institutional mission, agenda, regulation, and enforcement across the sectors is important for implementing this recommendation.

This recommendation is cast within the reality that nutrition funds are quite scarce worldwide, resulting in incomplete or fragmented programs (Klemm, et al., 2009). For this reason, we recommend an increase in private sector collaboration. The private sector involvement will increase the competition within the sectors and, in turn, the funds available. Encouraging for-profit institutions to

recognize this investment opportunity will require developing effective communication channels. These communication channels will also trigger a domino effect within the private sector as companies begin to recognize the returns of this investment strategy. Whereas the Vietnamese government may be motivated by politics and development agencies by the interest of contractors, the private sector relies on competition, which will change the existing dynamics of partnership. By encouraging for-profit organizations to join this fortification program, an unprecedented level of competitive discipline can be introduced, which will encourage more effective facilitation and increased collaboration across the sectors (Drayton, 2006).

Public officials and private executives often support the idea of public-private dialogue, but lack knowledge of relevant communication channels (Griffiths, 2003). As an initial step, Vietnam must create an ongoing forum for exchange of information between the private and public sectors. This forum will allow the public sector to spread awareness of the fish sauce fortification program and gain support from the private sector in order to expand and fund this program in the future. The private sector will also benefit from this forum by showing corporate responsibility and support for a new investment opportunity that improves the health of the consumers (M.G. Mannar & Ameringen, 2003).

Despite the private sector logistical and financial contributions, this recommendation has limitations. Indeed, it will require the micronutrient community to successfully address some of the greatest challenges hindering the scaling-up of evidence-based programs. In particular, this recommendation will

require a) coordination among stakeholders with different priorities, b) creation and execution of an effective communication strategy in the micronutrient community, and c) risk-taking on the part of the private sector to invest in this non-commercialized program. Despite its challenges, private sector involvement will be important for the sustainability of this program, and in particular for the unprecedented social entrepreneurial qualities it contributes.

RECOMMENDATION 4. BUILD FISH SAUCE FORTIFICATION INTO A BROADER, MULTI-DIMENSIONAL INTERVENTION PACKAGE:

Research on the effectiveness of anemia programs indicates the importance of integrated interventions - repetitive and sustained interventions to target the multiple causes of nutritional deficiencies. The following are recommendations to achieve these goals. Building fish sauce fortification into a more comprehensive program will be important to link the micronutrient community with the broader agendas of development and poverty reduction, health, and nutrition work (Abel, Rajaratnam, Kalaimani, & Kirubakaran, 2000).

RECOMMENDATION 4.1 PROGRAMMATIC STIPULATIONS

Programs that involve coordinated efforts tailored to local context are most successful in long-term reductions in anemia prevalence. According to the 2009 Report of the Micronutrient Program, an overarching barrier to micronutrient program success is, “The micronutrient community has not adequately engaged with broader nutrition, health, or development initiatives” (Klemm, et al., 2009, p. 8). Indeed, the tendencies toward vertical public health programs that target one disease at a time will negatively impact micronutrient

efforts in Vietnam. Increasingly, horizontal programs that require the micronutrient community to engage in broader health goals are important. In the case of Vietnam, the results of the food ethnography analysis encouraged in Recommendation 2 will enable incorporation of local conceptions of food quality into an overall iron supplement program. In addition, we call for a multi-pronged program based on our research that includes, for example, community health centers as primary health care facilities in rural Vietnam, community gardens located at health centers, and education programs at these centers.

Such multi-faceted programs should not be simply imposed on citizens, but rather introduced in a culturally sensitive way as a means to foster community development and awareness about iron deficiency. Over time, the private sector investment delineated in Recommendation 3 should be enlisted to further expand Vietnam's fortification program beyond this local first step and to participate in nutrition, health, and other development initiatives (e.g., microfinance).

RECOMMENDATION 4.2 PARTNERSHIP STIPULATIONS

Partnerships with agencies and programs already carrying out relevant interventions are also important mechanisms to integrate efforts. Examples of such global initiatives targeting anemia include the Global Alliance for Improved Nutrition (GAIN), Presidential Malaria Initiatives (PMI), Global Fund for AIDS, Tuberculosis, and Malaria, and President's Emergency Plan for AIDS Relief (PEPFAR) (USAID A2Z Micronutrient and Child Blindness Project, et al., 2006, p. 3). Because the primary cause of anemia in Southeast Asia is poor nutrition, rather than diseases (including helminthes infection, HIV/AIDS, or malaria),

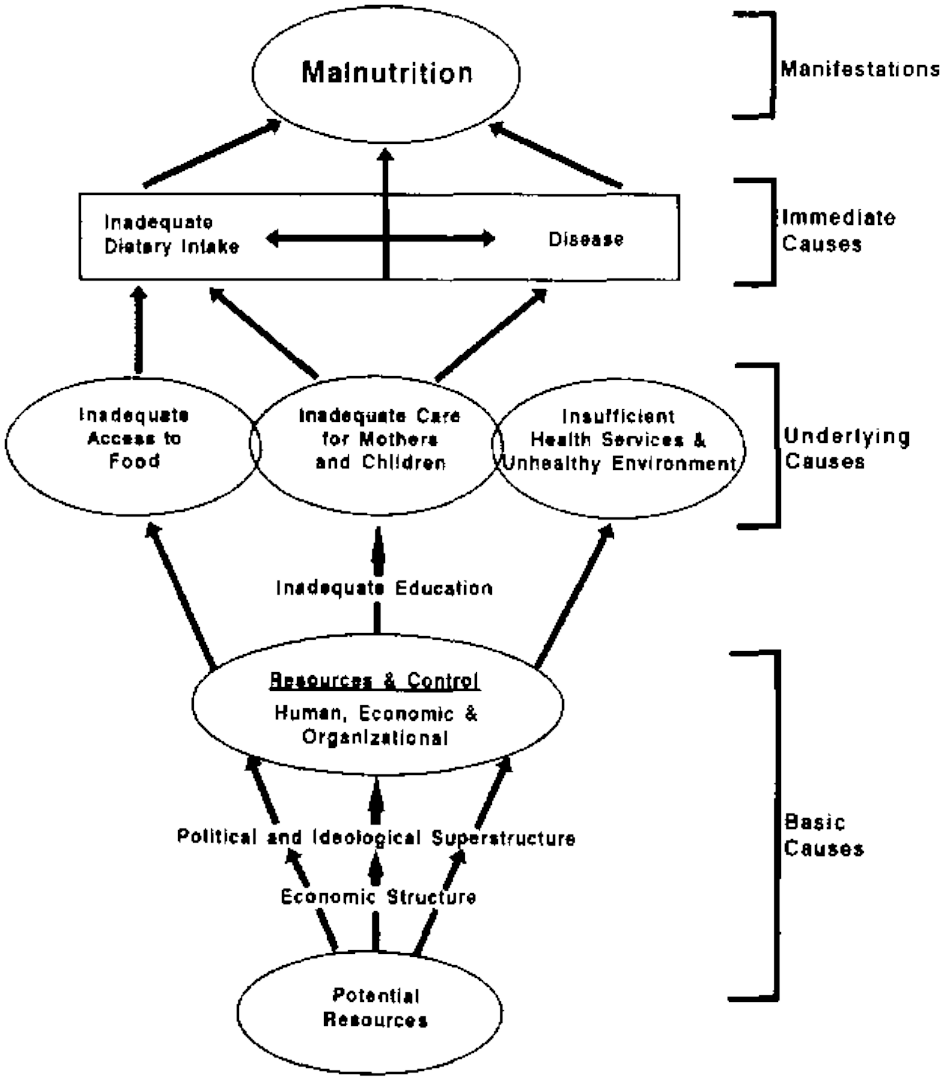
Vietnam should continue to foster a collaborative relationship with GAIN because of GAIN's programmatic focus on micronutrient malnutrition.

Vietnam's National Fortification Alliance – a working group of government, business, international organizations, and civil society that collaborate to accelerate food fortification – can be important in accelerating joint efforts and in receiving funds from GAIN. Because GAIN encourages the establishment of a strong National Fortification Alliance, Vietnam should further develop its fortification with GAIN's collaboration (Global Alliance for Improved Nutrition, 2009a).

A broad, multi-dimensional intervention package should also be guided by UNICEF's 1990 conceptual framework for nutrition (Pelletier, 2002). See Figure 3.

Figure 3

UNICEF Malnutrition Framework



The UNICEF framework, one of the most widely recognized approaches within the international nutrition community, describes how malnutrition and child death severely limit a country's development, and can be linked to basic nutritional deficiencies (Pelletier, 2002). As a result, the framework is consistent with our

principle that programs or interventions must be targeted to the underlying causes of malnutrition in specific societal contexts.

More to the point, the UNICEF framework states that the immediate causes of malnutrition are inadequate dietary intake and disease; the underlying causes are household food insecurity, inadequate maternal and child care, and insufficient health services and health environment. However, underlying these factors are basic structural forces, such as formal and non-formal institutions, political and ideological superstructure, economic structure, and potential resources (Pelletier, 2002). For Vietnam, the UNICEF framework provides a foundation for broader, multi-dimensional nutrition interventions that can be applied at the local levels to understand and address the immediate iron nutrition problem in Vietnam, and to pave the way for larger scale and sustained future program designs and policies.

RECOMMENDATION 5. INVEST IN RURAL LOW-INCOME WOMEN

Based on the results of our interviews, rural low-income women may be the most willing to purchase fortified fish sauce. And, they are also most likely to suffer from iron deficiency anemia. The fortification program that we recommended earlier, once mandated by the Vietnamese government, should continue to invest time, skills, and finances in this particular population group. Coverage rates and program evaluation statistics are too often merged with other population groups and national studies, resulting in insufficient attention to anemia-susceptible, low-income rural citizens. The National Fortification Alliance and other relevant sectors involved should consistently monitor these

communities to ensure access and use of iron supplements in their diets. The food ethnography component delineated in Recommendation 1 should also continue, especially for rural low-income groups, where the willingness to consume is greatest, yet the means to purchase is lowest.

Rogers (1995) provides a unique framework for implementing the preceding recommendations. His theory explores the mechanisms behind the spread of an innovation within a culture by taking into account the innovation itself, types of communication channels, the rate of the innovation, and the social systems that may benefit from change. Rogers defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, pp. 1-6). This theory is particularly relevant to iron fortification of fish sauce because it can be applied both contextually and universally. It also provides evidence that the 'opinion leaders' of a given society can have tremendous impact on the adoption of an innovation. Opinion leaders are the risk-takers who guide resistant or unconcerned members of society towards the innovation and also activate the domino effect within a social system in favor of the innovation. That is, an innovation's tipping point pivots on something quite tangible: the opinion leaders' support.

The adoption of an innovation, or the process of reaching this tipping point, has five parts, including: knowledge, persuasion, decision, implementation, and confirmation. During the knowledge phase, the individual initially becomes aware of the innovation. The persuasion phase occurs once the individual

becomes concerned with the implications of the innovation and begins to search for information on it. By the decision phase, the individual applies a degree of judgment on the innovation and considers both its advantages and disadvantages before use. At the point of implementation, the individual makes use of the innovation to whatever extent is appropriate in the particular context. Finally, the individual confirms his/her decision about the innovation in the confirmation stage by using it to the greatest degree possible (Rogers, 1995).

Rogers' five phases of an innovation provide a structural foundation for any process of change. Although these steps are not specific to food-based behavior change or to culturally important food items, they support the investment in Vietnam's key opinion leaders in rural areas – low-income women who are responsible for a family's diet and food preparation. Because of their willingness to adopt the innovation, rural low-income women can directly impact the tipping point of this innovation and have the potential to change social attitudes towards the fortified product over time.

Although the diffusion of innovation theory seems to be a promising strategy for introducing change in Vietnamese society, it has limitations. Diffusion of an innovation is not straightforward and requires the mobilization of particular groups within a social system. This recommendation also hinges on the assumption that the Vietnamese government will mandate a fortification program.

FINAL COMMENTS

Nutrition-based interventions too often overlook culture in the quest to quantitatively improve nutrition in a population. Such social change programs

become the product of biological measurements - nutritional requirements, human nature, and environmental assumptions. Similarly, theories of culture as a set of enduring social patterns, rules, and customs that are detached from biology are not sufficient: cultures do experience change and biology does inspire social behavior and beliefs. Recognizing the tacit and explicit interactions within a country's historical, cultural, and nutritional development is paramount to improving the micronutrient status of a population. This relationship between a particular place and its multi-faceted context should become a foundation for envisioning, implementing, and sustaining public health programs.

We need a biocultural fusion of these currently separate notions of biology and culture (Anderson, 2005, p. 5). That is, we should increase sensitivity to the varying concerns about health and nutrition and the fundamental values of cultures and subcultures worldwide (P. Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999). We should increase entrepreneurship and cooperation between public and private sectors of a society. Finally, we should apply this thesis' proposed organizational framework to the design and implementation of public health programs. Through this biocultural approach, we can incorporate important knowledge into the facilitation and improvement of micronutrient programs.

APPENDIX A:

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