THE BIOCULTURAL EPIDEMIOLOGY OF 'SECOND-HAIR' ILLNESS IN TWO MESOAMERICAN SOCIETIES

by

GEORGE EDWARD LUBER

(Under the Direction of Elois Ann Berlin)

This dissertation discusses two Mesoamerican folk illnesses, the Tzeltal Maya c*ha'lam tsots* and the Mixe *mäjts baajy*, which represent variations of 'second-hair' illness found in several Mesoamerican cultures. The Tzeltal Maya cha'lam tsots, or 'second hair', is identified by the presence of spiny, discolored hairs on the head. It is a potentially fatal condition thought to be caused by trauma to the head of individuals, mostly children. Hair loss, diarrhea, fever, edema, and general debility are common symptoms. Heinrich (1994) and Lipp (1991) report a similar illness among the Mixe of Oaxaca. *Mäjts baajy* or 'two head hairs', is a potentially fatal illness, primarily afflicting infants, marked by hair-loss, diarrhea, anemia, edema, moon-face, and fine, spiny hairs on the head. Tenzel (1970) describes another similar illness among the Cakchiquel Maya. In all cases, the core ethnomedical description, their sufferers, prognosis, and modes of treatment are nearly identical.

I present data demonstrating that these 'second-hair' illnesses carry a biomedical diagnosis of protein-energy malnutrition, and suggest that their similar cultural construction, in unrelated linguistic groups, is the result of a shared Mesoamerican "medical epistemology".

This comparative, biocultural research, employing ethnographic, clinical, epidemiological, and nutritional anthropometric methods, addresses a gap in the biocultural study of ethnomedical systems by clarifying the role that biology and culture each play in the cultural construction of illness while developing insights into the empirical basis of Mesoamerican ethnomedical concepts. Additionally, this research synthesizes current emic and etic approaches towards the development of an integrated biocultural medical anthropology.

INDEX WORDS: Medical anthropology, Biocultural epidemiology, Tzeltal, Mixe, Protein-energy malnutrition, Second-hair illness

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CHAPTER 1

INTRODUCTION

1.1 The Research Problem

Illness is a universal feature of the human condition and the search for solutions to the suffering caused by illness is a fundamental problem that has to be addressed by all societies. Anthropologists have long been interested in studying the ways in which different cultures deal with, think about, and act upon disease, and attempts to uncover cross-cultural patterns that underlie medical systems are not new in the medical anthropological literature (Pitt-Rivers 1924; Alland 1970; Foster 1976; Fabrega 1997). However, with few exceptions (Waxler 1981; Rubel 1984; Berlin and Jara 1993; Trotter 1991), most cross-cultural and comparative studies of folk illness to date have focused primarily on social and psychiatric processes, ignoring the role of biological factors even when they are clearly present as signs and symptoms (Browner et al. 1988).

Although medical systems are a central component of the comparative study of culture, many questions remain to be answered regarding the manner in which non-western, or ethnomedical systems confront states of disease and categorize and treat them as illness. For example, what is the relationship between the biological dimension of illness and its cultural presentation? What are the empirical bases for ethnomedical illness concepts and categories? Furthermore, what elements, if any, of ethnomedical illness concepts will be the same cross-culturally if the underlying biological pathology is also the same?

One of medical anthropology's most important contributions has been to demonstrate that indigenous peoples frequently posses detailed knowledge and beliefs relating to the factors that influence their own health and illness. Although it is widely held that the cognitive structures underlying illness behavior and decision making are implicit in utterances that can be systematically elicited from informants (Frake 1961, Metzger and Williams 1963), much contemporary medical anthropological research has focused on the psycho-social and ritual/symbolic aspects of health and illness beliefs rather than the biological and physiological realities that these utterances reflect upon (Browner et al. 1988). In fact, many of the classic works in the field can be characterized by this orientation (Pitt-Rivers 1924; Clements 1932; Evans-Pritchard 1937; Turner 1967, 1968).

Similarly, almost all work dealing with Maya and Mixe ethnomedicine has focused on its ritual and symbolic basis (Fabrega 1973; Holland 1963; Lipp 1991; Metzger and Williams 1963, Reyes Gomes 1985). This emphasis on the religious and cosmological aspects of Maya and Mixe ethnomedicine has tended to de-emphasize the importance of empirical medical knowledge, leading one to the conclusion that their ethnomedical beliefs and illness concepts have a weak relationship with bio-physiological processes and that their curative strategies serve primarily to satisfy psychosocial needs through religious and magical healing principles (Berlin and Berlin 1996).

While investigating the cultural, symbolic, and the social context in which an illness is situated is important to the understanding of how cultures interact with illnesses, its emphasis, at the exclusion of other approaches, has inhibited the cross-cultural comparison of potentially equivalent conditions (Rubel and Hass 1990) which can lead to

new insights into the empirical nature and generative processes of ethnomedical systems (Browner et al. 1988). Despite this emphasis, there in an emerging interest in investigating the biological basis of folk illnesses and comparing ethnomedical syndromes cross-culturally, as can be attested by several recent studies (Baer et al. 1999; Green 1999; Berlin and Jara 1993; Trotter 1991).

This research addresses the gap in the anthropological study of ethnomedical systems by clarifying the role of biology and culture in the identification and cultural construction of illness. Following Arthur Rubel and colleagues' (1984) ground-breaking work with the folk illness *susto*, this research assumes that, when a disease state is involved, *some* of the cultural response will be generated by the pathology itself, relatively free of cultural guidance (Rubel et al. 1984; Fabrega 1981). I propose that identifying those features of the cultural model of an illness that are generated by the biological pathology and those which are generated by the culture of the individual will provide valuable insights into the complex interplay between biology and culture, and illuminate the fundamental processes through which ethnomedical systems identify, categorize, and treat illnesses.

In order to answer these questions, this research investigates a group of similar, and previously unstudied, ethnomedical syndromes that have been identified and described in several Mesoamerican cultures which I call 'second-hair' illness.

1.2 'Second-Hair' Illness in Mesoamerica

The Tzeltal Mayan ethnomedical syndrome *cha'lam tsots* and the Mixe *mäjts baajy* represent regional variations of 'second-hair' illness found in several Mesoamerican cultures (Tenzel 1970; Lipp 1991; Heinrich 1994; Berlin 1996; Luber

1999). Glossed ‘second-hair’ or "two layers of hair," *cha’lam tsots* is a complex Tzeltal Mayan ethnomedical syndrome identified by the presence of short, spiny hairs growing close to the scalp, under the normal layer of hair (Berlin and Berlin 1996). It is a serious, and potentially fatal condition that is believed by the Tzeltal to be caused by physical trauma to individuals, mostly children. Hair loss, diarrhea, fever, edema, loss of appetite, and general debility are primary elements of *cha’lam tsots*.

An illness nearly identical to *cha’lam tsots* has been reported among the Mixe of Oaxaca, Mexico (Heinrich 1994; Lipp 1991). The Mixe *mäjts baajy*, or "two head hairs," primarily afflicts infants and is marked by diarrhea, anemia, a swollen body, puffed cheeks, and "numerous, fine shining hairs, or 'small spines' growing on the head" (Lipp 1991:158). As with the Tzeltal Maya *cha’lam tsots*, *mäjts baajy* is considered a serious and potentially fatal illness, primarily afflicting children.

Similar ‘second-hair’ illnesses have also been identified among the Cakchiquel Maya of Guatemala (Tenzel 1970) and the Jacaltecos and Motozintlecos of the Guatemala-Mexico border region (Mellado Campos et al. 1994). The Cakchiquel Maya equivalent is *ki-xiwi* or “spines of the head” (Tenzel 1970), while the Jacaltecos and Motozintlecos call it “mal de pelo” or “bad hair.” As with *cha’lam tsots* and *mäjts baajy*, the major symptoms of these illnesses include edema, diarrhea, and fever and the primary diagnostic criteria is the presence of spiny hairs sticking out of the head, under the normal layer of hair (Tenzel 1970).

Each of these ‘second-hair’ illnesses are considered serious and potentially fatal illnesses that primarily afflict children under five years of age. Most importantly, in all

four cases, the core ethnomedical description of the illnesses, the primary sufferers, prognosis, and modes of treatment are nearly identical.

1.3 Objectives and Hypotheses

While previous researchers have described each of these 'second-hair' illnesses, this research represents the first attempt to compare them by investigating their potential equivalence from an ethnomedical standpoint, and identifying a biomedical correlate, if one exists. This will be accomplished by describing and comparing the insider's or emic perspective of each illness, and by utilizing biomedical and epidemiological methods to develop the biological picture of these illnesses.

I have chosen to compare the Tzeltal Maya c*ha'lam tsots* with the Mixe *mäjts baajy* as I have prior experience with the Tzeltal Maya, and because these two groups are, from a cultural and linguistic perspective, the most dissimilar of the group. This choice is also intended to minimize the influence of cultural diffusion as the basis for the similarity of their medical concepts and beliefs.

Operating under the principle that "analyzing the convergences and divergences [between the ethnomedical and biomedical models] provides insights into the underlying assumptions and logic that generate the structure, organization, and function of the medical systems being compared" (Browner et al. 1988:684), the objectives of the research are:

1. To identify and describe *cha'lam tsots* and *mäjts baajy* in emic, ethnomedical terms.
2. To identify and describe *cha'lam tsots* and *mäjts baajy* in etic, biological terms.
3. To identify points of similarity and dissimilarity in the emic, ethnomedical constructions of *cha'lam tsots* and *mäjts baajy*.

4. To identify points of similarity and dissimilarity in the etic, biomedical description and diagnosis of *cha'lam tsots* and *mäjts baajy*.

This research explores the proposition that this group of 'second-hair' illness represents a systematic, patterned, and culturally integrated expression and explanation of illness that is derived primarily from empirical observation of the biological and physiological manifestations of disease. I hypothesize that *cha'lam tsots* and *mäjts baajy* are both manifestations of protein-energy malnutrition, a potentially deadly form of malnutrition of which kwashiorkor and marasmus are extreme manifestations, and propose that the striking similarities in their ethnomedical constructions are the result of this shared biological etiology. This research will explore this proposition by presenting evidence supporting the following hypotheses:

H_1: A Tzeltal diagnosis of *cha'lam tsots* will identify individuals with distinct biological characteristics which will correlate with a biomedical diagnosis of protein-energy malnutrition (PEM).

H_2: A Mixe diagnosis of *mäjts baajy* will identify individuals with distinct biological characteristics which will correlate with a biomedical diagnosis of protein-energy malnutrition (PEM).

H_3: Those biomedical features that define *cha'lam tsots* and *mäjts baajy* will be the same.

H_4: Those culturally recognized attributes used by the Tzeltal to construct the Explanatory Model of *cha'lam tsots* will be the same as those used by the Mixe for *mäjts baajy*.

It is important to emphasize that this research does not intend to "squeeze folk illnesses into the taxonomy of bioscience" (Browner et al. 1988:684), but rather, as Barlett and Low (1980) recommend, examine the interactions and relationships between the biological and cultural factors influencing the cultural construction of illness.

1.4 Interpretive and Ecological Approaches in Medical Anthropology

Medical anthropologists traditionally have utilized two distinct approaches in their study of human illness and disease: the ethnomedical and the ecological approach. Cultural anthropologists often use an ethnomedical model to interpret the cultural response to threats to health. Ethnomedicine refers to "those beliefs and practices relating to disease which are the products of indigenous cultural development that are not explicitly derived from the conceptual framework of modern medicine" (Ackerknecht 1971:11). In this approach, emphasis is placed on the society's conceptualizations of illness, its causes and cures, the role of healers in treatment, and (especially) the relationship between concepts of illness and cosmology (Rubel and Hass 1990). From this perspective, "the basic features of the social system are revealed as the group organizes itself to control the disease" (Swedlund and Armelagos 1990:3).

This ethnomedical approach has typically taken the form of a meaning-based ethnography of illness, which focuses on the "words, situations, context and feelings which are associated with and illness and give it meaning for the sufferer" (Good 1977:39). In this meaning-based, or interpretive medical anthropology "sickness is seen, not as a reflection or causal product of somatic processes but as a meaningful human reality...(therefore) human illness is fundamentally semantic or meaningful" (Good and Good 1981a:174).

One of the major critiques of the ethnomedical approach has been its peculiarly mentalist orientation and its focus on psychiatric illnesses (Rubel and Hass 1990). This sentiment is reflected in the following passage by Horacio Fabrega:

> "The implicit assumption adopted by the researcher is that he is dealing with a disorder that is either typically psychiatric or at least psychiatric-like. Excessive preoccupation with this dimension on the part of culturally-oriented anthropologists has tended to obscure the influences that biological components have on illnesses" (1974:40).

The other major anthropological approach to the study of disease, the ecological approach, is primarily used by biological anthropologists. This model, derived from epidemiology, places health, illness, and disease within a system of "mutually interacting organic, inorganic, and cultural environments" (Armelagos et al. 1992:41). Analysis focuses primarily on the host-pathogen interaction and the cultural and behavioral factors which influence risk. In this approach, human behavior and ethnomedical knowledge are viewed primarily as adaptive mechanisms in the response to an often dynamic disease ecology (Alland 1970).

Critiques of the ecological model argue that its reliance on the epidemiological "host-pathogen" model, and adaptationist perspective obscures the real factors in the spread of disease, and its failure to consider the social, cultural, political, and economic factors that effect pathogen transmission and a population's susceptibility limit its explanatory capacity (Armelagos et al. 1992). Medical ecologists have been criticized as primarily concerned with the biomedical perspective of disease, have neglected the importance of social relations, and have only considered specific aspects of the human ecosystem (Singer 1996).

1.5 Towards a Biocultural Synthesis

Although medical anthropology is, theoretically, interdisciplinary, it has, until recently, been sharply divided between these competing biological and cultural approaches. The emergent advocacy for the increased integration of the cultural

"interpretive" and biological "adaptationist" perspectives on health and illness, towards the development of a biocultural medical anthropology (Hahn and Kleinman 1983; McElroy 1990; Armelagos et al.1992; Leatherman and Goodman 1997), seeks to ameliorate this divide by encouraging research into the complex association between disease, individuals, cultural beliefs and behaviors, and the socio-political systems in which they are located (Armelagos 1992; Brown 1990; Goodman and Leatherman 1998a; McElroy 1990).

The hallmark of the biocultural perspective is its integration of the ethnomedical and ecological/epidemiological approaches to the study of health through the nested analysis of both cultural, ecological, political-economic, and social perspectives of illness. It proposes to study ethnomedical systems (including Western biomedicine) from the perspective of the agents using these systems (Hahn and Kleinman 1983). It grounds its analyses of the biological basis of disease in biomedical concepts as biomedicine offers a uniquely biological and physiological description of illness that can serve as a common point for comparison in many studies (Armelagos 1992). Biocultural medical anthropologists argue that both the ethnomedical and ecological approach offer important conceptual and methodological tools to the study of health and illness, but the exclusive use of one approach, at the expense of the other, fails to consider the full range of factors influencing health, illness, and well-being.

In a response to early critiques of the biocultural model from Turshen (1977), Waitzkin (1979), and Singer (1989, 1996), Alan Goodman and Thomas Leatherman, among others, have renewed efforts to build a "new biocultural synthesis" (Goodman and

Leatherman 1998) that more effectively considers political-economic and ecological factors crucial to the understanding of health and illness in human populations.

A major unresolved issue in the biocultural study of illness is the role of biological signs and symptoms in shaping the cultural construction of illness concepts and categories. Although it is well established that a society's social and cultural system of medicine provides the template through which sicknesses are conceptualized and healing occurs (Fabrega 1997), we know little about the influence of biological signs and symptoms on the cultural construction of folk illness categories.

Arthur Rubel's study of the folk illness *susto*, or 'fright-illness' (1964, 1984) is perhaps the best known attempt at uncovering the biological basis of a supposed "culture-bound" illness (Simmons 1985; Hahn 1995). He and fellow researchers found that those with *susto* (*asustados*) suffered a higher accumulated total of clinically-identifiable signs and symptoms than the control group. In addition, the *asustado* group had significantly higher levels of social stress than the control group. It is clear that having *susto* increased one's risk of death by exacerbating the consequences of existing organic diseases.

While examining the ethnomedical system of the highland Tzotzil Maya of Zinacantan, Chiapas, Fabrega and Silver (1973) discovered that "at a general, intuitive level it may be that knowledge about the strictly biological implications of disease is reasonably sensitive and accurate" (Fabrega and Silver 1973:132). As their study focused primarily on the symbolic and religious aspects of Tzotzil ethnomedicine, the possibility that "all persons recognize the biological implications of disease" (ibid:133) was noted, but left for future study.

Recent works on the empirical basis of ethnomedical treatments by Berlin and Berlin and colleagues (Berlin et al. 1995a; Berlin et al. 1995b; Berlin and Berlin 1996), as well as Barsh (1997), and Etkin (1988) have revealed a high level of efficacy and empiricism in traditional medical therapies, suggesting an acute knowledge of the biophysical basis of disease.

Berlin and Jara's (1993) discovery that the Tzeltal Maya illness *me' winik* is closely associated with gall bladder disease adds support to the notion that Tzeltal Mayan illness categories might have a closer association with biomedical categories than has been previously thought. From an applied perspective, these findings are significant because, prior to this discovery, *me' winik* was treated erroneously by local physicians as a gastrointestinal or gynecological problem (Berlin and Jara 1993).

Allan Young (1986) notes that "while the content and organization of medical beliefs are the product of both cultural and biophysiological realities, it is culture, [that] determines which biophysiological signs are selected and which are ignored, which objects and events are implicated in disease episodes and which are dismissed as irrelevant" (Young 1986:139). The objective is then to identify precisely how culture selects those biophysiological signs that are most important. Arthur Kleinman (1986) proposes that a comparative, cross-cultural and biocultural approach, holding disease as the dependent variable, will help to shed light on this cultural "screening" process.

Kleinman's and Eisenberg's conceptualizations of disease and illness as distinct but connected phenomena have advanced anthropological efforts at comparing the cultural response to abnormal physiological processes (Eisenberg 1977; Kleinman 1973, 1980). They defined measurable disturbances in bodily processes as "disease" and the

culturally-structured responses to these disturbances as “illness” (Rubel and Moore 2001). The elucidation of the differences between illness and disease was a breakthrough for the cross-cultural comparison of ethnomedical systems as:

> “Ethnographers now had a methodology for isolating universal biological manifestations independent of cultural setting, thereby providing those long sought objective, repeatable units so essential to controlled comparative research (Rubel and Moore 2001:441).

Therefore, for the purposes of comparing medical systems and illness concepts, medical anthropologists “can use diseases as biological constants to study the importance of cultural variation in understanding illness and coping with it” (Guarnaccia 2001:424). This study seeks to do just that. By identifying and describing the biological features of both c*ha’lam tsots* and *mäjts baajy* in biomedical terms, we can develop the “common-ground” on which to base our comparison of the cultural construction of ‘second-hair’ illness.

1.6 Significance

This research adds to the anthropological study of ethnomedical systems by contributing to the growing interest in research which bridges the gap between cultural “interpretive” and bio-epidemiological approaches towards a “new biocultural synthesis” (Goodman and Leatherman 1998). Following the biocultural approach to the study of folk illnesses, this research seeks to go beyond internal "emic" descriptions of illnesses towards the synthesis of both the ethnomedical and biomedical construction of illness with the explicit intent of developing an ethnographically valid and systematic cross-cultural comparison of two potentially-equivalent ethnomedical syndromes.

The integration of the cultural 'interpretive' and biological-adaptationist perspectives on health and illness makes this research even more relevant to the goals of medical anthropology by contributing to attempts at bridging the divide between biological and cultural approaches to the study of health and sickness. This theoretical and methodological integration is significant for anthropology as a discipline as it will provide the cornerstone for renewed collaboration that can enable the field to stand more united and develop a more singular voice.

In addition, this comparative approach is theoretically important for a biocultural medical anthropology for it will enable us to come to a greater understanding of the empirical basis of the Maya and Mixe ethnomedical systems, while developing generalizable relationships between the social, cultural, and biological variables influencing the cultural construction of illness, with the ultimate goal of illuminating the general principals upon which these systems of healing are based (Browner et al.1988; Leatherman 1989). In addition to the works of Rubel (1984), Weller (1984, 1984b, 1991), Fabrega (1973), James Young (1981), Foster (1994), Berlin and Berlin (1996) among others, this comparative research seeks to contribute to the development of a pan-Mesoamerican medical anthropology.

1.7 Outline of the dissertation

Chapter 2 will provide the background to the research communities where this research was conducted. It will focus on the cultural, political, economic, and ecological factors which are relevant to the study of illness and its determinants in these southern Mexican communities. Chapter 3 describes the research design and choice of methodology. As the integration of ethnographic and biological methodologies is a

hallmark of this biocultural approach, this discussion will describe the manner in which these two approaches can be most effectively combined.

The bulk of the data that were collected for this research is presented in Chapters 4 through 6. Chapters 4 and 5 develop the emic, ethnomedical perspectives of the Tzeltal c*ha'lam tsots* and the Mixe *mäjts baajy*. Chapter 6 explores the biological and epidemiological perspective of these illnesses and presents data to support the diagnosis of a biomedical equivalent.

Chapter 7 compares the ethnomedical and biomedical perspectives of 'second-hair'. It analyzes similarities and dissimilarities between the ethnomedical models described in Chapters 4 and 5, and the biomedical model developed in Chapter 6. In addition, chapter 7 will explore some of the reasons for the difference in epidemiological patterns noted between c*ha'lam tsots* and *mäjts baajy*. Chapter 8 will conclude this dissertation with a discussion of the theoretical and applied significance of this comparative, biocultural research.

CHAPTER 2

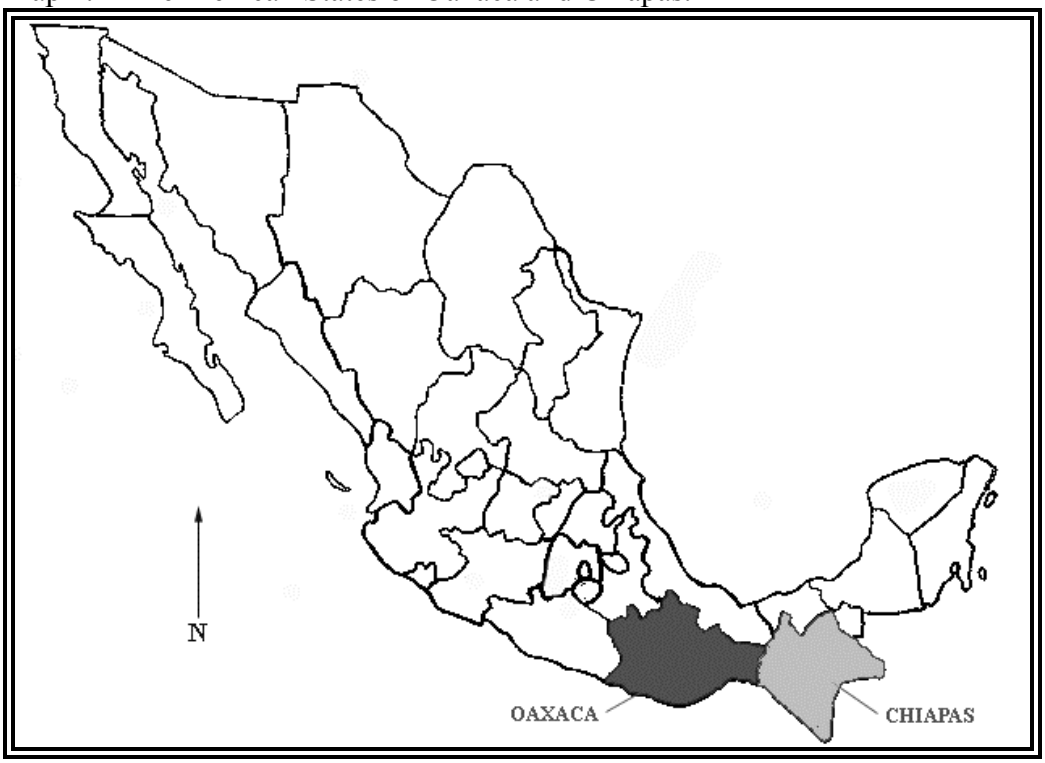
THE RESEARCH SETTING

2.1 The States of Oaxaca and Chiapas

This research was carried out among two indigenous groups of southern Mexico: the Tzeltal Maya of highland Chiapas, and the highland Mixe of Oaxaca. Although I have identified 'second-hair' illness in at least four cultures, I chose to conduct this research with indigenous groups from different language families, cultures, and social histories, with the explicit purpose of determining the cross-cultural variation in the importance and interpretation of biological signs and symptoms in the cultural construction of illness. While both of these groups are part of the Mesoamerican culture area, practice corn-swidden agriculture in marginal highland ecosystems, and share many sociocultural features, they are quite different from a linguistic and historical perspective.

Compared to the northern and central states of Mexico, the southern states of Chiapas and Oaxaca are characterized by their rugged landscapes, high linguistic and ethnic diversity, and by their poverty. Oaxaca stands out for having more speakers of indigenous languages than any other Mexican state. Its one million speakers, representing 14 major languages, accounts for 19% of Mexico's total speakers of indigenous languages. Chiapas is a close second to Oaxaca with 716,000 speakers, representing 11 languages, accounting for 14% of the country's total (INEGI 1990; INEGI 1993; Monaghan and Cohen 2000).

Map 2.1 The Mexican States of Oaxaca and Chiapas.



The highlands of Oaxaca and Chiapas are recognized as being among the most impoverished regions in Mexico. Both Oaxaca and Chiapas lag behind the national average with respect to several key sociodemographic factors (Table 2.1), including housing and education. The steep, mountainous terrain of these regions makes transportation and communication difficult. Only recently have roads reached much of the study area, and telecommunication infrastructure varies from poor to nonexistent. Extreme poverty, the remoteness of these regions, and general governmental neglect has severely hindered the provision of key social services such as education, health care, clean water, and sewage and waste management.

Table 2.1. Selected Sociodemographic Characteristics

	National	Chiapas	Oaxaca
Housing			
Average Occupants per Dwelling	4.7	5.2	4.9
Dwellings with indoor plumbing (%)	85.7	67.1	68.3
Dwellings with sewage (%)	74.9	56.5	44.7
Dwellings with dirt floors (%)	15.4	38.8	39.9
Education			
% Literate (over 15 years old)	89.7	75.2	77.3
% Without formal education	8.7	20.6	17.3
% Completed secondary school	29.2	17.8	18.2

Source: INEGI 2000

The poor quality of housing, education, and general poverty of these regions severely impacts health status. This contributes to the decline of life expectancy and the increase in mortality rates as compared to the national average (Table 2.2).

Table 2.2. Life Expectancy and Mortality Rates: Oaxaca, Chiapas, and Mexico

	National	Chiapas	Oaxaca
Life Expectancy			
Males	72.4	69.2	69.3
Females	77.0	74.0	74.0
Mortality			
General [1]	4.6	4.2	5.3
Infant [1]	15.8	14.2	15.9
Children (1 – 4 years)	1.0	1.5	1.9
Children (5 – 14 years)	.40	.52	.49
Maternal [2]	5.3	6.6	6.4

Source INEGI 2001; [1] Rates per 1,000; [2] Rates per 10,000 live registered births

In the following discussion, I provide a closer look at the Tzeltal and Mixe, focusing on the cultural, socio-economic, and ecological factors which are relevant to this cross-cultural and comparative study of illness and its cause.

2.2 The Tzeltal *Municipio* of Tenejapa

The *municipio* (municipality) of Tenejapa is one of 14 highland Mayan comminutes surrounding the regional center of San Cristóbal de las Casas, in the

southernmost Mexican state of Chiapas. With a population of 22,237, spread out over 99.4 km^2, it is one of the most densely populated of the highland Maya municipalities at 238 persons per km^2 (INEGI 1990).

This region of the central highlands of Chiapas has been fertile ground for anthropological research and, as such, boasts a rich ethnographic (Collier 1975; Cancian 1992; Vogt, 1969; Vogt 1976) and medical anthropological literature (Berlin and Berlin 1996; Berlin and Jara 1993; Fabrega and Zucker 1977; Fabrega 1973; Holland 1963; Metzger and Williams 1963). About half of the anthropological literature on Mexican Indians published between 1965 and 1995 deals with Chiapas (Kohler 2000:179). As with much of rural Mexico, this region has seen dramatic socioeconomic and political changes over the last few decades (Cancian 1992).

The *cabecera,* or municipal seat, known as *Tenejapa centro*, or *mero Tenejapa* ('true Tenejapa') lies on a paved road approximately 28 km to the north east of San Cristóbal. Since the Zapatista uprising on January 1, 1994, the road to Tenejapa, and other major arteries into the indigenous comminutes, has been consistently improved and is now in good condition, making this once remote region quite accessible to the services of the regional center.

The once arduous trip over mountainous terrain, which used to take 6-8 hours, now can be traversed in less than 40 minutes. Regular and inexpensive *collectivo* (collective taxi) service connects Tenejapa to San Cristóbal. Transportation to the outlying communities, or *parajes*, is provided by daily bus service. Few parts of the municipality lie outside of a day's travel to either San Cristóbal or the state capitol of Tuxtla Gutiérrez.

Map 2.2 Tzeltal and Tzotzil Municipalities of the Central Highland of Chiapas

source: PROCOMITH A.C. 1991

2.2.1 Language

Tzeltal Maya is the largest of the 11 languages spoken in Chiapas with 258,153 speakers (INEGI 1990). It is most closely related to its western neighbor language, Tzotzil. Together, Tzeltal and Tzotzil form the Tzeltalan branch of the Greater Tzeltalan subgroup of the Mayan language family (Campbell and Kaufman 1985). Tzeltal terms reported in this research are in the Tenejapa dialect.

2.2.2 Climate, Geography and Ecology

The climate of the central highlands is relatively wet and humid, with the rainy season running from mid-May through late October. Much of the moisture originates in the Gulf of Mexico to the northeast and the rain patterns are typical of tropical regions with clear mornings, turning to afternoon thunderstorms which taper off to light drizzle towards the evening. The dry season, running from November through early May, is mostly sunny, with warm days and cool nights. While frosts are not uncommon at high altitude during the winter nights, the lower elevations enjoy a temperate climate year-round.

Geologically, the highlands are composed mostly of marine limestone with volcanic rock intrusions (Berlin, Breedlove and Raven 1974:5). The terrain is mountainous with gentle slopes broken by rugged peaks and deep gorges. Erosion and dissolution of the limestone formation have resulted in a large number of caves and sinkholes, which have important ritual and religious significance in traditional Mayan culture. One major sinkhole (*sumidero)* is located just outside the municipal center.

Elevation varies in Tenejapa from a maximum of approximately 2,700 meters to a minimum of roughly 1,000 meters above sea level (Hunn 1977). Tenejapanecos recognize three altitudinally-distinct ethnoecological zones: 'tierra fria', 'tierra templada', and 'tierra caliente' (cold country, temperate country, and hot country), all which are found within the municipal boundaries. Although this vertical diversity makes farming difficult and less productive, it does provide a wide variety of microniches which are important to subsistence and economic activities.

Vegetation patterns vary significantly by altitude. Seasonal evergreen and tropical deciduous forests are found at the lower altitudes, turning to pine-oak-liquidambar and pine-oak forests at the higher altitudes. Evergreen cloud forests, once common, are all but gone at the higher peaks. With increased population pressure, the landscape is increasingly dominated by cleared pastureland and *milpa*, or cornfields, in different stages of succession. Isolated patches of old-growth and secondary forests dot the landscape.

2.2.3 Sociopolitical organization

Tenejapa still follows to some extent the "vacant center" (Tax 1937) settlement pattern typical of the Maya highlands. In this pattern, the political, economic, and ceremonial center, the municipal center, is surrounded by smaller, dispersed communities, or *parajes*, where the bulk of the population resides and works. This type of settlement pattern is called the vacant center because of the relative lack of permanent residents in the town center. Those who do reside in the center are typically religious and political officials fulfilling their official duties. Though the number of permanent residents in Tenejapa center is increasing, many still maintain a household and agricultural activities in their *paraje* of origin.

While it is assumed that the *parajes* or communities were once organized around water sources, they are more likely today to be defined and organized around the community school, a central plaza, and the omnipresent basketball court. The school is the center of community life and houses official space, the public announcement loudspeaker, as well as the community medical clinic.

Settlement density is great only in the municipal center, where services allow for a large number of households. In the *parajes,* household density is still low, though from older descriptions, probably greater than in the past. The typical household is comprised of several buildings, surrounded by fields in some stage of cultivation.

Most buildings have wood-plank, or cement-block walls, with a packed-dirt or concrete floor and a corrugated tin roof. The traditional thatch roofs are increasingly rare. More prosperous households are made of concrete block with cement roofs. The typical house-compound will have a minimum of two buildings, one for habitation, and the other for a kitchen. The kitchen building is almost always made of wood planks, and is constructed to allow for maximum ventilation as all cooking is done with firewood over an open hearth, or *fogón*. Ventilation in the kitchen is often very poor, a factor which undoubtedly contributes to the high level of respiratory illness. Households in the lower elevations typically have a poured concrete slab as a courtyard, which is essential for drying coffee beans.

The municipal center is the only locale in the municipality where modern amenities such as reliable electricity, indoor plumbing, sewer service and refuse pickup are available on a more or less consistent basis. Although there have been considerable efforts at bringing running water to and electricity to the *parajes*, almost half of the households in Tenejapa still do not enjoy either or both of these services (INEGI 1990). In most cases, having piped water means having a single spigot in the courtyard. Indoor plumbing is virtually non-existent in the *parajes*. Latrines and sewer systems are equally rare, and most people relieve themselves in cultivated land surrounding the house compound.

Social identity is still closely tied to the municipal traditions, as each municipality has a distinct clothing style. One can easily identify the municipal origin of an individual by their style of dress. The traditional dress for men consists of a black woolen poncho, white knee-length cotton shorts with intricate embroidery, flat woven hats with multicolored ribbons, and tennis shoes or leather sandals. Traditional women's wear consists of a heavy blue cotton skirt wrapped around the body and held in place with a broad woven cotton belt, and a white cotton embroidered blouse. A black woolen shawl provides protection from the cold. While men typically wear the traditional dress only during civil or religious duty, most women maintain the traditional style of dress, though they often substitute the traditional blouse with a T-shirt or turtleneck sweater. In addition to clothing, each highland municipality is characterized by a distinct dialect of Tzeltal or Tzotzil.

2.2.4 Economic Life

Agricultural labor still forms the basis of subsistence in Tenejapa. The majority of those who farm work for themselves, though there are an increasing number who lack land sufficient for subsistence. Those without land typically seek wage-labor in San Cristóbal, or the state capital Tuxtla Gutierrez, or on the *finca* plantations in the Soconusco region on the Pacific coast of Chiapas. *Finca* labor is important not only for the landless, as those with land are increasingly finding it necessary to supplement their subsistence activities with seasonal plantation labor.

The topographical diversity of Tenejapa allows for a number of zone-specific activities to supplement subsistence farming: wood-cutting in cold country, coffee, bananas, and citrus in the more tropical low country. Coffee production became

important in the central highlands during the late 1970's and boomed during the early 1990's (Kohler 2000), though the increased competitiveness of the world coffee market recently has resulted in a dramatic drop in coffee prices.

The oil-boom in northern Chiapas and Tabasco and government-funded projects such as road-building and hydroelectric projects during the late 1970's and early 1980's provided a much needed source of income for the impoverished indigenous groups of the highlands. Though they ultimately have improved the standard of living for the indigenous peasantry, these projects had a tremendous transformative effect on the cultural and economic life of the highland Maya (Cancian 1992) Today, those that cannot (or will not) work in subsistence activities seek jobs in San Cristóbal, Tuxtla Gutiérrez, and Mexico City. Farming, shop-keeping, school teaching, taxi-driving, and healing remain among the only professions that allow one to remain in their communities.

2.2.5 Tzeltal Health Beliefs and Behaviors

For the Tzeltal, illness can be caused by both natural and supernatural agents. Foster's (1976) classification of disease etiologies into naturalistic and personalistic illnesses provides a useful framework for understanding the difference between these two illness-causing agents.

Personalistic illnesses are attributed to the victim-specific, purposeful and active intervention of an agent, such as a supernatural being, or another human. The vast majority of work done on highland Maya ethnomedicine deals with conditions in the personalistic realm (e.g. Fabrega 1970; Fabrega and Silver 1973; Guiteras-Holmes 1961; Harman 1974; Holland 1963; Metzger and Williams 1963; Vogt 1966, 1976). This is

despite evidence that most of the illnesses the Tzeltal suffer from are in the naturalistic category (Berlin and Berlin 1996).

Personalistic etiologies are grouped by the Tzeltal into several categories. *Ak'bil chamel* or "human-given illness" ('sorcery') results in problems of the soul, or spirit resulting from sorcery, object-intrusions, and envy. Persons which exceptionally strong souls or special powers are capable of inflicting these conditions. *Smantal ta rios*, or "God-given illness" is the result of transgressions against the pantheon of deities that regulate the spiritual and natural world. Neglect of one's ritual duties can anger these illness-causing deities, causing illness. Insulting one's spiritual ancestors can also result in illness and even death. Another important personalistic condition, fright illness, or *xiwel,* is similar to the folk-illness *susto*, wide-spread throughout Latin America. Most likely an introduced concept, *xiwel* is caused by the loss of a soul which is scared out of the person by a frightening event, such as a bad fall or an encounter with a snake. The soul remains where it is lost and treatment requires the recovery and replacement of the lost soul.

The diagnosis of personalistic conditions is based on the retrospective assessment of etiological agent and typically takes place after plant-based treatments fail, or if the condition worsens. Diagnosis and treatment of personalistic conditions require the services of a specialist healer, called *jpoxi*, or *jpoxtawanej*, and may or may not include the use of plant-based remedies.

Naturalistic illnesses, called *bats'il chamel*, or "true illness", have their etiologies in natural forces, or in conditions such as excessive cold or heat, or through an individual's disequilibrium with the social environment. They are empirically

determined as diagnoses are based primarily on apparent signs and symptoms (Berlin and Berlin 1996). For example, the Tzeltal distinguish between several forms of diarrhea, based upon the observable characteristics of the stool: *ja'ch'ujt*, or "watery diarrhea" is diagnosed by its fluid content, *sim nak'al tsa'nel*, or "mucus-hidden diarrhea" by the presence of mucus, *ch'ich' tsa'nel*, or "bloody diarrhea" by the presence of blood in the stool. Each form of diarrhea is treated as a distinct illness which requires unique treatment.

Naturalistic conditions are also grouped by the Tzeltal into several major classes, including: gastrointestinal conditions, respiratory conditions, headache, dermatological conditions, fevers, arthralgias and myalgias (rheumatic pains), women's conditions, weakness and wasting, mental conditions, breaks and sprains, and emotional conditions (Berlin and Berlin 1996). The diagnosis of these conditions is based largely on the recognition of the biological manifestation of illness and treatments are almost always plant-based. Treatments of these conditions does not require extensive ritual healing activities such as prayers or the burning of candles and incense. The extensive and effective pharmacopoeia of medicinal plants is further evidence of the importance of this class of illness (Berlin and Berlin 1996).

As is common in many ethnomedical systems worldwide, Tzeltal illness classification is largely symptom-based in that many common illness terms are the equivalent of what would be defined as signs or symptoms in Western biomedical terms. For example, fever (*k'ajk*), cough (*obal*), and diarrhea (*tsa'nel*) are all considered illnesses in their own right. There is no linguistic marker differentiating signs or symptoms and illness.

The vast majority of Tzeltal illness falls in the naturalistic realm and most treatments are undertaken without the help of a specialist healer. Knowledge of the curative properties of medicinal plants is widespread and most healing is done within the household. Specialist healers or *jpoxtawanej* "one who knows medicine" are regarded with equal measures of awe and suspicion by the Tzeltal as they often charge exorbitant prices for their cure. They are typically called in when all other treatments (including those by government and private doctors) have failed.

The development and expansion of government health services since the 1950's has led to a situation of medical pluralism in which both traditional and Western medicine is utilized. This process of medical change has been prompted by government projects and evangelical Protestant groups who have promoted illness interpretations based on biological causes and combated medical beliefs based on the Mayan religious worldview (Menegoni 1996: 382). Despite the efforts of the evangelicals, utilization of government health clinics is low, perhaps as reaction to the evangelical movement, as the reaffirmation of traditional medicine is used by some as a defense of ethnic identity.

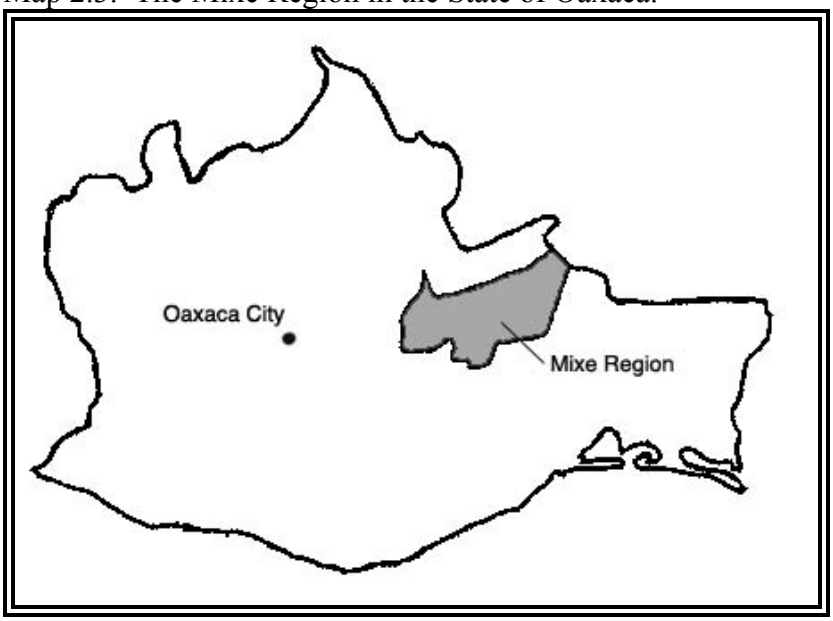
2.3 The Highland Mixe of Oaxaca

The Mixe inhabit the rugged and mountainous northeastern corner of the southern Mexican state of Oaxaca. The Mixe call themselves *Ayuuk jaa'y*, or simply *Ayuuk*, which translates metaphorically to "people of the beautiful language" (Reyes Gómez 1994). They are a fiercely independent people with a strong sense of shared identity, due in large part to their geographic isolation and historical resistance to Spanish conquest (Salamon-Nahmad 1990, Lipp 1991). They are distinguished as the only group to resist

military conquest by the Spaniards, including expeditions by Cortéz himself (Schmieder 1930).

The Mixe territory covers an area of some 3,063 km^2, stretching from the ceremonial center of the Mixe universe, the mountain of Zempoaltépetl (13,500 ft) in the western highlands of the Sierra Juaréz, to the municipality of San Juan Guichicovi in the eastern lowlands of the Isthmus of Tehuantepec. It is comprised of 19 municipalities, with a population of roughly 130,000 (INEGI 2000).

Map 2.3. The Mixe Region in the State of Oaxaca.



The majority of this research was carried out in the western highland municipality of Totontepec in the far northwestern corner of the Mixe territory, though additional interviews were conducted in the neighboring municipalities of Mixistlan de la Reforma, Tlahuitolepec, and Tamazulapam. Totontepec is the largest of the Mixe municipalities with a area of 318 km^2. With a population of 5,645 it has a population density of 17.75 persons per km^2, or about one-twelfth of that of Tenejapa's 223/km^2 (INEGI 2000).

The municipal center, Totontepec center, is the oldest of the Mixe settlements (Schmieder 1930) and lies on a dirt road approximately 110 miles to the northeast of Oaxaca. Although the trip from Oaxaca City is arduous, taking some 6 to 7 hours over terrible roads, locals regularly make the trip for lack of an alternative. One needs to travel to Oaxaca City for everything from governmental business to banking and health care. The Mixe town of Ayutla, on the road to Oaxaca City, has served as the regional center in times past, but still lacks many of the basic services available only in the state's capitol. Regular bus service connects Totontepec and the neighboring municipal centers to Oaxaca City, but one must rely on foot-travel, or the occasional passing truck, to access the more remote communities, called *agencias*.

I chose to conduct my research with the western highland Mixe as they have been the focus of the vast majority of the ethnographic work (Monaghan and Cohen 2000). Additionally, one of the most prominent Mixe researchers, Dr. Salomón Nahmad-Sitton of the Centro de Investigaciones y Estudios Superiores de Antropólogica Social-Oaxaca (CIESAS-Oaxaca) established in 1984 the Centro de Investigaciónes Ayuuk-Mixe, with the purpose of coordinating, promoting, and facilitating research with the Mixe people (Nahmad-Sitton 1990). This center for Mixe studies is located in Ayutla and much of the work it conducts is carried out in this region. I was fortunate to be able to take advantage of the many collaborators and contacts made available by Dr. Nahmad-Sitton and the Centro de Investigaciónes Ayuuk-Mixe.

2.3.1 Language

Mixe is a sub-group of the Mixe-Zoque language family that includes Zoque and Sierra Popoluca (Kaufman 1962). With almost 113,000 speakers, Mixe ranks fifth on

Oaxaca's list of fourteen major languages (Monaghan and Cohen 2000). Mixe terms reported in this research are in the Totontepec dialect.

2.3.2 Climate, Geography, and Ecology

The municipality of Totonteptec lies at 6,035 feet above sea level on the northern slopes of the Sierra Juaréz, a prominent mountain range which forms the northern boundary of the Valley of Oaxaca, running along the spine of the Sierra Madre, through the center of Oaxaca. The east-west orientation of the Sierra Juaréz blocks the prevailing winds from the north, which originate in the warm waters of the Gulf of Mexico. As these winds sweep across Oaxaca towards the cooler waters of the Pacific to the south, they gain tremendous force. The winds on the Isthmus of Tehuantepec, the "waist" of Mexico, to the east are notorious, frequently toppling over trailer trucks as they pass through.

As these moisture-laden winds pass over the Sierra Juaréz, they deposit their rain on the northern slopes. As a result, the climate of the western highlands is cool and wet, with an annual average rainfall of over 172 cm (INEGI 2000). The rainshadow of the Sierra Juaréz is strong, and forms the high-desert Valley of Oaxaca, approximately 20 miles to the south.

October through March is the drier season with cool, sunny days. A nightly frost is not uncommon at the higher elevations. April through September is the wet season, with most of the rainfall occurring in the months of June through August. A mist-cloud is a constant companion of the higher communities during the wet season.

The Mixe region can be divided into four ecological zones (Lipp 1991). The western region is a high-altitude cold zone which averages between 2,000 and 3,400

meters. The ecology is characterized by oak and straight-boled pine forests, and at the higher altitudes by a tropical montane cloud forest. Towards the east, the elevation lowers, forming a temperate zone of 1,200 to 2,000 meters. This zone is characterized by *Liquidambar* and mixed hardwood forests, with cloud-forests at the higher peaks. Much of this zone is under cultivation and in various stages of reforestation.

To the east of the temperate zone is a lower-altitude dry zone of 200 to 1,200 meters. This zone stretches eastward to the municipality of San Juan Guichicovi in the Isthmus of Tehuantepec. This zone is composed of open pine forests and grasslands. The climate is dry and cultivation is possible only in the humid bottom lands. The far northeastern boundary of the Mixe region, on the border of the state of Veracruz, is a humid tropical forest zone.

2.3.3 Sociopolitical organization

As the mountain environment of the Sierra Juaréz offers no extensive level areas, the Mixe settlement pattern is significantly more concentrated than the Tzeltal. Although the population of the municipality of Totontepec is much smaller that that of Tenejapa, and its population density much lower, the steep terrain has favored larger, more concentrated settlements, not only in the municipal center, but in the outlying communities, or *agencias*, as well.

Like other Mesoamerican indigenous communities, the Mixe civil and religious organization is composed of a complex hierarchy of age-graded offices, or cargos. Totontepec, like 412 other municipalities out of 570 in the state, has (quite proudly) abolished political parties from its local government. Non-partisan, rotating elected officials each serve a one-year maximum as municipal president.

Mixe communities use the traditional *mitung* ('all to work') for public works. All able-bodied adults are required to commit time to the community, working to maintain roads or repair schools. Each week, the community loudspeaker announces the jobs that need to be done that weekend. Even those who have emigrated are morally obligated to send back support for the community.

Compared to the Tzeltal, Mixe traditional life, as witnesses by housing style, diet, medical practices, economic activity, clothing, and religion is vanishing at a much more accelerated rate. One of the first features of Mixe traditional life to disappear in the face of ladinoization was the wattle and daub, palm-thatched traditional house. Since the 1970's, these structures have been disappearing at a fast rate and during my field stay, I saw less than five of this type. I doubt any were used as the primary dwelling structure.

Most houses in this region are built of concrete block, with a large main building and one or two separate storage rooms. In contrast to the Tzeltal houses, the main building typically houses the bedrooms as well as the kitchen and eating areas. Most houses have indoor plumbing, with a flush toilet.

Men's traditional clothing, rarely worn, consists of a cotton shirt and pants, woven palm hats, and *huarache* sandals. In the colder, wet climates, a woolen poncho is standard. Women's traditional wear consists of the standard blouse, or *huipile*, and a long cotton skirt, tied at the waist with a woven sash. The most distinctive piece of clothing worn by Mixe women is a length of cloth folded and worn on the head as a covering. As with the highlands of Chiapas, each municipality has their own distinctive style of dress, though fewer and fewer Mixe continue to wear traditional dress.

Nothing is perhaps more central to the identity of the Totontepec Mixe than music. Although it is historical fact that the Mixe were never conquered by the Spanish military, legend has it that they were finally drawn out of their mountain stronghold by the beautiful music that flowed out of the Dominican mission in the nearby Zapotec town of Villa Alta (Schmieder 1930). Each municipality boasts an orchestra and several smaller bands (typically age-graded) which lead the procession on important religious events. In Totontepec, recordings of the municipal orchestra are played over the loud speaker at 4:30 am as a town wake-up call.

2.3.4 Economic Life

The Mixe territory covers a wide variety of different ecological zones and local economic and subsistence activities reflect this ecological diversity. Economic life in the Mixe communities is still based largely on subsistence agriculture, though the completion of the road linking Totontepec to the main highway has begun to change this. Swidden agriculture is still the favored method of preparing the *milpa* for a new crop as the mountainous terrain makes mechanized agriculture all but impossible.

The Mesoamerican triumvirate of corn, beans, and squash combine to form the basis of the Mixe diet. Potatoes are important crops for communities at the higher altitudes while the lowland communities produce *camote* (sweet potato) and sugar cane. The lower elevations of the Mixe territory are also engaged in coffee and cattle production for the regional and export markets (Bernal Alcantara 1991), though coffee has become less important over the past several years due to the steadily decreasing price of coffee beans on the global market.

Globalization has had a profound impact on Mixe economic and social life primarily due to the pressures of out-migration on working age men and women. Since the 1950's Mixe men and women have sought work in Oaxaca City, Mexico City, and the United States. Few families survive without the benefit of the weekly or monthly remittances sent back from family members working outside the community. My principal collaborator, Arelí Bernal Alcántara, is the only adult member of his family to have never worked abroad in the United States, primarily because a childhood accident left him quadriplegic.

2.3.5 Mixe Health Beliefs and Behaviors

Like most rural populations in Mexico, the Mixe suffer primarily from gastrointestinal disorders such as diarrhea, dysentery, and intestinal parasites, as well as upper respiratory ailments, rheumatism, and arthritis (Lipp 1991; Sesia 1993). Levels of severe malnutrition in children have been declining for the past two decades, though levels of mild malnutrition are still quite high (Baltazar Jiménez, personal communication 2001).

Of central importance to Mixe health beliefs are notions of causation of illness. Typically, minor and acute ailments such as cuts, bruises, stomach aches, diarrhea, and coughs are believed to be caused by natural forces. For the Mixe, these naturalistic illnesses typically are the result of an imbalance in somatic harmony that is brought about by several factors, including overeating, overexertion, and sudden shifts in body temperature. Most illnesses that the Mixe suffer are recognized as having natural causes and are cured by home remedies, particularly medicinal plants.

Personalistic illness for the Mixe is closely linked to morality and one can become ill as a result of violating social and religious norms. These transgressions are called *poky*, and are roughly equivalent to the Christian concept of sin (Lipp 1991). Another common cause of personalistic illness is *cip*, which is the result of extreme anger and conflict. Perhaps the most important (and common) class of personalistic illness is fright illness, or *cigi' wi*, which is the Mixe equivalent of *susto*. As mentioned before, this is a concept that most likely is imported. "Evil winds", or *mal aires,* known as *tsu box wiin tooy,* is a condition caused by the evil winds of the night entering the body and causing harm (Lipp 1991; Heinrich 1998).

There are several different general terms applied to Mixe specialist curers, or *curanderos: koco'y*, or *yahco'kpii'* "curer of all things" and also *co' ydumbii*, or "medicine workers" (Lipp 1991). The largest sub-group, herbalists, or *ujts nü tsoybü,* are called upon for their expertise in medicinal plants and typically treat naturalistic conditions such as diarrheas, coughs, and skin lesions (Reyes Gómez 1985). Their services do not command the fees typically given to healers specializing in personalistic conditions. Another important group of curers are the midwives, or *parteras* called *ma uunk wixyop'*. *Chupadores* are healers who know how to "suck" illness from the body. Called *mu' kpü*, these healers are typically called on to cure illnesses that are the result of personalistic conditions such as witchcraft and fright (Reyes Gómez 1985).

Mixe healers are not organized into any social grouping and, in general, deprecate the skills of other healers while praising their own. I have found that this level of competitiveness between healers is not uncommon in Mesoamerican societies. Mixe curers are consulted typically in the case of personalistic illness, though some are

consulted in the case of naturalistic illnesses such as serious trauma or childbirth. Although the cost for a "fright illness" cure is usually minimal, more elaborate rituals require a substantial cost, typically including a fee in addition to the purchase of the eggs, turkeys, incense, and candles which are required for the treatment. Lipp (1991) provides a thorough review of the ritual aspects of Mixe healing ceremonies.

The growing influence of Protestant religion since the 1970's has also impacted health behaviors as it forbids the use of traditional medical practices, though this proscription is not always followed. These influences, in addition to the education system's emphasis on the efficacy of biomedicine, have been important factors contributing to their increased utilization of western medicine, and the diminished influence of traditional medical practitioners (Lipp 1991). Despite the Mixe receptiveness to western medical forms, they maintain a strong respect for traditional medicine, especially the use of medicinal plants for the treatment of common, naturalistic illness.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

"The most fruitful approach to understanding folk illnesses is to seek an interaction between biological and social factors" (Rubel et al. 1984:122).

The main goal in this biocultural study of 'second-hair' illness is to understand how specific biological processes and cultural beliefs interact to produce a set of signs, symptoms, and behaviors that are recognized by members of a particular cultural group as a specific, identifiable illness (Browner et al. 1988). Towards this biocultural synthesis, Browner and colleagues (1988) propose a methodology and analytic framework which combines the emic perspective of the ethnomedical approach with the etic measures that bioscience and the ecological model can generate. The goal of this approach is to generate both an emic and etic dataset that will allow for the comparison of the ethnomedical and biomedical construction of illnesses.

While they do not claim that this approach is appropriate for all medical anthropological research, it is appropriate for those studies which aim for "cross-cultural comparisons of human physiological processes, the ways in which such processes are perceived by informants, and the culture-specific behaviors these perceptions produce" (Browner et al. 1988:682).

Following this methodology, there are three basic procedures to the research design adopted for this project. Each procedure was performed independently for both the Tzeltal *cha'lam tsots* and the Mixe *mäjts baajy*. These procedures are:

Procedure 1: Identifying and describing both ethnomedical syndromes in emic terms.

Procedure 2: Determining the extent to which both ethnomedical syndromes can be understood in terms of etic, biomedical concepts and diagnoses.

Procedure 3: Identifying areas of convergence and divergence between the emic and etic understandings of both illnesses.

The following discussion will describe the research design and methodology employed in fulfilling the objectives of each procedure.

3.1 Procedure 1: The Emic Perspective.

The first component of the research design explores the emic, ethnomedical construction of *cha'lam tsots* and *mäjts baajy* by developing an ethnographic description of each illness. In order to generate the ethnomedical description and explanation of each illness, I employed the explanatory model methodology set forth by Kleinman (1980) and modified by Berlin and Berlin (1996).

3.1.1 Explanatory Models

Explanatory models (EM) are sets of beliefs or understandings of illness that contain any or all of five components, or domains: etiology, onset of symptoms, pathophysiology and course of sickness (severity and type of sick role), prognosis, and treatment (Kleinman 1986:36). They are "formed and employed to cope with a specific health problem and need to be analyzed in that concrete setting" (Kleinman 1980:106). Therefore, they are an explanation of a specific illnesses, not illness in general.

The EM approach utilizes a semi-structured ethnographic interview (Spradley 1979) to elucidate emic understandings of a specific illness. This involves asking a patient (or a sufferer of an illness), or healer, open-ended questions concerning their knowledge of an illness. EMs have been widely used by medical anthropologists as a

core technique in the cross-cultural comparison of illness concepts (Rubel 1990), although they are most often used to explore the experiential aspects of health (Browner et. al 1988), and are rarely used to investigate the biological nature of an illness (cf. Berlin and Jara 1993)

It has been frequently noted that an individual's explanatory model can differ depending on the setting in which it is elicited. Therefore, anthropologists with experience in the local community, in touch with local customs and conventions, and accompanied by a native collaborator have the best chance of eliciting an accurate explanatory model for an illness. To obtain as accurate a model as possible, it is important to elicit them in the informant's home, and on their grounds, as they often differ most in the clinical setting. The home-elicited model "usually represents a more accurate and full disclosure of the patient's model" (Kleinman 1980:106). Therefore, all of our interviews were conducted in patients' and healers' homes.

All of the structured interviews were conducted with the assistance of a native collaborator, at the informant's home, and in the indigenous language: Tzeltal Maya or Mixe. When permission was obtained I tape-recorded our interviews. While the Tzeltal always consented to tape-recording, the Mixe were quite often reluctant to agree to let me record their interviews. In these cases, I rely on detailed interview notes.

All interviews were transcribed, verbatim, into Tzeltal or Mixe and translated into Spanish. Coding of each Spanish-text interview was conducted with the computer text analysis software N*U*D*I*S*T (Scolari 1996), and focused on identifying and coding the attributes of each of the five EM components.

Previous research conducted by Berlin and Berlin (1996) and myself (Luber 1999) concluded that knowledge about the Tzeltal Maya c*ha'lam tsots* is not held exclusively by specialist healers (curanderos or *jpoxtawanej*), but rather there are many individuals in each community who have had extensive experience with this illness and are considered specialist c*ha'lam tsots* healers. Often, patients will seek out these specialists first, before consulting a traditional healer, when seeking treatment for their illness.

3.1.2 The Explanatory Model Sample

For the Tzeltal sample, I conducted interviews with patients, traditional healers, and specialist healers with specific knowledge of *cha'lam tsots* treatments. With one exception, these interviews were conducted with healers from the municipality of Tenejapa. The one exception was a healer from neighboring Oxchuc, who was particularly knowledgeable about *cha'lam tsots*. A total of 26 EM interviews were conducted: 18 with patients, 8 with specialist healers.

For the Mixe sample, I was able to interview 10 traditional healers with experience or knowledge about *mäjts baajy* and its treatments. In addition, I was able to locate 14 laypersons who had direct experience with this illness.

3.1.3 Other Ethnographic Methods

In addition to the structured EM interview, I also made use of informal ethnographic methods to gather contextual and ethnomedical and epidemiological data. These included informal interviews with local Mexican physicians who provide health care in community clinics. Called *pasantes*, these doctors are recent medical school graduates who are fulfilling their year of obligatory social service. These interviews were

aimed at getting a better understanding of the health care needs of the communities and the prevalence and standard treatment of nutritional disorders.

In addition to interviews, I also accompanied these physicians on their weekly visits to outlying communities. Part of every *pasante's* duties includes surveillance of the nutritional status of community children and I frequently helped in measuring the height and weight of these children. During these visits, I was able to speak with the parents of undernourished children and gain a better understanding of the prevalence of 'second-hair' illness in the Mixe and Tzeltal communities.

Additional meetings with state and regional public health officials from the Instituto Mexicano de Seguro Social (IMSS), Secretaría de Salud (SSA), and Instituto Nacional Indígena (INI) provided a picture of the burden of disease on the local populations and was an important source of current epidemiological data.

Another source of informal ethnographic data came from rides I gave to locals on my way to the research sites. This was an unexpectedly rich source of data that I was fortunate to take advantage of by virtue of having a vehicle in the field. As travel to the outlying *parajes* or *ajencias* is often tedious and expensive, picking up hitchhikers is a common courtesy extended to all those who bother to wave down a vehicle. Therefore, it was not uncommon for me to have a car load of passengers headed for one destination or another. Never would a trip pass without a passenger inquiring as to what a foreigner like myself was doing in these parts. I would oblige their curiosity with a description of my activities and would inquire if anyone knew anything about these illnesses. These inquiries rarely failed to generate a lively discussion about these illnesses and provided

some valuable insights that were missed by the structured EM interviews. The results of these data are presented in Chapters 4 and 5.

3.2 Procedure 2: The Etic Perspective, biological and clinical data.

The objective of this phase of the research was to generate a picture of the biological basis of 'second-hair' illness. Data-collection procedures included medical histories, clinical examinations, laboratory analysis of blood and fecal samples, three-day dietary recall questionnaires, and anthropometric measurements.

As will be discussed below, 'second-hair' illness has been eradicated from the Mixe region. Therefore, the clinical and biological picture of 'second-hair' illness comes exclusively from cases identified among the Tzeltal.

3.2.1 The Case-Control Methodology

In investigating the biological dimension of illness it is important to specify how individuals diagnosed with a particular condition differ clinically from individuals not diagnosed with the condition. A standard epidemiological technique for addressing this important question is the case-control methodology (Lilienfeld 1994; Schlesselman 1982). This approach has been widely used by epidemiologists and anthropologists in the biological description of disease and the identification of associated risk factors (see Rubel et al. 1984).

In the case-control approach two samples are recruited: one sample of cases (sufferers of *cha'lam tsots*) and another sample of controls (non-sufferers). When conditions permit, a matched-pair sample is preferable. In the matched-pair methodology, each case is matched with a socio-economically and demographically (age, gender) equivalent control who has not been diagnosed with the condition. Each

participant is given the same battery of interviews and examinations and the results are compared.

Although I began this research with the intent of recruiting a matched-pair sample, I quickly learned that while mothers were willing to allow us to examine and treat their sick children, they were often hesitant to allow us to look at a healthy child. There is a widespread proscription in Mesoamerican societies against strangers obtaining bodily samples (hair, fingernails, blood) and mothers were often suspicious of our motives when we asked to examine healthy children, for fear of our obtaining these bodily samples.

Due to these difficulties I was unable to recruit a matched-pair sample. I was, however able to recruit an unmatched control sample, comprised largely of children, and a few adults who arrived at the examination center to consult with the doctor about another health condition. As most of these illnesses were acute gastroenteritis or upper-respiratory infection, they were recruited into the study as the best-possible substitute for a matched-pair sample of controls.

3.2.2 Sampling

Study participants were recruited from four communities in the municipality of Tenejapa. These communities were selected on the basis of several factors. First, I wanted to sample communities in each of the three ethnoecologically recognized zones in Tenejapa (hot country, temperate country, and cold country) as I felt that locally available food resources might have an impact on dietary patterns and resource use.

Second, I wanted to sample communities that had varying degrees of access to Tenejapa center and San Cristóbal. The differing degrees of access would, presumably,

affect the availability of certain products such as fresh meat (beef and pork) and fish, as well as the ability of men to seek daily wage-labor in Tenejapa center and in San Cristóbal. Two of the communities chosen were on well-traveled roads that offered relatively easy access to the municipal center and beyond. The other two were several miles off of the main roads and required long trips to town. Daily travel was not an option. The characteristics of these communities are summarized in Table 3.2.2:

Table 3.2.2 Communities surveyed for c*ha'lam tsots*.

Paraje	**Population** (estimate)	**Ethnoecological Zone**	**Elevation (meters)**	**Access to the municipal center**
Nabil	360*	Cold country	2200	Moderately difficult
Juxal ja'	470	Temperate country	1450	Easy
Tres Cerros	680	Temperate country	1475	Moderately easy
Cruz Pilar	350	Hot country	1011	Difficult

* this figure reflects the recent split of Nabil into two communities, Nabil and Bajchen

In ideal circumstances I would have preferred to have selected *parajes* in the municipality at random. Unfortunately, isolated opposition to a biodiversity conservation and bioprospection project, led by researchers at the University of Georgia and El Colegio de la Frontera Sur, made access to certain communities in Tenejapa difficult. Under advice from my collaborator, José Guzman Gomez, I decided to select certain communities using the criteria described above. Despite the non-random nature of this phase of sampling, I have no reason to believe that our sample differs in any meaningful way from a random sample, and I am confident that the study population is representative of Tenejapa.

In order to identify sufferers of *cha'lam tsots* within these communities, we conducted a door-to-door survey to identify all sufferers of the illness in the community. We simply asked "Are there any sufferers of *cha'lam tsots* in your household?" In

addition, after the door-to-door surveys were completed, the local authorities would usually volunteer to make an announcement over the *paraje* public address system to notify all parents with children suffering from *cha'lam tsots* that we were in town looking for cases of the illness.

Once cases were identified we scheduled an appointment to meet for the physical exam and interview. The community authorities provided us with a room, typically an unused room in the elementary school, in which to conduct the exam and interviews in a more controlled and private setting, though some of these exams were conducted at the patient's house.

We were able to identify 19 cases of *cha'lam tsots*; 12 females and 7 males. Our control sample consisted of 16 individuals; 10 females and 6 males.

3.2.3 Data Collection

The following data collection procedures were used to quantify and classify the range of signs and symptoms associated, from a biological standpoint, with *cha'lam tsots* and *mäjts baajy*. These data are used to evaluate how sufferers of these conditions differ clinically from non-sufferers, and to determine if these illnesses can be understood as clinically-discrete diseases. Interviews and examinations were conducted only with the informed consent of the study participants, which was obtained following a thorough explanation of the risks and benefits of participating in this research.

3.2.4 General Interview

Each study participant (case and control) was asked to complete a questionnaire detailing their socioeconomic and demographic information (Appendix A). As these illnesses primarily affect children, the primary caregiver often answered for the child.

Data were collected for both the individual and the entire family. This questionnaire includes information on socioeconomic status: income, landholdings, participation in the cash economy, and other socio-economic factors. Demographic information included individual and family information on: age, gender, family composition and size, and education levels. We also asked questions regarding the family's use of, and access to, sewage systems, latrines, and safe drinking water.

3.2.5 Health History Interview

Each study participant (case and control) was asked to list all of the illnesses that they had suffered from in the year previous to the interview (Appendix B). For each illness episode, the ethnomedical name for the illness, a description of the illness, duration, severity, treatment sought, and the outcome was recorded. This information is used to assess potential co-occurrence of *cha'lam tsots* with other pre-existing health conditions. This information was most often elicited from the primary caregiver, most commonly the mother of the child.

3.2.6 Three-Day Dietary-Recall Survey

The estimated food record methodology (Ulijaszek 1993) is perhaps the most widely used retrospective method for field-collection of the dietary intake of individuals (Quandt 1986). Following this methodology, each study participant, or their primary caregiver, was asked to recall, in as exact quantities as possible and using familiar household measures, all food consumed in the three days prior to the interview (Appendix C). The informant was asked to recall specific food-consuming events and, for each event, to list all foods, liquids, and condiments consumed, and the amount of each.

This proved to be an especially difficult interview because many informants had difficulty understanding the relevance of my questions to their child's health. Many mothers became quite irritated that we were spending time questioning them on what foods their child ate when we should have been busy curing their sick child. Under-reporting of food consumption was common and the general quality and reliability of these data are suspect at best, and have to be evaluated as such.

3.2.7 Anthropometric Assessment

These data are important in determining the nutritional status of the study participants, while testing the hypothesis that these illnesses are related to, or are the outcome of, protein-energy malnutrition. From an anthropometric standpoint, the presence of protein-energy malnutrition is based upon a low weight-for-height, and measures of subcutaneous fat (from triceps skin-fold) and muscle (from mid-arm circumference) below the standard of reference described by Frisancho (Frisancho 1990).

For each study participant we took the following anthropometric measurements: weight, height, mid-arm circumference, triceps skin-fold, head circumference, and chest circumference (Appendix D). In order to reduce inter-measurer error, all measurements were taken by myself using the standard methodology described in Lohman, Roche and Martorell (1988). These are as follow:

Height

For the measurement of height, or stature, the participant was asked to remove their shoes and stand on a concrete floor against a vertical wall with no baseboards. The participant's head was placed in the Frankfort Horizontal Plane, with heels together and arms hanging down at their sides. The posterior aspect of the cranium, scapulae,

buttocks, and heels were in contact with the vertical plane of the wall. A flat board was used to make a right angle with the vertical wall and a mark was made on the wall, with pencil. The participant was asked to move aside and the measurement was recorded, to the nearest 0.1 cm. For infants unable to stand, recumbent length was measured. The infant was placed on a level surface. With the aid of the caregiver, the infant's legs were extended with the feet and head held in level with a headboard and footboard. Marks were made, the infant was removed, and the measurement taken.

Height is a major indicator of general body size and bone length. It is a central measurement in the identification of long-term malnutrition and in the interpretation of weight in short-term malnutrition (Gordon, Chumlea, and Roche 1988).

Weight

A high-quality, portable, spring-mechanism analog scale was used to measure the participant's weight. The scale was tared each time we made a measurement. The participant was asked to remove any unnecessary clothing and shoes and stand, with weight equally balanced, on the scale. Measurements were recorded to the nearest 0.1 kg. For infants, we measured first the combined weight of the caregiver and infant and second, the weight of the caregiver without the infant. In these cases, any unnecessary clothing was removed from the infant.

Weight is the most commonly recorded anthropometric variable and is important in screening for obesity and short-term undernutrition (Gordon, Chumlea, and Roche 1988).

Head Circumference

A non-stretching tape was used to measure all circumferences. All objects such as hairpins, hats, or caps were removed and the child was asked to stand. Infants were measured on the caregiver's lap. The measurer stood to the left of the infant and placed the zero end of the measuring tape on the side of the head. Anteriorly, the tape was placed just above the eyebrows and posteriorly, was placed so that the maximum circumference was reached. Large amounts of cranial hair, such as braids or pony-tails were excluded. Measurements were recorded to the nearest 0.1 cm.

Head circumference in infants is closely related to brain size and development. Low measurements are indicative of poor growth and malnutrition (Callaway et al 1988).

Chest Circumference

During the measurement, the participant was asked to stand erect, with the feet at shoulder width, and hands at their sides. Infants were measured on the caregiver's lap. Males and infant females were asked to remove their shirts, while adolescent females wore a thin undershirt. Chest circumference was measured on a level plane located just above the nipples, in a line corresponding to the level of the sixth ribs. Participants were asked to inhale, then exhale and the measurement was made at the end of the expiration. Measurements were recorded to the nearest 0.1 cm.

Chest circumference is often used as a screening variable for general malnutrition in infants and children, low measurements indicating poor growth (Callaway et al. 1988).

Mid-arm Circumference

The study participant was asked to remove any obstructing clothing and stand erect with the arms hanging freely and the palms facing the thighs. Again, infants were

measured on the caregiver's lap. The measurer stood behind the participant's left side and located the mid-point of the upper arm. To locate the mid-point, the participant's left elbow was flexed 90° and the lateral projection of the acromion process of the scapula, at the top of the arm, was located. The most proximal point of the ulna, the inferior margin of the olecranon process, at the elbow, was located and the midpoint between the two points marked. With the arms hanging freely the tape was wrapped around the arm at the mid-point, perpendicular to the long axis, taking care not to compress the soft tissues of the skin. Measurements were recorded to the nearest 0.1 cm.

Arm circumference provides an index of body fat and protein mass (Callaway et al 1988). It is often combined with triceps skinfold thickness to calculate arm-muscle circumference and upper-arm muscle and upper-arm fat areas. Low values of either measurement is interpreted as evidence of protein-energy malnutrition (Frisancho 1990).

Triceps Skin-fold

The triceps skinfold is measured on the mid-point of the left upper-arm on the posterior aspect, over the triceps muscle. As the mid-point of the upper-arm was used, this measurement was taken in conjunction with the mid-arm circumference. The participant is measured standing, except for infants, who were seated, with the left arm hanging loosely. The measurer stood behind the participant's left side and "picked up" the skinfold with the thumb and index finger of the left hand, proximal to the mid-point of the upper-arm. The calipers were applied to the marked mid-point at an angle perpendicular to the long axis. The calipers were allowed to come to rest on the skinfold and the measurement was taken. Measurements were recorded to the nearest millimeter. Due to potential intrameasurer measurement errors, this measurement was taken three

times and the mean used. I used Lafayette calipers which were tested for calibration prior to usage.

Triceps skinfold is closely correlated with percentage of body fat and is the most common measurement used in the assessment of body composition (Harrison et al 1988).

3.2.8 Clinical Examination

Any evaluation of the biological basis of these illnesses would not be complete without a thorough clinical examination conducted by a qualified physician. I was fortunate to have the help of Dr. David Kiefer, a family-practice physician from the University of Washington, who volunteered to assist with this phase of the research. With his help, we designed a comprehensive physical examination to identify or rule out all possible causes of organic illness, not just protein-energy malnutrition (Appendix E).

Laboratory analysis included general bloodwork (CBC with differential, Shilling Hemogram) and a fecal sample to determine the presence of parasites. Due to the widespread cultural proscription against strangers obtaining bodily fluids or body parts, such as hair and fingernails, many participants denied consent to draw blood or collect fecal samples. This proscription was especially enforced by mothers of very sick children. Furthermore, as Mexican law prohibits foreigners from collecting blood or bodily fluids, the blood samples were drawn and fecal samples were collected by a Mexican laboratory technician.

3.3 Procedure 3: Identifying areas of convergence and divergence between the emic and etic construction of the illnesses.

Procedure 3, the analysis phase of this research, will test the four hypotheses proposed in Chapter 1 by using the data generated by Procedures 1 and 2. To summarize, the four hypotheses driving this research are:

H_1: A Tzeltal diagnosis of *cha'lam tsots* will identify individuals with distinct biological characteristics which will correlate with a biomedical diagnosis of protein-energy malnutrition (PEM).

H_2: A Mixe diagnosis of *mäjts baajy* will identify individuals with distinct biological characteristics which will correlate with a biomedical diagnosis of protein-energy malnutrition (PEM).

H_3: Those biomedical features that define *cha'lam tsots* and *mäjts baajy* will be the same.

H_4: Those culturally recognized attributes used by the Tzeltal to construct the EM of *cha'lam tsots* will be the same as those used by the Mixe for *mäjts baajy*.

Hypotheses 1 and 2 are tested by evaluating the etic, biological data collected in Procedure 2. The case and control samples are compared to determine how they differ with respect to clinical diagnosis, medical history, anthropometric measurements, dietary intake, and laboratory analysis of blood and fecal samples. These data are presented in Chapter 6.

Although this research was begun with the assumption that both c*ha'lam tsots* and *mäjts baajy* were illnesses currently afflicting the Tzeltal and Mixe, I was (pleasantly) surprised to discover that *mäjts baajy* has been eradicated by the Mixe. While this discovery renders Hypothesis 3, the comparison of the biomedical dimensions of each illness, untestable in its formal sense, I was able to collect ethnographic data strongly suggestive of a biomedical diagnosis. These data are presented in Chapter 7.

Testing Hypothesis 4 requires a comparison between the emic, ethnomedical construction of each illness. In looking for similarities and dissimilarities between the Tzeltal and Mixe conceptualization of these illnesses, the unit of comparison is the components of each illness' EM developed in Procedure 1. For example, I compare the Tzeltal notion of attributed etiology with the Mixe explanation of attributed etiology by comparing the frequency of reports of each attribute within the EM component. In other words, those attributes for which there is high agreement among the Tzeltal should also show high agreement among the Mixe. As I anticipate differences in the "language of illness" each culture employs when speaking about "second-hair illness", this analysis will also look for similarities on a more general level, focusing on the *gestalt* description of the EM. This analysis is presented in Chapter 7.

The testing of these hypotheses sheds light on the core objective of this research, which is an evaluation of how the biological basis of each illness contributes to the emic EM. The last phase of analysis answers this question by comparing the emic, ethnomedical construction of each illness developed in Procedure 1, with the etic, biomedical construction of each illness developed in Procedure 2.

Again, the unit of comparison is the components of the EM. For example, the ethnomedical understanding of the etiology for *cha'lam tsots* is compared with the biomedical model for the etiology of *cha'lam tsots*, and the ethnomedical understanding of the pathophysiology of *cha'lam tsots* is compared with the biomedical understanding of the pathophysiology of *cha'lam tsots*.

As this comparison between emic, ethnographic data and etic, biological data is necessarily a qualitative one, the analysis focuses on finding patterns of agreement and

disagreement between the two models, and exploring reasons for the agreement or disagreement. For example, if the emic model indicates that "bad dreams" are a symptom of either illness (it is for the Tzeltal), I look for an explanation of this symptom in biomedical terms. As it is known that night fever is known to produce restless sleep and unusual dreams, we might be able to find a connection between the two models.

The objective of this analysis is to evaluate the relationship between the ethnomedical and biomedical models of this illnesses and to uncover any potential biological "cues" that a group uses to construct their EM of illness, revealing the medical epistemology employed in the cultural construction of these illnesses.

3.4 Field Stays

The research described in this dissertation was carried out over several years. My first investigation into the Tzeltal Maya c*ha'lam tsots* was conducted over a 10-week fieldseason during the summer of 1998. This research focused on developing the explanatory model of c*ha'lam tsots* through interviews with current and past sufferers of c*ha'lam tsots*, and with traditional healers.

I was able to return to Chiapas for two weeks during the summer of 1999 to carry out further research. My principal objective during this visit was to determine the distribution of c*ha'lam tsots* among the Tzeltal communities of Chiapas.

The bulk of the research reported in this dissertation, including all of the work done on the biomedical dimension of *cha'lam tsots,* was conducted during the course of a year, between August 2000 and August 2001. August 2000 through February 2001 was spent in Chiapas investigating the Tzeltal c*ha'lam tsots*. The clinical exams were conducted during the months of November and December 2000, and follow-up work

continued through February 2001. In March 2001 I moved fieldsites to the highland Mixe communities of Oaxaca to begin my investigations of the Mixe *mäjts baajy*. I concluded my work with the Mixe in August 2001.

CHAPTER 4

THE EMIC, ETHNOMEDICAL PERSPECTIVE OF THE TZELTAL MAYAN *CHA'LAM TSOTS*

This chapter discusses how the Tzeltal Maya think about, and act upon, the illness that they call *cha'lam tsots*. The principal source of data described in this and the following chapter comes from the semi-structured Explanatory Model (EM) interviews, though other, informal sources of data helped to clarify and expand our understanding of the ethnomedical perspective of this illness. To briefly summarize, EMs represent individuals' knowledge of five central aspects, or components, of a specific illness: attributed etiology, onset and preliminary symptomology, pathophysiology and course of the illness, prognosis, and treatment options.

The EM methodology is used not only to explore each individual's understanding of a particular illness, but also to produce a comprehensive list of all the attributes of each EM component across each study population. This comprehensive list is then used to develop a consensual model for the illness; one that focuses on the most salient and agreed upon features of each component of the model, across the study population.

As there is always a degree of variability between individuals' explanatory models, this shared EM was generated from an analysis of the frequency of responses to questions regarding each component of the model, as "the exploration of explanatory models does not generally depend upon statistical analysis other than, at most, frequencies of recognition of taxonomic categories" (Pelto and Pelto 1990:289).

Again, as these explanatory models are representations of the cognitive structures individuals invoke when thinking about and acting upon an illness, I do not claim that they are immutable or invariable, as they most probably are. Rather, I view the explanatory model approach as an effective method for arriving at a group-level description of an illness that is guided by concepts that make possible the comparison and correlation with a biomedical model.

4.1 Sample

Explanatory models were elicited from 8 traditional healers and 18 laypersons in the municipality of Tenejapa. An initial cohort of these informants was referred to me by Dr. Elois Ann Berlin, based on her prior contacts with traditional healers in Tenejapa. In order to facilitate access, I utilized a snowball sampling technique to recruit other traditional healers into the study.

Laypersons with experience with c*ha'lam tsots*, either as healers or as patients, were recruited into the study in a number of ways. Patients, or caregivers of patients, were referred to me by healers who had provided treatment. Additionally, I would ask these former patients if they knew of any people in their community who knew how to diagnose or treat c*ha'lam tsots*. I would use this referral system to identify individuals to participate in the study.

This referral-based technique for recruiting an ethnographic sample is common in this region and reflects the necessity of utilizing contacts in order to gain the trust of potential study participants, and legitimize my presence. The technique of "cold-calling" on households to recruit a random sample of informants is a particularly ineffective manner in which to recruit participants as most people are distrustful of strangers.

In the following description of the EM for *cha'lam tsots*, informant responses are given as a proportion of total informant responses to a particular question. Numbers in parenthesis indicate the identification number of the informant from whom the quote came.

4.2 Prevalence and Seasonality

Cha'lam tsots is not a rare illness for the highland Tzeltal Maya. During my three years studying this illness I met very few people who had not heard of, or had direct experience with, this illness. Almost everywhere I went in the highland Tzeltal region people would ask what I was doing in their community, and as I described my research, they would nod their head in understanding and comment that this was indeed a serious illness that demanded attention. Though most had only a general knowledge about this illness, they rarely had difficulty identifing someone they know who has suffered from it or one person in their community who knew how to identify or treat this illness. Therefore, from an ethnomedical perspective, c*ha'lam tsots* is a relatively common illness, especially among infants. Prevalence, from an epidemiological perspective, was assessed and will be discussed in later chapters.

In addition to indigenous notions of prevalence, I sought to uncover when this illness is most common, whether it is a seasonal condition or not, and which age or gender groups were most likely to become sick with c*ha'lam tsots*. Seventy-three percent reported that although it is possible to fall ill with *cha'lam tsots* during any time of the year, most became ill with the illness during the "dry season" months of April, May, and early June.

During the course of an interview with a well-respected traditional healer from the community of Sibaktel in Tenejapa I was told that not many people knew how to cure c*ha'lam tsots* because it is a new illness for the Tzeltal. I was surprised by this information and asked when it first appeared. The healer reported that the first cases of c*ha'lam tsots* appeared during the early 1980's, two to three years after the eruption of the "Chichónal" volcano in 1980 in the neighboring state of Tabasco, to the north of Chiapas. This eruption left a layer of ash all over the highlands and is used by many locals as a historical reference point. Although he did not attribute the emergence of c*ha'lam tsots* to the volcano, he was sure of the date of its emergence due to this historical marker. Four other informants (for a total of five) provided data that corroborated one, or several, aspects of this initial account. One elderly woman *jpoxtawanej* from the community of Juxal ja', reported that she first started seeing cases 15 years ago (1985) and that the wind was responsible for bringing this disease to the Tzeltal people.

The first reference to *cha'lam tsots* in the ethnomedical literature on the Tzeltal Maya appears in Berlin and Berlin (1996), which reports on ethnoepidemiological studies conducted during the early 1990's. Although this work represents the first systematic investigation of the prevalence of Tzeltal Maya illnesses, it was conducted after the reported emergence of *cha'lam tsots*. Earlier work on Tzeltal ethnomedicine makes no mention of this illness.

4.3 Primary Sufferers

When asked "who gets *cha'lam tsots*?" 88% of informants responded that children were the primary sufferers, though 46% also responded that adults, especially

the sick and elderly, can become afflicted. Healthy adults are unlikely to fall ill with *cha'lam tsots*. Several informants (12%) had no idea if this illness affected any age group in particular and responded that they believed that all people could possibly get *cha'lam tsots*.

4.4 Distribution

Another interesting aspect of this illness, perhaps being related to its recent emergence, is its distribution. Although *cha'lam tsots* is well understood among the Tzeltal Maya of the central highland municipalities of Tenejapa, Oxchuc, and Cancuc, it is completely unknown to the neighboring Tzotzil Maya municipalities. Although the Tzeltal and Tzotzil are closely related historically and linguistically, share many cultural and social features, and have similar ethnomedical systems, there is no equivalent of *cha'lam tsots* in the Tzotzil lists of illnesses they suffer.

Furthermore, it appears that it is also only found in the Tzeltal municipalities of central highland Chiapas, not in the lowland Tzeltal communities of southern and eastern Chiapas. In fact, I was only able to interview or collect reports of c*ha'lam tsots* from the adjoining municipalities of Tenejapa, Oxchuc, and Cancuc (see Map 2.2).

During the summer of 1999, I made a trip to Tzeltal communities outside of the highlands, primarily to investigate whether Tzeltal migrants to the tropical lowlands of southern Chiapas, near the Guatemala border, also suffered from c*ha'lam tsots*. Accompanied by another anthropologist, David Casagrande, we visited the communities of Maravilla Tenejapa and Nuevo Matsab, in the municipality of Las Margaritas. We chose to visit these two communities as they were formed some 30 years ago by migrants from two locales in Tenejapa, and I hypothesized that, as migrants from Tenejapa, and

the highlands, they would have still maintained many of their traditional medical beliefs and if c*ha'lam tsots* was an old medical concept, then they would have knowledge of it even if they did not suffer from it.

Despite repeated questioning and interviewing, only one individual had any knowledge of c*ha'lam tsots*. This individual was a nurse in the local Instituto Mexicano de Seguro Social (IMSS) clinic who reported treating an infant girl whose father was insisting that his daughter was suffering from a strange illness he called c*ha'lam tsots*. The father and daughter had apparently just arrived in the lowlands from the highlands, and he had to explain to the nurse what the illness was. She reported that the infant girl died only a few days after seeking treatment at the clinic. A survey of both communities turned up no one who had heard of, or was suffering from c*ha'lam tsots*. Although I have not conducted an exhaustive search for cases in the lowlands, these initial data indicates that c*ha'lam tsots* is possibly limited to the highland communities.

4.5 Attributed Etiology

The Tzeltal consider *cha'lam tsots* to be closely associated with diarrheal disease (Berlin and Berlin 1996) and ascribe to it a naturalistic etiology; an illness which has a natural, not supernatural, causative agent. Notions of etiology, or causation, are fundamental to the ethnomedical system of the Tzeltal Maya and treatment options are often a reflection of the perceived etiology of a particular illness. Two primary questions were asked concerning the cause, or etiology of *cha'lam tsots*: "What are the causes of *cha'lam tsots*?" and "Why does one get it?" Although both questions were intended to explore etiology, they were interpreted quite differently by the informants.

TABLE 4.1 Attributed Etiology for *cha'lam tsots.*

"What are the causes of *cha'lam tsots?*"

Watery Diarrhea (ja'ch'ujt)	92%*
Fever	88%
Stomach ache (k'ux ch'ujtil)	73%
No appetite	69%
Bad Dreams	62%
Weakness	54%

"Why does one get *cha'lam tsots?*"

Neglect by the mother	77%
Falls down and hits head	46%
Too much sun on the head	38%
Don't know	23%

* Percentage of informants who gave that response to a particular question.

Informants answered the first question, "What are the causes of *cha'lam tsots?*", by describing the major signs and symptoms that precede the illness. These signs and symptoms were described as the early manifestations of c*ha'lam tsots*, and clues that one might be coming down with the illness. As Tzeltal ethnomedicine is symptom-based and does not distinguish between illnesses and symptoms, these preliminary signs and symptoms are interpreted as necessary pre-existing conditions. Watery diarrhea (ja'ch'ujt), fever, stomach ache (k'ux ch'ujtil), general gastrointestinal distress, bad dreams, and weakness were the most reported "causes" of c*ha'lam tsots* (Figure 4.1) The following quotes illustrate this relationship:

> "The sickness comes if one has fever, and their hair falls out. If the fever is serious, the hair falls out and later *cha'lam tsots* begins. The children have *cha'lam tsots* a lot because of fever. Sometimes fever happens a lot and for this reason they have *cha'lam tsots*." (#21)

> "Diarrhea, fever, headache, and one's stomach hurts, these are the causes. It gives pure dreams and I have to hold/embrace her, she sleeps only in my arms." (#13)

Again, these are the proximate "causes" of c*ha'lam tsots* and serve as conditioning factors which, if not treated properly, will cause the short, spiny hairs, which define this illness, to emerge on the scalp.

The second question, "Why does one get *cha'lam tsots?*" elicited responses that described why these signs and symptoms appeared in the first place. Primary among

these responses was the neglect of a young, and inexperienced mother. In essence, a child would not get c*ha'lam tsots* if the mother knew how to properly look after her child. There are two principal means through which an individual can get c*ha'lam tsots*, both resulting from the apparent neglect of the infant by a young and inexperienced mother. First, c*ha'lam tsots* can be caused by one, or several blows to the head of a child when they fall down. The blow to the head is not described as severe, and most often does not result in bleeding. This frequently happens to infants of 10 to 18 months old who are learning how to walk.

> "Sometimes it begins when they are little and they fall down and hit their head. Because of this, they say, the sickness, *cha'lam tsots,* comes." (#23)

> "Sometimes they hit their head, and there begins the sickness because they hit their heads a lot. Sometimes children don't behave well, they hit their heads and there the sickness *cha'lam tsots* begins." (#19)

Second, an infant can fall ill with *cha'lam tsots* when they are left out in the sun too long by a mother who is working in the milpa, or cornfield. According to this explanation, the intense sun and heat burn the head of the child causing the new hair to grow differently and the old hair to fall out. After this incident, or a series of such incidents, the child begins to weaken, the preliminary signs and symptoms appear, the scalp hair begins to fall out and the second type of hair appears. Exposure to heat and sunlight sufficient to cause *cha'lam tsots* can only occur during the dry months of the year, from March through early June, as there is too much cloudcover and rain the rest of the year.

> "She (the child) doesn't want the heat when we harvest. And we have to carry the child to work...just so it arrives on the head." (#5)

Analysis of these ascribed etiologies highlight two important facts: this illness afflicts infants of aproximately 10-18 months of age, or children during the dry months of the year, from March through early June.

It is important to note that the short, spiny, "second hairs" which are the central feature of c*ha'lam tsots* are not viewed as a cause of c*ha'lam tsots*, but they are most certainly seen as the pathologic agent. The "second hairs" *are* the illness and, as we will see below, are the focus of any treatment, though their appearance is attibuted to the etiologic factors previously described.

4.6 Onset, Preliminary Symptomology, and Diagnosis.

This section explores how and when a *cha'lam tsots* illness episode begins and how individuals come to recognize and diagnose their illness as *cha'lam tsots*. One begins to suspect a case of c*ha'lam tsots* when the major symptoms which precede this illness become more severe, or do not heal. Tzeltal children are no strangers to gastrointestinal and upper-respiratory infection, and a case of diarrhea, cough, or fever does not initially provoke much concern. Only when these symptoms become more severe and persist for some time, or do not respond to treatment, do caregivers start to become concerned.

One of the earliest and most important signs to emerge indicating c*ha'lam tsots* is the child's loss of appetite, as exemplified by the following statement: "They don't eat. They drop little pieces of their tortilla all over the ground" (#23). This statement of children not taking care when eating their tortilla was a common one. Mothers report that their children lose their desire for staple foods such as tortillas, beans, and eggs, and often leave their portions unfinished. The loss of appetite does not apparently include "dulces"

or treats such as soft-drinks, candy, and coffee (which is always served with sugar). One mother reported that her infant girl, who was suffering from a particularly severe case of c*ha'lam tsots*, would drink as much as a half-liter of soda a day, but would not touch her meal of tortillas and beans:

> "She (her daughter) does not have the will to do anything. She cries and cries for her sweets but will not eat her tortilla. She cries and cries and I have to give them to her, so she will not cry." (#26)

Predictably, following the loss of appetite the child begins to lose energy and becomes increasingly irritable. This "debilidad" brings with it sleeplessness, bad dreams, and constant crying. Mothers report that their children do not have the interest to do anything and are increasingly lethargic. They often cry when held or moved. Typically, at this point, the mother or caregiver would begin to suspect a case of c*ha'lam tsots* and seek out a specialist for a diagnosis.

Among the earliest symptoms to emerge that indicate c*ha'lam tsots* are facial edema, a red rash on the scalp, alopeica (hair-loss), high fevers, and marked short-term weight loss.

When asked "How do you know it's *cha'lam tsots*?" informants responded that a diagnosis from a qualified person was necessary to make sure it was c*ha'lam tsots*.

> "Curanderos know if it is *cha'lam tsots*. Also there are those who know how to examine your head and find the hairs." (#14)

Most *parajes* in Tenejapa have at least one person who knows how to diagnose c*ha'lam tsots*. There is not a specific name for this type of healer, and they are referred to simply as people who know how to diagnose, or to diagnose and treat the illness: "Los que saben de curar c*ha'lam tsots*." Those with knowledge of the treatment are not

necessarily full time traditional healers, though many are. Since c*ha'lam tsots* is considered an illness with a naturalistic etiology, a specialist healer, a *jpoxtawanej*, is not required for the proper treatment, though they are often preferred because of their skill with medicinal plants.

A positive diagnosis of c*ha'lam tsots* relies on the identification of the short, spiny, and discolored scalp hairs. Although "specialist" diagnoses are important in Mayan ethnomedicine, non-specialists are able to provide a positive diagnosis based upon two, possibly minimum factors: the appearance of the characteristic spiny hair (100%), and the presence of diarrhea (69%).

The central sign for *cha'lam tsots* is the appearance of the short, delicate, discolored, and spiky hairs on the head of the infant, under the normal layer of hair. One cannot be diagnosed with this illness without this sign. *Cha'lam tsots,* literally translated, means 'two layers" (*cha'* 'two', *lam* 'layers', *tsots* 'hair') (Berlin and Berlin 1996).

These hairs are described as being new hairs which, over time, replace the normal scalp hair. They exhibit a range of colors, indicating the severity of the illness. Generally, the lighter the hair, the more severe the case of c*ha'lam tsots*. Three colors were typically identified: "blanco" (white), "amarillo" or "rubio" (yellow or blonde), or "rojo" (red). Two healers described the hairs as exhibiting the characteristics of a flag, with alternating light, reddish blonde, and dark hairs (#21 and #27). The "second hairs" are shorter than normal hairs, typically no longer than 1-2 cm. In addition, many of the hairs are described as being curly, or misshapen. Many of the shorter, straight hairs are said to "pica", or be prickly to the touch.

The diagnosis often takes place at mid-day, as several informants mentioned that the hairs are best visible during the noon-day sun. The person doing the diagnosis will comb through the patients head with their hands, parting the hair to look for the short hairs close to the scalp (see Figure 4.1).

Figure 4.1: A healer diagnosing c*ha'lam tsots*.

Often the hairs are difficult to see, being obscured by thick, black hair. Some will spit into the palm of their hand and rub the side of the head with the saliva, claiming that it makes the hairs stand up. The diagnoser then rubs the side of the head with their cheek or the back of the hand, felling for the tell-tale spiny hairs. If the hairs are identified, and the patient has other signs of the illness, such as diarrhea, fever, and loss of appetite, a positive diagnosis is made.

4.7 Course of the Illness

A description of the course of this illness was elicited from the responses to the following three questions: "What does it do to the body?" "What parts of the body does *cha'lam tsots* affect?", and "How does it feel, or appear to a person?" The first two

questions elicited responses that described the physical and largely exterior symptoms of this illness. The responses to these questions are summarized in Tables 4.2 and 4.3:

TABLE 4.2: What does it do to the body?

Hair falls out	88%
One has swelling (*sijt'ubel*)	73%
Red rash on the head	73%
Gives diarrhea (*bosbos tsa'nel*)	62%
Lose weight	62%
Gives cough (*obal*)	46%
Swollen belly (*nukul ch'ujt*)	35%

TABLE 4.3: Parts of the body affected.

The head	100%
The body (swelling)	73%

In general, as the illness progresses the preliminary signs and symptoms increase in severity. Specifically, the infant has constant diarrhea, continued weight-loss, and increased edema. The edema, called *sijt'ubel,* typically begins in the face (a condition commonly called "moon-face") and progresses to the forearms and lower legs. Thirty-five percent of the informants reported a distended, swollen stomach, with veins clearly visible underneath the skin. This condition is called *nukul ch'ujt*, or "barrigon" in Spanish.

Symptoms indicative of gastrointestinal and respiratory infections also become more severe and a night-fever is common. While the preliminary symptomology described identified the diarrhea as the watery type, or "*ja'ch'ujt*", 62% of informants reported that the diarrhea changed to the heaping, or lienteric type, called "*bosbos tsa'nel*" or "*jewjew tsa'nel*". With this type of diarrhea the bowel movement looks like undigested food, and mothers report that the food passes right through the child. Several informants (46%) reported that a general cough, known as "*obal,*" is also common with a case of c*ha'lam tsots*. Weight loss becomes more acute and in the advanced stages is accompanied by a swollen belly, called "*nujul ch'ujt*."

The most striking feature of advanced cases is the alopecia and most consider a case of *cha'lam tsots* to be advanced and life-threatening when hair-loss becomes significant. The hair falls out in clumps, leaving large hairless patches on the head. As the hair falls out, the scalp hairs are replaced in places by the fine, delicate, and light-colored "second hairs".

Figure 4.2: Hair loss in a case of c*ha'lam tsots*.

It is important for an explanatory model to elicit both the physiologic and the psychological dimensions of an illness, for both types of data can give important clues to potential biomedical equivalents for ethnomedical syndromes. The third question, "How does it feel, or appear to a person?" generated responses that described the internalized, psychological, or emotive aspects of *cha'lam tsots.* These are summarized in Table 4.4.

TABLE 4.4: Psychological effects of c*ha'lam tsots*.

Have general weakness or "debilidad"	92%
Don't want to eat	73%
Irritable, want to cry	65%
Have bad dreams	54%

General weakness, captured by the term "debilidad," is the most commonly reported symptom of c*ha'lam tsots*, and is most likely the result of the loss of appetite and the burden of infectious disease described above.

It becomes clear that hair loss and swelling are not the only salient features that need to be considered in determining a biomedical equivalent for this illness as the symptoms of general weakness, such as a lack of appetite, and bad dreams (most probably due to feverish sleep) can be equally illuminating.

4.8 Prognosis, or Predicted Outcome

Cha'lam tsots is considered to be a serious and potentially fatal illness, especially when left untreated. And, as can be expected with a serious illness, the most agreed upon elements of the explanatory model for *cha'lam tsots* were those responses pertaining to the prognosis or predicted outcome of this illness. If an individual does not seek treatment, they will invariably die (100%). Such responses include:

> "They die if they don't find the medicine of that plant. One dies, a person dies. If he finds the medicine, he doesn't die--only their head hurts them".

There were two variant descriptions of how a person might die from this illness: "One dies. One gets thin," and "one dies, it causes swelling."

If a patient does receive treatment, most informants (81%) reported that it is likely that they would recover, indicating that, although c*ha'lam tsots* is a serious and potentially fatal condition, it can be cured.

4.9 Healing Strategies

The treatment option for c*ha'lam tsots* was generally well understood and agreed upon by laypersons and specialists. Informants reported that the only way to treat

c*ha'lam tsots* was to apply a medicinal plant remedy to the scalp of the patient. As this illness has a naturalistic etiology, the treatment is plant-based, does not involve spiritual or ritual elements, and can be administered by a specialist healer or a layperson with specific knowledge of the treatment.

Although informants were in agreement on the method of treating c*ha'lam tsots*, there was little agreement on the specific remedies used in the treatment. Most lay individuals knew that the treatments were plant-based, but could not recall the name of the medicinal plant. The plant or plants used in the treatment of *cha'lam tsots* varies by the healer. While most know that their remedy is different from those used by other healers, they all insist that theirs is the most effective treatment, indicating the competitive nature of the healing business in Tenejapa. Again, although the plants used in the treatment differ substantially, the mode of application does not. The most commonly reported are: *verbena carolina, sambucus mexicana,* and c*himaphila macolata* (see Table 4.5). Three informants (12%) reported using horse manure, either mixed with the medicinal plants or alone:

> "They told me for my first son to put horse manure on his head- with this he improved, with this I covered his head, but it stunk" (#6).

TABLE 4.5: Medicinal plants and remedies used in treatments.

Tzeltal Name	Scientific Determination	Percentage of Reports
Chijil te'	*Sambucus mexicana*	23%
Lam te'	*Plantago australis*	19%
Sakil yakan k'ulub wamal	*Verbena carolina*	12%
Poxil cha'lam tsots	*Chimaphila macolata*	8%
Zapatia	no determination	8%
Cha'lam tsots wamal	*Erechtites hieracifolia*	3%
Tsajal on te'	*Drimys granadensis*	3%
Tsa' kwáyu	Horse manure	3%
Yax te' (mixed with horse manure)	*Rapanea juergensenii*	3%
Yijkats te' (mixed with horse manure)	*Struthanthus quercicola*	3%
Tsajal nich wamal	*Castilleja arvensis*	3%
Nuk balil jonon	*Prunella vulgaris*	3%
Taj	*Pinus spp.*	3%
Mes te'	*Baccharis vaccinioides*	3%

The healer first obtains the medicinal plant or plants to be used in the treatment. Many reported that the plants they use (*zapatia,* for example) are only available seasonally and they have to travel great distances to locate plant material. Once obtained, the healer grinds the plant or plants to a poultice, using a grinding stone (mano and matate) or simply crushes it with a rock. All parts of the plant are used. A small amount of water is added to help in the grinding. The crushed plant matter is transferred to a bowl and mixed with cold water. In all, about a quarter-liter of plant-water mixture is made.

All of the mixture is then rubbed into the head of the patient. The head is then covered tightly with a cloth and the patient is instructed not to remove it. This treatment is repeated once each day for three days. After each treatment the hair of the patient is carefully combed to remove the c*ha'lam tsots* hairs from the scalp. Some healers report that severe cases might require more than one three-day treatment cycle.

Figure 4.3: Application of the treatment for c*ha'lam tsots*.

One particularly knowledgeable healer from the *paraje* of Juxal'ja reported treating scores of c*ha'lam tsots* patients. She reported that, on average, patients who come to her for treatment have been sick for about two to three months, and their condition by this time is usually quite severe. Most have almost total hair loss, are swollen with edema, have no appetite, and are lethargic and irritable. With a case this advanced, she estimated that a child would need several months to recover after the treatment, though she reports a good success rate.

Healers claim that their treatments work because they kill, or remove, the "second hairs" that are causing this illness. The "second hairs" are clearly seen as the pathologic agent in this condition, and, in this sense, they *are* c*ha'lam tsots*. Other accompanying symptoms, such as diarrhea, fever, edema, and weight loss are merely associates. Tzeltal ethnomedicine does not distinguish linguistically between symptom and illness. C*ha'lam tsots* is, in its strictest sense, nothing more than the appearance of illness-causing "second

hairs". Therefore, a treatment for c*ha'lam tsots* must address the "second hairs" as the pathologic agent.

One interesting insight into the Tzeltal conception of c*ha'lam tsots* came about during my stay with the Mesa family in the *paraje* of Nabil, in Tenejapa. Nabil is in cold country and temperatures at night often drop below freezing. Like all families the Mesas raise a few animals as livestock and pets, and when it gets especially cold, they bring the weakest animals into the kitchen to be by the fire. For several evenings they brought in a young chick who was struggling to survive. After a while I realized that they had named this chick "c*ha'lam tsots*", and when I inquired as to why, the grandmother responded that it was because the chick was missing most of its feathers and looked rather weak and frail. This insight into the "cultural model" for c*ha'lam tsots* revealed that the defining characteristics of this illness are the loss of hair and the overall weak condition of the sufferer.

CHAPTER 5

THE EMIC, ETHNOMEDICAL PERSPECTIVE OF THE MIXE *MÄJTS BAAJY*.

The following discussion will develop a description of the Mixe ethnomedical syndrome *mäjts baajy*. The methodology used to elicit the explanatory model and general description of *mäjts baajy* was similar to that used with the Tzeltal, with a few notable exceptions, due primarily to the fact that knowledge of *mäjts baajy* was not widely shared.

It is important to preface the following discussion on the EM of *mäjts baajy* with a few comments about the differences in conducting ethnographic research among the Mixe and Tzeltal Maya.

Although the Mixe are fiercely proud of their traditions and have resisted cultural change for several centuries, they are an exceptionally friendly and outgoing people. It was not uncommon for me to be stopped on the street, or invited into someone's house for a chat about what I was doing and about my impressions of the Mixe people. I was often asked if I was enjoying my stay in Totontepec and how I liked the town. The level of civic pride was exceptional and, I believe, relevant to the explanation of the success of local public health and development projects.

My interviews with traditional healers had a very open, relaxed tone to them. Our conversations were more informal and covered a wider range of topics. Interviewees were also more comfortable with discussing different aspects of Mixe medicine, religion,

and culture, not just *mäjts baajy*. Answers were often open-ended and led into tangential discussions which they felt were relevant to my purpose. This was perhaps aided by the fact that all but a few of my interviews were conducted in Spanish as the rates of bilingualism were much higher than in Tenejapa.

In contrast, interviews with Tzeltal healers often had the tone of a question-and-answer session, and information that was not directly relevant to the question posed was often omitted. Probing was an essential skill and questions had to be rephrased several times in order to cover all the angles of a particular question. Although this difference is probably the product of the highland Maya's guarded nature against outsiders, there are other factors which I believe served to restrict the openness of the discussion; primarily the practice of paying informants for their interviews and tape-recording the conversation.

In Chiapas there is a long tradition of paying informants for their time and information. Few can argue that people's time is valuable and should be recompensed as such. Therefore, each Tzeltal informant was paid one-half a day's wage, which was approximately 30 pesos, or $3.50 US. Specialist healers often demanded more for their information; as much as 100 pesos, or $11 US.

Through discussions with anthropologists at CIESAS-Oaxaca and the Welte Institute for Oaxacan Studies, I was quick to learn that Oaxacan anthropologists do not pay informants for interviews and I was asked not to start. Having worked in Chiapas for some time, I was reluctant not to pay my informants for their time. I decided to bring up the subject with Areli Bernal Alcantara, my Mixe collaborator in Totontepec, who agreed that I should not pay for interviews.

One significant result of this decision was that, by not receiving money for their time, informants maintained control over the interview and did not feel obliged to allow me to tape-record the conversation. The Mixe voiced strong objections against having their voice recorded and, with the exception of five informants, I was forced to rely on notes taken during and after the interviews. I contrast, as we always paid our Tzeltal informants, I was allowed to tape-record all of our interviews.

5.1 Sample

Explanatory models were elicited from 10 traditional healers and 14 laypersons in the highland municipalities of Totontepec, Tlahuitoltepec, Tamazulapam, and Mixistlan de la Reforma. The average age of informants was 54 years, reflecting the fact that knowledge of this condition is limited to those who have had experience with it, as will be discussed below. Although knowledge of this illness is not widespread, there was generally a high level of agreement among those who have had experience with it.

5.2 Prevalence

When I first arrived in Totontepec I arranged a meeting with Areli Bernal Alcántara who was refered to be by the noted Mixe ethnographer Dr. Salamón Nahmad-Sitton, of CIESAS-Oaxaca. Dr. Nahmad-Sitton, who has led numerous research projects in the Sierra Mixe, had never heard of this 'second-hair' illness and suggested that I speak with Areli, as he would certainly know about it, if it existed at all.

Areli, who was to become my principal collaborator, is a native of Totonetepec and an avid historian of all things Mixe. Upon meeting with Areli I was somewhat surprised to discover that he had never heard of this illness, and he suggested that I speak with a friend if his who was a traditional healer. When I questioned Areli's friend about

mäjts baajy, she shook her head and told me she too knew nothing of this illness, though another friend of hers, an elderly woman who was a particularly well known and knowledgeable healer, might.

Finally, after several interviews, I found someone who confirmed that this illness did in fact exist. *Mäjts baajy* was a recognized illness for the Mixe, but she reported that she had not seen a case of it in many years. In fact, she had never actually treated a case of *mäjts baajy*, but knew about the illness, and its cure, by watching her mother treat children with it.

Without exception, all of my interviewees were surprised that I was asking about their knowledge of such a rare illness, and they often paused to remember certain facts about the illness. Many of the interviews had a reminiscent tone about them as the healers would remember various facts about this illness. As our discussions would unfold I often had the feeling I was "digging up" long-gone memories. Informants would suddenly remember a forgotten aspect of the illness which they would interject at odd times.

The fact that *mäjts baajy* is a nearly forgotton and rare disease was one of the most interesting and significant findings of this study. Although informants recalled that *mäjts baajy* used to be a very common illness in the Mixe area, it has disappeared since the arrival of roads, electricity, and the introduction of public health infrastructure in the early to mid 1970s.

> "Well, it was bad. In that time the people didn't know much, but when the doctors (médicos) arrived, and when the services of the clinic arrived here, well they told us then that this (illness) was caused by malnutrition, for a lack of vitamins… Now it is not like before. Now the children don't have this illness. It is because they look after them well at the clinic." (#2).

This finding is supported by the work of other anthropologists studying Mixe ethnomedicine. The following is a quote from the Mixe ethnobotanist Dr. Michael Heinrich discussing the similarity between c*ha'lam tsots*, which I had at this time begun investigating, and *mäjts baajy*:

> "Quite clearly there are many similarities between what you and I have recorded with respect to the general concepts, symptoms, and the biomedical equivalences. The key differences is that it seems to me that *mäjts baajy* is a nearly forgotten and relatively rare disease, while your data (on c*ha'lam tsots*) point to the opposite direction!" (Heinrich, pers. comm. 1999).

Two facts quickly emerged from my preliminary work in the Mixe region. First, according to informants, *mäjts baajy* is an illness that has essentially been eradicated from this region. Second, only older healers, and older laypersons, even knew about it. Younger healers had often never even heard of *mäjts baajy*, and if they had, knew very little about it. All of the informants who were able to provide information about this illness were 45 years old and older. In fact, knowledge about this condition was largely limited to this group. This is in sharp contrast to the Tzeltal sample where most everyone, from shopkeepers to taxi-drivers, had at least some idea of what this illness was. Despite the rarity of this illness, I was able to locate individuals who knew about the illness, who had suffered from it, what caused it, and how they treated it.

5.3 Primary Sufferers and Seasonality

As with c*ha'lam tsots*, *mäjts baajy* is an illness which primarily afflicts infants. When asked "Who suffers from *mäjts baajy*?" all informants reported that young children were most at risk, though adults could occasionally fall ill.

> "Children suffer from this illness. The boys and the girls equally. It is because their parents don't look after them and make sure they eat. The children don't eat well." (#3).

When asked at what age these children fall ill, several informants responded that the typical sufferer of *mäjts baajy* is from one to two years old, although children up to the age of six or seven are susceptible.

> "It depends, (they can get sick) up to two years old, or the age when they have a new sibling. If a sibling arrives they can become sick too." (#1)

Most informants did not know what time of year this illness was most common, though four informants responded that the rainy season months of June and July were the most common months to fall ill as the parents were unable to provide proper nutrition during these lean times

> "Children would fall ill in the rainy season, in the summer months of June and July when it rains the most. This is when people can't work as much to find food and sustenance." (#12).

5.4 Distribution

The distribution of *mäjts baajy* is not limited to the western highland municipalities where this research was conducted. Frank Lipp (1991) describes cases of *mäjts baajy* in his research conducted among the Mixe of the central western highlands, and Michael Heinrich (1994) describes *mäjts baajy* (called *metsk kuaay*) in his research in the lowland Mixe community of San Juan Guichicovi, located in the far eastern reaches of the Mixe region in the Istmus of Tehuantepec.

5.5 Attributed etiology

The Mixe explanation of causation for m*äjts baajy* is markedly different than the Tzeltal explanation for *cha'lam tsots* as they use both naturalistic and personalistic explanations. The use of either explanation appears to depend largely on the

specialization of the the healer: older, more traditional healers prefer personalistic etiologies, while younger healers and laypersons prefered naturalistic explanations.

As with the Tzeltal sample, two primary questions were asked concerning the cause, or etiology of *mäjts baajy*: "What are the causes of *mäjts baajy*?" and "Why does one get it?" While Tzeltal informants clearly saw a difference in meaning between these two questions, the Mixe did not.

Over the past thirty years Mixe ethnomedicine has been strongly influenced by biomedical models of disease causation and, as a result, all but four of my informants (83%) provided a naturalistic etiology. They explained m*äjts baajy* as a nutritional disorder caused by the child not eating enough of the proper foods.

> "It is because the child does not eat well, and when they don't eat well they become weak and have no energy to do anything." (#18)

At the most general level, our informants reported that the child does not eat properly because of neglect or improper care from the mother, but most specified that there were two mitigating circumstances which prevented proper care: the arrival of another child or pregnancy, and poverty, usually seasonal.

The most common reason given as to why a child did not get proper nutrition was the inability of a mother to breastfeed her child due to a new pregnancy or the arrival of a newborn.

> "Well, the majority get this illness when the mother begins to carry a new baby. I know that it's because the mother doesn't look after the child who is going to have a new brother. It's because she is pregnant and can't attend to the child very well. Then the child doesn't eat and becomes malnourished and then becomes sicker." (#1).

> "There are children who just turn one year old when the mother becomes pregnant and she doesn't have milk for the child. And this is when the malnutrition arrives because in these times they didn't give the powdered milk like they do now. No one knew about the "Leche Nido" powdered milk." (#3).

Twenty-two informants (92%) reported that *mäjts baajy* used to be common in the Mixe area due to extreme poverty and remoteness, which prohibited access to high-quality proteins. Prior to the 1970's the Mixe region was largely roadless, as the only passable road was a north-south artery though the western highlands. The municipality of Totontepec was over a day's walk from this road and people relied on pack animals or small planes for their access to foods not available in the region. These foods included scarcities such as meat, milk, and eggs.

> "Before the people didn't know about these things. Because before the people were poor and they saved. No one drank milk like now, and those things that they give the children. But now the road has come, now we know of these things and we give them to the children." (#12).

The road to Totontepec, and other roads throughout the highlands, were constructed during the early 1970's (1972 through 1975), and have transformed the local economy as well as the nutritional status of children. Most informants credit the arrival of the road as the time when *mäjts baajy* ceased to be an important illness.

Healers who specialize in curing personalistic illnesses typically reported that m*äjts baajy* is a particular manifestation of fright-illness, or "*susto*," which is a common folk-illness in Mesoamerican cultures (Rubel et al 1984). One becomes "*asustado*" after a frightening experience which startles the blood and heart, or dislodges one of the souls that a person accrues during their lifetime. The loss of a soul is akin to losing part of one's lifeforce and children are especially vulnerable. *Susto* weakens the body, rendering

it susceptible to "mal aires" or bad airs, which can lead to a wide-range of illnesses, especially *mäjts baajy.*

Though fright illness can be brought about in a variety of different ways, *mäjts baajy* is typically brought about by either frightening dreams which cause sudden movements in the child's arms and legs, or a startling fall.

"They jump in their bed at night, and we know that it is *susto*." (#4)

Susto is viewed as the provoking factor which leads to the child's loss of appetite. In this sense, *susto* is seen as the ultimate cause of the child's malnutrition; the reason why the malnutrition appears in the first place. A diagnosis of *susto* is always retrospective and is typically reserved for more serious, or advanced cases of illness, including *mäjts baajy*. The diagnostic technique will be discussed below.

5.6 Onset, Preliminary Symptomatology, and Diagnosis.

The primary sign alerting caregivers to the possibility that their child has *mäjts baajy* is a loss of appetite. Informants commonly reported that if a child does not want to eat their food for three consecutive days, then they would begin to suspect *mäjts baajy*.

> "The illness begins when the child doesn't want to eat anything and throws bits of tortilla everywhere." (#18)

Following the loss of appetite, the child becomes lethargic, irritable, and suffers sleeplessness. In the following dialogue, an informant describes the early onset of *mäjts baajy*:

> "It begins with a loss of appetite, and they don't have the will to play, to eat, to do anything."
>
> "It's because of susto?"

"Yes, a susto *grande*, that's what happens to one. And if you don't pay attention and cure them, well it's sure that it will make them skinny and the swelling will appear.

"Swelling?"

"Yes, swelling. It appears whereever it wants to appear, in the body, in the face, wherever." (#5).

Typically reported preliminary signs of *mäjts baajy* that follow the loss of appetite include weight loss (96%), edema (86%), and fever (83%) (see Table 5.1). A palid, anemic complexion with sunken eyes was also commonly reported (67%). In contrast to the Tzeltal, the Mixe do not consider *mäjts baajy* to be closely associated with diarrheal disease, and only 46% mentioned it as an important preliminary symptom.

Table 5.1: How does *mäjts baajy* begin? What are the first signs?

Loss of appetite	100%
Weight loss	96%
Edema	86%
Fever	83%
Palid, anemic complexion	67%
Diarrhea	46%

As with the Tzeltal *cha'lam tsots,* the diagnosis of *mäjts baajy* is contingent upon the presence of short (1-2 cm.), delicate, and spiny hairs appearing first on the back of the neck, progressing down the spine and over the whole head. Called "*espinillas*" or "little spines," these delicate hairs exhibit a range of color from reddish to blonde, which signal the severity of the illness. The lighter the color, the more severe the illness. Although the literal translation of m*äjts baajy* is "two hairs" or "second hair", the Mixe typical translate *mäjts baajy* into Spanish as "*espinillas*", again indicating that the pathological agent in these illness is this second-type of hair. It is interesting to note that Tenzel's

(1970) description of the Cakchiquel Mayan *ki-xiwi* also translated to Spanish as "*espinillas"* and not "*dos pelos*" or "second hairs" as is the case with the Tzeltal Maya.

Almost all informants (92%) reported that a proper diagnosis of *mäjts baajy* requires a specialist healer, who knows how to "look" for the "espinillas". The diagnosis would typically take place outside in daylight, as good light is necessary to both see the hairs and determine their color, which is important in assessing the severity of the illness.

5.7 Course of the Illness

As with c*ha'lam tsots*, the progression of the illness is signaled by the spread of the "espinillas" and the deterioiration of the child's condition. Although the Tzeltal report that the "second hairs" appear only on the head of the child, the Mixe report that the hairs begin on the back of the head and progress across the side of the head and down the neck and spine, finally covering the entire head (see Tables 5.2 and 5.3). The spread of the "*espinillas*" is accompanied by alopecia.

TABLE 5.2: What does it do to the body?

Hair falls out	100%
Lose weight	92%
Edema	86%
Fevers	79%
Diarrhea	63%
Distended belly (*ki'ix)*	63%

TABLE 5.3: Parts of the body affected.

The head	100%
The body (swelling)	86%

As the hairs spread, the child's condition deteriorates, weight loss quickens, edema and hair loss increase, fevers become more common, and diarrhea, if present, becomes more severe. Sixty-three percent of informants reported that a condition called *ki'ix* was commonly seen as the illness becomes severe. This condition is marked by a distended belly and "worms, like spaghetti" (#13) in the feces, which block the child's

stomach. From a biomedical perspetive, this is most likely *Ascaris lumbroides* infestation, a common parasite in this region.

Psychologically, the child becomes increasingly lethargic and irritable as their appetite all but disappears. The terminal phase of this illness is marked by sleepless nights and an almost total apathy to their surroundings. These symptoms are summarized in Table 5.4

TABLE 5.4: Reported psychological effects of *mäjts baajy*.

Loss of appetite	100%
Lethargy	92%
Irritable, wants to cry	86%
Sleeplessness	67%

5.8 Prognosis

As with c*ha'lam tsots,* agreement on prognosis was high. All informants reported that without treatment a sufferer of m*äjts baajy* would die. Most reported that a child would die because they did not want, or were unable, to eat. In other words, they would die of malnutrition.

> "The child will become thin because they don't want to eat. And then they will die. If they don't receive the treatment, they will die." (#21)

In general, informants reported that, if a child received treatment, the prognosis was good, though many children reportedly died of this condition.

5.9 Healing strategies

One of the most striking differences between the Tzeltal and Mixe EMs was in the treatment strategy. Both groups agree that the "second hairs" are the pathological agent in these illnesses and both treatments target the new type of hair growing on the scalp. While the Tzeltal treat the hairs and scalp by applying medicinal plants, the Mixe attempt

to cure this illness by removing the offending hairs by shaving them off. Additionally, the Mixe report that only specialist healers are able to provide the treatment; there are no laypersons who treated *mäjts baajy*.

Once a child has been diagnosed with m*äjts baajy*, they are brought to a specialist healer for a treatment. Healers who ascribe a naturalistic etiology for *mäjts baajy* employ a treatment which aims at removing the *espinillas* which are causing the illness. The healer begins the treatment by confirming the presence of the hairs. This is done by spitting into the palm of a hand and rubbing the neck and spine until the spiny hairs all stick up in the same direction. This is typically done in the noonday sun as the hairs are most visible in direct sunlight.

The area affected by the *espinillas*, typically the neck, sides of the head, and upper back are rubbed with "manteca" or lard (some report using Colgate brand shaving cream) and the hairs are shaved off with a razor. The shaved area is cleaned off and alcohol is applied. Following this treatment the child is given dried fish, beef, pork or any "greasy" meat that is available. This dietary prescription is another important difference between the Mixe and Tzeltal models for these illnesses and is a result of the Mixe acknowledging a nutritional basis for the illness.

> "Well, after (the treatment), they tell me that the mothers have to give them more food that contain more proteins. Like fish, meat, eggs. In that time there was no milk. They gave more food with proteins." (#5)

In addition to the shaving and dietary supplementation, many informants reported that children needed to get rid of the *lombrices* or worms, called *tü'ün ntsaa'n,* that blocked the child's stomach, causing the condition called *ki'ix*.

"Later, once the treatment is finished, maybe the next day, we have to purge the stomach."

"Why do you purge?"

"To clear the stomach so that what they eat can do well for them."

"For the worms?"

"Yes, for the worms. The child has a little *empacho* (blockage). It because of the worms, not the food, the worms cause harm."

"What kind of worms are they?"

"The ones they call 'large white worms'."

"Large, round ones?"

"Large, like spaghetti, they're called *'tü'ün ntsaa'n'*." (#4)

Common treatments for the worms included *epasote* (*Chenopodium ambrosioides*), and "tablets" which are presumably Albendazole or Mebendazone, common pharmaceutical treatments for *Ascaris lumbricoides*.

The treatment for *mäjts baajy* is typically given once and the patient is expected to make a full recovery in roughly 15 days. One healer, who was particularly knowledgable about *mäjts baajy,* reported that the treatment had to be repeated three times, in successive days, for it to be effective. The prescription for the high-calorie, high-protein greasy meats is followed for a period of several days to a week after the shaving treatment. If the child does not improve in this time period one either repeats the original treatment or begins to suspect a case of *susto*, and brings the child to a specialist healer who knows how to treat *susto*.

Healers who ascribe a personalistic etiology for *mäjts baajy* employ a slightly different treatment strategy. Although the intricacies of each treatment are as varied as

the individuals who perform them, there are a few basic elements common to all treatments.

The initial stage of the treatment focuses on removing the "*mal aires o espiritu*" or "bad winds or spirits" inhabiting the patient and diagnosing the severity of the case of *susto*. The healer passes an uncooked egg over the patient's entire body, transferring the spirits into the egg. The egg is then broken into a glass half-filled with water. The manner in which the egg breaks into the glass indicates the severity of the illness. If the yolk of the egg does not break, the "evil eye" is implicated as the cause of the *susto* and the yolk is broken by a stick. If the yolk breaks then the *susto* is caused by another, less serious event.

The second stage of the treatment involves applying a mixture of medicinal plants to the head and body of the patient. One informant reported that the the following oration is given prior to the application of the plant treatment:

> "Padre mío, tú me vas a ayudar y beso un padre nuestro. Diós te salve María para que la virgen también me ayude y asi primero beso y digo en el nombre de ustedes en el nombre de Diós y en el nombre de la virgen santísima tú me vas a ayudar a que sane esta persona, tú vas a hechar bendicciones en esta hierba."

There are several plants used in the treatment of *susto*. Among them are "elegant leaf," or *pix na'ay* (*Mafafa* spp.) in Mixe, as well as a plant called *juquelite* and *hojas de aguacate,* or "avocado leaves". The plants are crushed and mixed with *aguardiente*, or cane liquor, salt, garlic, and *tierra de tusa* or "gopher dirt" which is the dirt that a gopher digs up and deposits in front of its burrow. This mixture is applied to the heart of the patient once each day for three consecutive days.

If the illness is advanced the head, neck and back of the patient will be covered in another mixture made of the crushed leaves of a plant called *mäjts baajy öjts*, or "second-hair plant", mixed with a little bit of cane liquor. The treated areas are wrapped tightly in a cloth and the patient is told to rest. After each application of the plant mixture the head of the patient is carefully combed to remove the offending hairs. Following this treatment patients are given a greasy meat, typically dried fish, for several days, until they improve.

Frank Lipp (1991), in his work among the Mixe of the central western highlands, reports a slightly different treatment for *mäjts baajy*, probably reflecting local differences in treatment options. His description is worth quoting at length as the treatment he describes has many similarities with the Tzeltal treatment strategy:

> "The hard seed of the mamey fruit is broken open, cooked, and mixed with lard. The child's head is then rubbed with this mixture and covered with *Ricinus* leaves. Another method is to grind up several *Drosera capillaris* plants and place them on the child's head. The child is well wrapped and placed in the sun for a few days. The hair is then carefully combed, so that the fine, golden hairs, which are visible to only a few, all drop off. If this cure is ineffective, the child's head is then covered with fresh cattle excrement" (Lipp 1991: 158-59).

CHAPTER 6

THE BIOMEDICAL BASIS OF 'SECOND-HAIR' ILLNESS.

In this chapter I present data that describe 'second-hair' illness from a biomedical perspective. As *mäjts baajy* has been eradicated from the Mixe region, the biological picture of "second-hair illness comes entirely from data collected in Tenejapa on the Tzeltal Maya *cha'lam tsots*.

As previously mentioned, one of the purposes of the explanatory model methodology was to develop avenues for exploration in the search for etiologic agents, risk factors, and biomedical equivalence. The basic structure of the EM, as presented in the previous two chapters, was designed to maximize the potential to draw comparisons between the ethnographic and the biomedical data that will be presented in this chapter.

Once the ethnographic component was completed, I began collaboration with a US-based family-practice physician, Dr. David Keifer, to explore the clinical and epidemiological picture of this illness. Based upon the EMs, we hypothesized that c*ha'lam tsots* most resembled protein-energy malnutrition and our selection of research methodology reflects this hypothesis.

6.1 Protein-Energy Malnutrition

The term protein-energy malnutrition (PEM) was described by Jelliffe (1959) to encompass the spectrum of macronutrient deficiency syndromes, including marasmus, kwashiorkor, and nutritional stunting or dwarfism, which are caused by an inadequate

dietary intake of protein and/or calories. The most common victims of PEM worldwide are children in underdeveloped and developing countries (WHO 1990).

There are two basic types of PEM: marasmus and kwashiorkor. Marasmus is caused by a decreased caloric intake relative to energy expenditure and typically develops over a long period of time (Hensrud 1999). As marasmus advances, fuel stores are depleted and the individual develops the characteristic wasted appearance. The hallmarks of marasmus are reduced body fat and lean tissue stores. Essentially, marasmus is starvation.

The term "kwashiorkor" comes from the Ga language of West Africa and can be translated as "disease of the displaced child" because it was commonly seen after early weaning (Klein 2000). The weaned child is often fed a thin corn or barely gruel of poor nutritional quality (compared with breastmilk) and fails to thrive. From a clinical perspective, kwashiorkor refers to an inadequate protein intake with a fair or normal caloric intake (Balint 1998). A diet with excessive calories from starch or sugar, but deficient in total protein and essential amino acids, results eventually in kwashiorkor. In contrast to marasmus, which is typically slow to develop, kwashiorkor can develop quite quickly, in a matter of weeks, without adequate nutritional support and especially in the presence of infection.

The presence of peripheral edema is the hallmark which distinguishes children with kwashiorkor from those with marasmus. Other signs suggestive of kwashiorkor in children include: poor growth, decreased subcutaneous fat, muscle wasting, atrophic lingual papillae, angular stomatitis, cheliosis, ridging of nails, abdominal distension, hepatomegaly, dyspigmentation of the hair, easy pluckability and breakability of the hair,

thin, sparse hair, diffuse depigmentation of the skin, psychomotor change, facial edema ("moon-face"), and flaky-paint dermatosis (Jelliffe 1966, Balint 1998). Children with kwashiorkor are typically lethargic and apathetic when left alone and become quite irritable when picked up or held. The intermediate, combined form of PEM is called marasmic-kwashiorkor. Children with this form have some edema and more body fat than those with marasmus.

Marasmus is the most common form of PEM throughout most developing countries. Kwashiorkor is less common and is usually manifest as the intermediate marasmic- kwashiorkor state (Klein 2000). It tends to be confined to those parts of the world (typically rural Africa, the Caribbean and Pacific islands) where the staple and weaning foods are high carbohydrate, low protein foods such as yam, cassava, sweet potato, maize, and green banana.

The diagnosis of PEM is obvious in its most severe forms; in mild to moderate forms, the usual approach is to compare the body weight for a given height with standardized growth charts (Cotran 1999). From an anthropometric standpoint, the diagnosis of PEM is based upon low body weight for height, and measures of subcutaneous fat (from triceps skin-fold) and muscle (from mid-arm circumference) below the standard of reference described by Frisancho (Frisancho 1990).

Waterlow (1972) suggests using weight and height standards to identify PEM in children. A child with low height for age is classified as stunted, while low weight for age is considered wasted. Additionally, the type of PEM can be differentiated based on the presence or absence of edema as well as a child's weight in comparison with that

expected for their age (see Table 6.1). For this study, we employed the criteria described by Balint (1998: 3-4):

> "The expected weight is considered to be the weight that falls at the 50th percentile for the child's age. If the weight is 60% to 80% of expected and there is edema, the child has kwashiorkor. If there is no edema, the child is simply undernourished. If the weight is less than 60% of expected and there is edema, it is classified as marasmic kwashiorkor. Without edema, this marked degree of undernutrition is labeled marasmus."

Table 6.1 Features of PEM Syndromes in Children

Feature	Kwashiorkor	Marasmus
Weight for Age (% of expected)	60 – 80%	< 60%
Weight for height	Normal or decreased	Markedly decreased
Edema	Present	Absent
Mood	Irritable when picked up, Apathetic when alone	Alert
Appetite	Poor	Good

(Source: Klein 2000)

Recent research indicates that kwashiorkor might not always be caused by a relative deficiency in protein intake, as had previously been thought, as protein and energy intake is often similar in children with kwashiorkor and marasmus (Klein 2000). In these cases kwashiorkor is caused by the physiologic stress of an infection, often gastrointestinal, that induces a deleterious metabolic cascade in an already malnourished child. Therefore, kwashiorkor is often triggered by an acute illness that punctuates periods of chronic undernutrition. This fact underscores the impotrtant two-way relationship between infectious disease and malnutrition.

Scrimshaw, Taylor and Gordon (1968) have proposed a bidirectional relationship between diarrhea and malnutrition where malnutrition predisposes the host to diarrhea, and conversely, diarrhea exerts a negative impact on nutritional status. Diarrheal diseases and other common infections in children affect nutritional status by reducing appetite and

by interfering with nutrient absorption and utilization (Martorell and Yarbrough 1983; Molla et al 1983).

Nutrient absorption is compromised by two major factors: morphological changes in the intestinal tract, which reduces the absorbing surface of the intestinal villi and contributes to lower nutrient absorption capacity, and by hastening the transit time of foods, reducing the time available for absorption (Chen 1983).

6.2 Sample

Over a one-month period of time, during November 2000, 19 cases and 16 controls were recruited from the Tzeltal municipality of Tenejapa. Cases were recruited from a set of patients who presented with a self-report, or parental report, of an ethnomedical diagnosis of *cha'lam tsots*.

Females accounted for almost two-thirds of the case sample, an interesting finding considering that girls are typically healthier as infants than boys. This may be indicative of differential treatment in child-rearing practices in local Maya culture.

Five of the controls were older than 18 years and are not factored in the analysis of the anthropometric data as growth charts are applicable only to the age of 18 years. This fact is reflected in the statistical analysis of the anthropometric data. The age profiles of cases and controls are given in Table 6.2:

Table 6.2 Average Ages in Months of Case and Control Study Participants

	Cases	Controls*
Mean	45.2	43.7
Median	32.4	38.5
Mode	19.1	36.3

* excluding participants 18+ years who are excluded in anthropometric analysis

Although we found cases in all three ethnoecological zones, the majority of the cases were found in the temperate and hot zones (see Table 6.3). Three cases came from "cold country," nine from "temperate country," and seven from "hot country." Our sample is, however, too small to draw any conclusion concerning relative risk by ethnoecological zone.

Table 6.3 Location and Sex of Cases.

Paraje	Number of male cases	Number of female cases	Total number of cases
Nabil	0	3	3
Juxal'ja	1	2	3
Tres Cerros	4	2	6
Cruz Pilar	2	5	7
Totals	**7**	**12**	**19**

Table 6.4 Location and Sex of Controls.

Paraje	Number of male controls	Number of female controls	Total number of controls
Nabil	2	4	6
Juxal'ja	3	4	7
Tres Cerros	1	2	3
Cruz Pilar	0	0	0
Totals	**6**	**10**	**16**

As discussed before, recruiting healthy controls proved to be quite difficult, in some communities more so than others. We were unable to recruit any controls in the community of Cruz Pilar presumably because of rumors that we were collecting blood and other bodily samples to sell at a profit in San Cristóbal. While it was not apparent during the course of the study, there were several individuals in Cruz Pilar who opposed our presence and spread harmful rumors. During the follow-up phase of the research, in January and February 2001, several mothers would not let us check-up on their child for fear of the validity of the rumors. Thankfully, this was the only community where

nascent opposition existed and we were able to recruit control participants in the other three communities.

6.3 Prevalence

From an epidemiological perspective prevalence refers to the number of actual cases of an illness, in a specified region, at any given moment in time. For this research we calculate prevalence as the total number of cases we were able to isolate in the four study communities during the one month period of patient recruiting. As we estimate a population of 1,860 persons for these 4 communities, the prevalence of *cha'lam tsots* is 10.2 cases/1000 people, or roughly 1 percent of the total population.

6.4 Medical histories

We began each case and control evaluation with a detailed medical history. If the participant was a sufferer of c*ha'lam tsots* we were interested in recording the severity of their symptoms, the duration of the illness, when it began, and current symptoms they were experiencing. Controls were asked to describe their current health status, and, if they were sick, to report the nature of their complaint. As the patient typically was an infant or small child, interviews were conducted with the primary caregiver, usually the mother.

One of the most interesting findings involved the episodic nature of c*ha'lam tsots*. Fourteen case histories (74%) reported that the illness would be severe for short periods of time, broken by longer periods of remission where the child's symptoms would improve. This was clearly the case with most of our sample as many of the symptoms that caregivers had reported were not evident in the physical exam due to the fact that their child's condition was described as improving and symptoms were less severe. The

majority of our cases reported that the child had been suffering from c*ha'lam tsots* for several months, and was in a period of remission at the time of the study.

The signs and symptoms reported in the case histories were generally supportive of a diagnosis of PEM. These are summarized in Table 6.5:

Table 6.5: Major signs and symptoms reported in the case medical histories

Diarrhea	100% (19/19)	Stomach ache	32% (6/19)
Short, spiny hairs	100% (19/19)	Loss of appetite	21% (4/19)
Fever	95% (18/19)	Edema	16% (3/19)
Hair loss (alopecia)	89% (17/19)	Irritability	16% (3/19)
Cough	53% (10/19)	Headaches	11% (2/19)
Head sweats	53% (10/19)	Weight loss	11% (2/19)
Flu (gripe)	42% (8/19)		

Not surprisingly, diarrhea, fever, the appearance of the short, spiny hairs, and hair loss topped the list of major signs and symptoms of *cha'lam tsots* that our case group reported. Other indications of infectious disease, such as cough, head sweats (fever), flu symptoms, and stomach ache were also commonly reported. Conspicuous in its low rate of report in the medical histories were weight loss and edema as major signs of *cha'lam tsots*. Although these two signs were frequently reported in the EMs of *cha'lam tsots* they were not frequently reported in the medical histories. This may be due to a number of factors including the importance that caregivers ascribe to these individual signs.

According to the medical histories, the severity of the signs and symptoms indicative of gastrointestinal or upper-respiratory infection co-varied with the severity of their overall condition. As diarrhea, fever, cough, and flu worsened, so did the individual's case of *cha'lam tsots.* According to the medical histories, there appears to be a strong connection between overall nutritional status and the severity of their GI or

respiratory infections. There were no reports of any significant illnesses prior to becoming ill with c*ha'lam tsots*.

General weakness was the most common health complaint among the controls. Reports indicative of infectious disease among the control group was limited to two complaints of diarrhea and one complaint of cough. Hair loss, short, spiny hairs, and edema were not reported. These signs and symptoms are summarized in Table 6.6.

Table 6.6: Major signs and symptoms reported in the control medical histories

Weakness	25% (4/16)
Stomach ache	19% (3/16)
Headache	19% (3/16)
Diarrhea	13% (2/16)
Cough	6% (1/16)

6.5 Clinical exam

The medical history interview was followed with complete physical examination designed to identify any signs of PEM as well as any other illness that might be present. Again, this exam was conducted by a US-trained medical doctor, with the aid of a local collaborator/translator. As stated above, many of the signs and symptoms reported by caregivers in the medical history interview were not evident in the physical exam, perhaps due to the fact that their child's condition was reported to be improving and signs and symptoms were abating.

All but two cases presented, to varying degrees, the short, discolored, and "spiny" hairs described in the EMs. These hairs ranged in color from light blonde, to dark red. They were often curly, and thinner than the normal scalp hair, and ranged from 1 – 3cm in length. Several cases presented advanced alopecia and one infant, a 16 month old girl, had lost almost all of her hair in the span of several weeks (see Figure 4.2).

Signs of recent severe malnutrition were evident in a few patients. Two patients presented bilateral spoon-shaped deformities of the nails called *koilonychia,* a sign indicative of severe malnutrition. Flag sign, characterized by alternating bands of light and dark color along the length of the hair, is a sign reflecting episodes of PEM punctuated by normal nutrition (Jelliffe 1966). This was observed in one case. Signs of infectious disease were observed in 9 patients (47%). These findings are summarized in Table 6.7:

Table 6.7: Major signs identified in the clinical exam of cases

Short, spiny, discolored hair	89%	(17/19)
Thin, sparse hair	42%	(8/19)
Fever	37%	(7/19)
Upper-respiratory infection (cough)	16%	(3/19)
Edema	16%	(3/19)
Spoon-shaped nails (koilonychia)	11%	(2/19)
Flag sign	6%	(1/19)
Ear infection	6%	(1/19)

Although edema was a key, but not necessary, component of the EM for *cha'lam tsots*, only three of our cases presented edema. Additionally, we did not find any signs of "flaky-paint" dermatitis, or dispygmentation of the skin, which is another common sign in kwashiorkor. Initially we were quite surprised at these findings, but these data are consistent with reports in the case histories of the episodic nature of this illness. The controls presented none of the clinical signs indicative of kwashiorkor.

6.6 Assessment of Anthropometric Data

The analysis of anthropometric dimensions is an indispensable tool for the assessment of the nutritional status of individuals. It is the central diagnostic tool for the assessment of PEM and provides the clearest picture of the nutritional status of the case

and control study participants. For the following analysis we used the most current growth standards published by the National Center for Health Statistics (NCHS 2000).

6.6.1 Assessment of Growth, Body Size and Nutritional Status

The assessment of growth and body size relies on four basic measures: height-for-age, weight-for-age, weight-for-height, and Body Mass Index (BMI). Growth percentiles were calculated using the nutritional program NutriStat, which is a component of the EpiInfo software (CDC 2001). Graphs of these growth percentiles for all cases and controls are presented in Appendix F.

All of the 19 cases presented weights-for-age below the 20th percentile; 12 were below the 5th percentile. Similar observations were made for measures of height-for-age, where 14 of the 19 cases were at or below the 5th percentile, and 1 case above the 50th percentile. For measurements of weight-for-height, 14 of the 19 cases were below the 50th percentile for weight-for-height; and 2 were below the 5th percentile. A summary of these findings is presented in Appendix G. In order to compare the differences between the case and control groups, percentile scores were transformed into z-scores and two-sample (independent) t tests were performed on the means of each variable between the case and control samples.

Height-for-age is a measure of long term nutritional status and both groups show marked levels of stunting (low height-for-age) due to long-term nutritional stress. The comparison of the z-scores for height-for-age revealed no significant difference between the case and control group, indicating that both groups share the same long-term nutritional status (Table 6.8). The mean z-score of –2.5 indicates a rather high degree of stunting.

Table 6.8: Two-sample (independent) t test on height-for-age z-scores

Group	N	Mean	SD
Case	19	-2.537	1.300
Control	11	-2.470	1.148

Separate Variance t = -0.147; df =23.3; p = 0.442 (one-tailed)
Difference in Means = -0.067; 95.00% CI = -1.012 to 0.877

While we found no difference between the two groups for height-for-age (all were stunted), there were marked differences in weight-for-age and weight-for-height, which are measures of short-term nutritional status. For both measures the z-scores for the case group was significantly lower than the control group, indicating that they are experiencing short-term nutritional stress.

Weight-for-age in the case group was significantly lower (p = 0.005), by one standard deviation, than the control group (see Table 6.9). Using the categories proposed by Frisancho (1990) the case group is categorized as wasted (z-score < -1.650), while the control group is categorized as below average weight (z-score between -1.650 and -1.040).

Table 6.9: Two-sample (independent) t test on weight-for-Age z-scores

Group	N	Mean	SD
Case	19	-2.428	1.302
Control	11	-1.476	0.571

Separate Variance t = -2.760; df =26.6; p = 0.005 (one-tailed)
Difference in Means = -0.952; 95.00% CI = -1.659 to -0.244

Weight-for-height also differed significantly (p = 0.02) between the case and control group (see Table 6.10). The cases presented a below average mean z-score for weight-for-height (-0.665), while the controls z-score (0.099) puts them in the average weight-for-height category.

Table 6.10: Two-sample (independent) t test on weight-for-Height z-scores

Group	N	Mean	SD
Case	19	-0.665	1.050
Control	11	0.099	0.856

Separate Variance t = -2.163; df =24.6; p = 0.02 (one-tailed)
Difference in Means = -0.764; 95.00% CI =-1.492 to -0.036

Body Mass Index (BMI) is commonly used to assess chronic energy deficiency and overweight in children over one year of age. BMI is expressed as a ratio of weight (kg) to height (m^2), multiplied by 100. Low percentiles are related to starvation, deficiencies of the immune system, increased morbidity, and mortality (Trahms and Pipes 1997). Analysis revealed that the case group presented significantly lower BMI scores (p= 0.043) than the control group, indicating a greater degree of long-term caloric stress than was revealed by the height-for-age scores.

Table 6.11: Two-sample (independent) t test on BMI- z-scores by Age

Group	N	Mean	SD
Case	11	-0.108	0.679
Control	10	0.556	0.949

Separate Variance t =-1.829; df = 16.2; p = 0.043 (one-tailed)
Difference in Means = -0.664; 95.00% CI = -1.434 to 0.105

In summary, from an anthropometric standpoint all participants, cases and controls, were stunted, indicating long-term, chronic malnutrition. While both the case and control groups show moderate levels of chronic malnutrition, as indicated by low height-for-age scores, only the case group presented z-scores indicative of severe short-term malnutrition, indicated by below average weight-for-height and extremely low weight-for-age scores. The cases are therefore stunted and wasted, indicating short-term and long-term nutritional stress. The controls are merely stunted and are not experiencing short-term nutritional stress. Therefore, c*ha'lam tsots* appears to represent

an acute, short-term nutritional crisis that occurs in the presence of prolonged undernutrition.

6.6.2 Assessment of Muscle and Fat Status

The assessment of muscle and fat status of individuals is based on measurements of the upper arm circumference and triceps skinfolds (Frisancho 1990). The calculations used to compute total upper-arm area, upper-arm muscle area, and upper-arm fat area are described in Appendix H. These measurements provide an assessment of the muscle and fat status of the study participants and are useful in differentiating between protein malnutrition (kwashiorkor) and energy malnutrition (marasmus) in PEM.

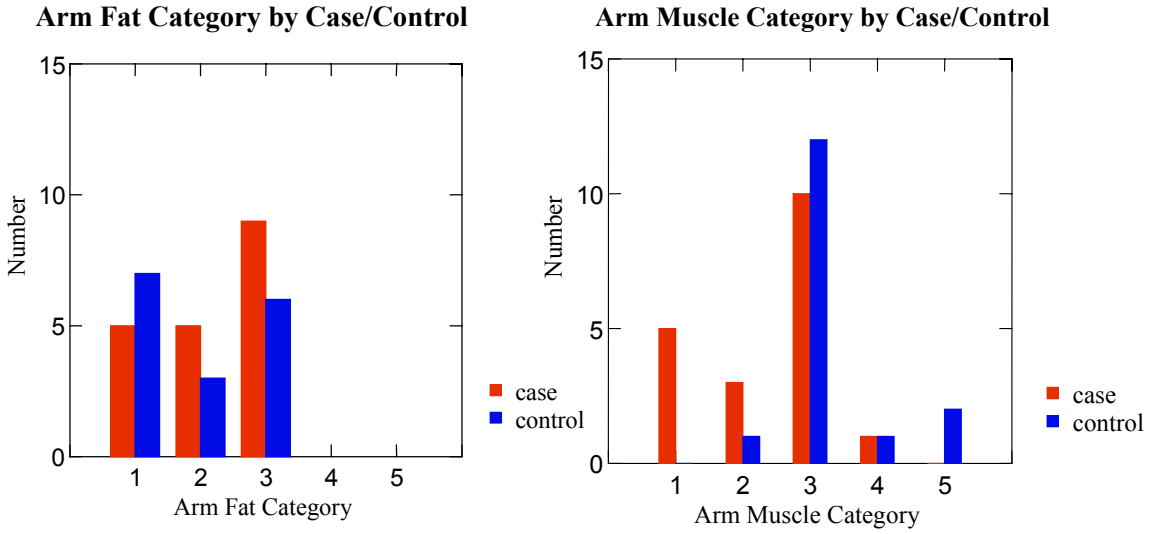
Using the standards described in Frisancho (1990), an individual's upper-arm fat area and upper-arm muscle area fall into one of 5 percentile categories that denote varying levels of wasting or low fat status. These categories and their corresponding indicators are described in Table 6.12

Table 6.12: Arm Fat and Muscle Categories Suggested by Frisancho (1990)

Category	Percentiles Represented	Analysis for Upper-arm Muscle Area	Analysis for Upper-arm Fat Area
Category 1	$< 5^{th}$	Low muscle: Wasted	Low fat: Lean
Category 2	6^{th} to 15^{th}	Below average muscle mass	Below average fat
Category 3	16^{th} to 75^{th}	Average muscle	Average fat
Category 4	76^{th} to 85^{th}	Above average muscle mass	Above average fat
Category 5	86^{th} to 100^{th}	High muscle: good nutrition	High fat: Excess fat

We observed below average to severe muscle wasting in 8 of the 19 cases. None of the controls had below average or severe muscle wasting. 10 of the 19 cases and 10 of the 16 controls showed below average and low measures of upper arm fat. These findings are summarized in Figure 6.1.

Figure 6.1: Histograms of Arm Fat and Arm Muscle Categories by Case/Control



As the data on arm fat and arm muscle are categorical I performed a cumulative logistic regression analysis to determine if there were significant differences between the case and control groups. The analysis of the mid-arm muscle mass revealed that the cases were significantly leaner than the controls ($p = 0.008$). There was no statistical difference between the cases and controls in measures of mid-arm arm fat area ($p = 0.36$).

These findings indicate that, according to fat measures, both groups are receiving the same amount of calories, though on the whole they are both below average in fat status. With respect to muscle status, the cases are significantly more wasted, many severely. The cases group is not getting enough protein as their muscle mass is significantly lower. This could be due to either a decreased intake or a decreased ability to utilize protein because of infection.

6.7 Laboratory Analysis

As low serum album is a marker of kwashiorkor, a laboratory technician was hired to collect blood and stool samples. Blood samples were collected to analyze the

levels of serum albumin, which is an measure of protein stores. Low serum albumin levels are indicative of *kwashiorkor*, or protein malnutrition. The stool samples were collected to identify the presence of parasitic infections such as *Ascaris lumricoides* or *Entamoeba hystolytica*, which are common parasitic conditions in the Chiapas highlands.

Again, due to the strong cultural proscription against others having possession of one's body parts, including hair and nails, most participant's caregivers were reluctant to consent to this procedure. We were only able to collect blood samples on 10 of the 19 patients and 13 of the 16 controls, and stool samples on 9 of the 19 cases and 13 of the 16 controls.

Laboratory analysis of the 10 cases that consented to blood draws revealed only one case with serum albumin below normal levels (< 3.5 gr/dL). Analysis of the stool samples revealed that three of the nine cases (33%) had *Ascaris lumbricoides* infection. No cases were infected with the *Entamoeba hystolytica* parasite.

Analysis of the 13 controls that consented to blood draws revealed no controls with serum albumin below normal levels (< 3.5 gr/dL). Analysis of the stool samples revealed that five of the thirteen controls (38%) had *Ascaris lumbricoides* infection. No cases were infected with the *Entamoeba hystolytica* parasite. The levels of *Ascaris lumbricoides* infection in both the case and control groups are consistent with levels typically found in this region.

The results of the laboratory analysis shed little light on the health status of our study participants. We expected to find more cases with low levels of serum albumin, though this may be explained by the fact that many of the cases were apparently experiencing a remission and reduction of the severity of their symptoms. Serum

albumin levels respond quickly (in one to two weeks) to the elevated bioavailability of serum proteins, either due to improved nutrition or to improved absorptive capacities (Klein 2000).

6.8 Dietary-Recall Data

As previously noted, I collected three day dietary-recall data on all of the study participants. This interview proved to be exceptionally difficult and the results are suspect at best. Even when we explained the purpose of the interviews, caregivers did not draw the connection between our questions regarding diet and their infant's condition, and were frustrated that we were spending time talking rather than giving medicine to their child. The caregiver was rarely able to recall foods and amounts consumed, even for the day prior to the interview, much less for three days prior. Based upon several fieldseasons of observation of Tzeltal dietary practices, I feel that the accuracy of reports is low and cannot provide an accurate picture of the nutrient intake of these individuals. Therefore, they will not be considered in this analysis.

6.9 Findings

Through analysis of the clinical examinations, medical histories, and anthropometric data, the findings support Hypothesis 1 that c*ha'lam tsots* carries a biomedical diagnosis of PEM. More specifically, the data suggest that these children are suffering from acute and recurrent bouts of *kwashiorkor* which are the result of chronic gastrointestinal infections that limit their ability to absorb protein. In a few cases I note that protein intake is dramatically reduced by the increased consumption of high-caloric, high-carbohydrate foods.

Using the criteria set forth by Balint (1998), all 19 cases are diagnosed as PEM (see Table 6.13). Although the EM of *cha'lam tsots* clearly pointed to kwashiorkor as the type of PEM we expected to encounter, we were quite surprised that we were only able to diagnose two cases of kwashiorkor among our samples. Nine of our cases presented medical histories and anthropometric data that strongly indicate *kwashiorkor* but did not present edema at the physical exam. We feel that these individuals are suffering from kwashiorkor-type PEM, though they do not fully fit into the diagnostic criteria described by Balint (1998). These individuals are marked on the following table with an asterisk.

Table 6.13: Weight, Percentage of Expected Weight, and Diagnosis

Age	Sex	Weight	Expected Weight	% of Expected	Edema	Diagnosis
24m	M	7.25	12.5	58	-	PEM-Marasmus
33m	F	10.5	13.4	78	-	PEM-Undernourished*
23m	F	9	11.9	75	-	PEM-Undernourished*
15m	F	9	10.2	88	-	PEM-Undernourished
19m	M	9.5	11.9	80	-	PEM-Undernourished*
4y 1m	M	16	17	94	-	PEM-Undernourished
5y 11m	F	16.5	19.5	84	-	PEM-Undernourished
5y 3m	F	14	18	77	-	PEM-Undernourished*
16m	F	7.25	10.6	68	+	PEM-Kwashiorkor
10y	F	20	32.5	62	-	PEM-Undernourished*
8y	F	20	25	80	-	PEM-Undernourished*
19m	F	9	11.2	80	-	PEM-Undernourished*
3y 3m	M	11	15	73	-	PEM-Undernourished*
9y	F	16.5	28.5	57	+	PEM-Marasmic- kwashiorkor
7m	F	7	7.7	90	-	PEM-Undernourished
36m	M	12.5	14.3	87	-	PEM-Undernourished
4y	M	14	16.75	83	-	PEM-Undernourished
18m	F	9.75	11	88	+	PEM-Undernourished
26m	M	9.75	12.9	75	-	PEM-Undernourished*

source: CDC, NCHS growth charts (revised November 28, 2000)
* Individuals who presented a medical history and anthropometric measurements indicative of kwashiorkor, but did not have edema.

Our search for a biomedically "typical" case of *cha'lam tsots* was confounded by the fact that we encountered cases during both the acute and remission phases of this

illness. Those that were currently experiencing an "episode" of c*ha'lam tsots* showed signs indicative of kwashiorkor: edema, hair loss, rapid weight loss, and lack of appetite. As gastrointestinal infection, evidenced by severe diarrhea, is a core (often necessary) criterion in the diagnosis of *cha'lam tsots*, one probable reason for the episodic nature of this illness might lie in the physiologic stress that infection induces in the already malnourished child (Klein 2000). These episodic infections likely "push" an already malnourished child from mild malnutrition to severe, acute malnutrition.

Those that had recovered from a recent "episode" presented anthropometric measurements indicative of recent protein malnutrition. Although it is possible that the absence of the hallmark edema might be the result of a recent improvement in their condition, it is also possible that an ethnomedical diagnosis of c*ha'lam tsots* can include individuals with a mild to moderate form of PEM where the characteristics that define severe forms, such as kwashiorkor and marasmus, are not apparent.

6.10 Case Vignettes

The following vignettes are provided to give a more in-depth description of some of the various cases of *cha'lam tsots* that we encountered.

Case #1: Mariana

Mariana's case of c*ha'lam tsots* began when she was approximately one year old. We interviewed her and her mother six months later after she had, for the most part, recovered from her initial bout of illness. Her mother reported that her condition began the previous June after a protracted bout of *obal* 'cough' for which she received an injection (presumably of antibiotics) by the community health volunteer. Her illness began with a case of *ja'ch'ujt* or "watery diarrhea" which over time changed to *bosbos*

tsa'nel or "heaping diarrhea". She also reported hair loss, edema, and loss of appetite. The injection she received reportedly helped her through the worst of the illness though she was still suffering from c*ha'lam tsots* as the short, spiny hairs were still present.

During our initial exam she appeared healthy, though she did show signs of recent malnutrition. Her hair was thin and sparse and she had the lighter, thin, curly hairs growing among the her normal straight black hair. Aside from the "second hairs", she appeared normal. Anthropometrically she was both stunted and wasted. She was in the 1st percentile for height-for-age, the 5th percentile for weight-for-height, and the 1st percentile for weight-for-age. Her weight-for-age was 68% of expected, although her serum albumin level was within the normal range and she did not have any parasites, as her mother reported treating the whole family two months prior.

When I revisited Mariana one month later her condition had deteriorated significantly. Her mother reported that she would not eat any food except for soft drinks and sweets, which she provided to her, if only to calm her constant crying. Mariana presented significant hair loss, facial edema ("moon-face"), a fever, a rash on the scalp. Her mother also reported that her daughter had recently lost a significant amount of weight and had a severe case of lienteric, or heaping diarrhea. The child was exceedingly irritable and did not stop crying during the interview. Requests to re-weigh Mariana and to conduct a more extensive physical exam were denied due to her irritable state. I was permitted to examine the extremities and noted facial edema and pitting edema in the legs. Her nails were spoon-shaped, which is another sign of kwashiorkor. Clearly Mariana was suffering from kwashiorkor. Not only was her weight-for-age low, but she presented the hallmark edema, and was exceedingly irritable.

Case #2: Marivel

Marivel, age 8, has suffered from c*ha'lam tsots* for the better part of her young life. Her mother reported that she first became ill with c*ha'lam tsots* at about a year and a half of age when she began to lose her hair, have uncontrollable diarrhea, and rapid weight loss. She recovered from this initial bout, but has had repeated episodes of c*ha'lam tsots* throughout the past few years.

Marivel's mother became pregnant with her younger sister Marta when Marivel was one year old. She was weaned off the breast and given *posol*, or corn gruel, to eat. She never gained the weight she should have as a child. We recruited her sister Marta as a control, and the comparisons between the two children are startling. Marta never suffered from c*ha'lam tsots* and has had a generally healthy childhood. While Marivel is thin, fragile and shy, Marta is gregarious and energetic.

Marivel is both stunted and wasted. She is in the 1st percentile for height-for-age, in the 32nd percentile for weight-for-height, and in the 1st percentile for weight-for-age. Her weight-for-age was 80% of expected; she is categorized as borderline severe malnourished. She complains of weight loss, asthma, chronic lienteric diarrhea (*bosbos tsa'nel*), fevers, and hair loss, but not edema. Her clinical exam revealed the short, spiny hairs characteristic of c*ha'lam tsots*.

Her sister Marta, almost 2 years younger, is the same height and weighs 2 kilos more. Like most of the children of Tenejapa, Marta is stunted. Her height-for-age falls in the 1st percentile, but she is not wasted. Her weight-for-height is in the 79th percentile.

6.11 The potential biomedical equivalent of *mäjts baajy*

As I was unable to locate a single individual with an ethnomedical diagnosis of *mäjts baajy*, I was forced to rely on ethnographic data in determining the potential biomedical equivalence of *mäjts baajy*. After several months without finding a case I was fortunate to meet and interview a Mixe traditional healer with some perspective on this issue.

As the daughter of a locally-renowned *curandera*, Sra. Eloisa Flores grew up learning the arts of traditional healing. By the time she was 20 years old she had moved to the town of Tlalhuitoltepec to study nursing with the Salesian monks who had built a monastery and infirmary to serve the highland Mixe communities.

This sect of the Roman Catholic church was among the first to establish community development projects in the Mixe region and they took as their first priority the health and nutritional well-being of the Mixe. Beginning in the early 1970's they developed programs aimed at the assessment, treatment, and prevention of what has been described to me as rampant malnutrition and poor health. They also trained indigenous healers in western medicine and Sra. Flores was one of their students.

Sra. Flores' nursing duties were largely directed at treating acute gastroenteritis, respiratory infections, and severe cases of malnutrition. She reported treating scores of *mäjts baajy* cases during her years at the Salesian clinic. During one of our interviews, she was discussing the fact that there used to be many malnourished children in the region, but things have improved since the arrival of the Salesians:

"There are malnourished children now, but now they don't have the signs of *mäjts baajy*, the hairs. Now no."

"Why not?"

"Because now it's a different form of malnutrition. It used to be what they call marasmus and kwashiorkor. Marasmus is when they are thin, very thin."

"And *mäjts baajy* is which type?"

"*Mäjts baajy* is kwashiorkor. Now you don't see that sign of the hair in the children, but I have worked for a long time with malnourished children in Tlahuitoltepec. I observed many children who arrived with this swelling like water, which is the sign of kwashiorkor."

"And this is the same illness as *mäjts baajy*?"

"The same. Only the children don't fall ill with this form anymore."

"It's not marasmus because? They don't have swelling?"

"No swelling, they have a face like an old person"

"And the children with kwashiorkor have swollen faces"

"Swollen, like a fat person."

Considering the strong credibility of Sra. Flores as an informant, her nursing training, and her experience treating malnutrition, it is more than likely that she is correct in her diagnosis. In addition to this evidence, the Mixe explanatory model for *mäjts baajy* also provides evidence to back up Sra. Flores' statements.

While most informants had never heard of the term kwashiorkor, many described *mäjts baajy* as a form of malnutrition that afflicts children under 5 years of age, the most common age for this illness. Additionally, *mäjts baajy* typically begins with the child's loss of appetite, or by early displacement from the mother's breast; folk etiologic factors which are consistent with common risk factors for PEM. The physiological

manifestation of *mäjts baajy* is also consistent with a biomedical diagnosis of kwashiorkor-type PEM. The rapid weight loss, reports of edema, hair loss, and infection (as indicated by diarrhea, cough, and fever) are all hallmarks of kwashiorkor.

I also showed informants the diagrams of different forms of malnutrition from the "Where There is No Doctor" book (Werner 1992) and all informants responded that a child with *mäjts baajy* looked like the picture of the child with kwashiorkor.

Based on the statements made by Sra. Flores, and the correspondence between key elements of the ethnomedical and biomedical models, I am confident that *mäjts baajy* is, from a biomedical standpoint, kwashiorkor-type protein-energy malnutrition, confirming Hypothesis 2.

CHAPTER 7

ANALYSIS

7.1 A Comparison of the Ethnomedical and Biomedical Perspectives of 'second-hair' Illness.

A primary objective of this comparative study of 'second-hair' illness has been to demonstrate that a biocultural approach to the study of ethnomedicine can yield valuable insights into the biological basis of ethnomedical syndromes, as well as the empirical basis of ethnomedical knowledge and classification. In the previous chapter, I presented evidence that supports the hypothesis that c*ha'lam tsots* and *mäjts baajy* both represent ethnomedical diagnoses of PEM. This chapter will take these findings one step further by comparing the ethnomedical models of c*ha'lam tsots* and *mäjts baajy* with the biomedical model developed in the preceding chapter, with the goal of analyzing convergences and divergences between the folk and medical models.

The basic proposition that this research explores is that c*ha'lam tsots* and *mäjts baajy* represent systematic, patterned, and culturally integrated expressions and explanations of illness that are derived primarily from empirical observation of the biological and physiological manifestations of disease. I will explore this proposition by identifying the potential biomedical equivalence for the primary characteristics of these illnesses as identified in the explanatory models. The goal is to elucidate the relationship between the ethnomedical construction of these illnesses and their biomedical diagnosis

While the EMs of c*ha'lam tsots* and *mäjts baajy* are, in general, remarkably similar there are a few key differences, most notably in their understanding of etiology and the treatments they have developed to cure these illnesses. These similarities and dissimilarities will be noted below. In order to facilitate comparison between the emic and etic perspectives of these illnesses I will use the structure provided by the EM categories developed in Chapters 4 and 5.

7.1.1 Primary Sufferers, Seasonality, and Etiology

Both the Tzeltal and Mixe report that the primary sufferers are children from one to five years of age, and that the most common time of year to fall ill are the months of April through July. From an epidemiological perspective kwashiorkor is most common in this age group and is especially common in infants during the weaning period. The biological reasons why children would be most at risk for kwashiorkor during the months of April through July will be discussed below.

As a result of the influence of the biomedical model of illness, most younger Mixe healers believe that *mäjts baajy* is caused by malnutrition, and treat it as such. While older healers agree that *mäjts baajy* is caused by a lack of appetite they attribute its onset to a startling experience that brings about fright-illness or *susto*. This ultimate cause notwithstanding, there is, in general, a close correspondence between their attributed etiology of *mäjts baajy* and the biomedical model.

The Tzeltal model for c*ha'lam tsots* differs from the Mixe in attributed etiology as they do not acknowledge a relationship between c*ha'lam tsots* and malnutrition. Nevertheless, a closer look at their attributed etiology for c*ha'lam tsots* reveals important information about the epidemiology of this illness. To briefly summarize, the Tzeltal

give two basic explanations for the cause c*ha'lam tsots*. First, a child gets c*ha'lam tsots* if they receive repeated blows to the head when they fall down, typically when they are learning how to walk. Second, they can fall ill if they are left out in the sun too long by a mother who is busy working in the milpa. Both explanations place ultimate blame on a negligent and typically inexperienced mother.

Several clues emerge from an analysis of these two ascribed etiologies. The first etiologic agent, repeated blows to the head, is actually identifying the time in an individual's life when they are most susceptible to c*ha'lam tsots*; about one to one and a half years old, which roughly corresponds to the weaning age. The weaning age is the most critical time in a child's growth and displacement off of the breast, due to the arrival of a younger sibling, has a strong effect on a child's nutritional status. As soon as the displaced child is weaned from the nutrient-dense, protein-rich breastmilk to the starchy, protein-poor cereal, the child beings to become malnourished. Several patients reported that their illness began in this manner.

One important factor contributing to the increased risk of severe malnutrition among the Tzeltal during the weaning period is their practice of weaning children on a thin corn-gruel called *posol*, which is low in essential amino acids but high in carbohydrates. *Posol* is made by soaking corn kernels in water with a little calcium carbonate then grinding the grains to a paste. Whenever needed, this paste is mixed with water to make the *posol*. Although children are given as much *posol* as they want, it is an incomplete protein and a diet limited to *posol* inevitably results in micro- and macronutrient deficiencies.

The second etiologic agent, being left out in the sun, explains the time of year when children are most likely to become malnourished; i.e., during the dry, hot months of late March through early June. The Tzeltal report that the hot sun during this time of year "burns" the child's head causing the "short hairs" to appear. This typically happens when the child is left in the sun while the mother helps with the work in the milpa.

Although the dry season in the highlands extends from November through early June and, at this altitude, the sun is equally intense during most of this season, I believe that the Tzeltal identify late March through early June as the time of year when children fall ill primarily because it is the time of year which corresponds to the end/beginning of the agricultural cycle, when food stores are at their lowest.

Presumably, children who become sick in this manner, do so for a lack of food. Indeed, food-consumption studies have shown that the Tzeltal increase their utilization of non-cultivated "famine" foods during this time (Berlin and Berlin 1998). Many of the patients we interviewed reported that their illness began during this time of the year, or became worse during this time.

Analysis of these ascribed etiologies reveals that, instead of describing the biological "causes" of c*ha'lam tsots*, the Tzeltal are describing the most important risk factors for this illness: age and seasonality. From a practical sense, this information is undoubtedly more valuable to the Tzeltal in preventing the illness. Furthermore, these beliefs about causation are further evidence that the Tzeltal rely on empirical evidence for the construction of their explanatory model for c*ha'lam tsots*.

7.1.2 Onset, Preliminary Symptomatology, and Diagnosis

The Tzeltal consider c*ha'lam tsots* to be closely associated with diarrheal disease and begin to suspect a case of c*ha'lam tsots* once the child suffers from severe diarrhea for a prolonged period of time. A child's loss of appetite is the second key indicator that the child might be suffering from c*ha'lam tsots*.

The Mixe do not place as much emphasis as the Tzeltal on diarrhea as an early indicator of *mäjts baajy*. Instead, their EM focuses primarily on a child's loss of appetite as the principal early warning sign. If a child does not have an appetite for three days, then the mother begins to suspect a case of *mäjts baajy*. Diarrhea and other indications of infectious disease are instead given as common preliminary symptoms.

These differences in reported onset are minimal and perhaps reflect local differences in the prevalence of diarrhea versus upper-respiratory disease, though I have found no concrete evidence to support this proposition. Both groups also reported that weight loss, edema, fever, and loss of energy were common preliminary signs and symptoms.

All of the preliminary signs and symptoms reported by the Tzeltal and Mixe are consistent with those identified by biomedicine as common precursors to PEM in children. As discussed previously, the connection between diarrhea and malnutrition is well documented. In a protein-deficient child, antibodies used to fight off infection are degraded to provide amino acids for other uses, leaving the malnourished child more vulnerable to infections (Whitney and Rolfes 1999:179). Given the high incidence of both gastrointestinal infection and malnutrition in these Mayan communities, it is not surprising that diarrhea plays a major role in the EM of c*ha'lam tsots*.

Loss of appetite is another key criteria in the Mixe and Tzeltal EMs and is a key sign differentiating kwashiorkor from marasmus (see Table 6.1). The biochemical processes responsible for the loss of appetite in kwashiorkor are complex and are closely linked to protein deprivation.

While body fat reserves can meet most of the body's energy needs, red blood cells and the nervous system require glucose to meet their energy needs. In a starving or fasting person this glucose comes from the breakdown of protein tissues in the muscles and liver. This breakdown of body proteins is taxing on the body and, without alternative sources of energy, death would ensue in a matter of weeks, regardless of the amount of fat a body has stored. Ketosis is the body's way of adapting to this problem. Ketosis produces glucose from fatty tissues by condensing CoA fragments derived from fatty acids to produce this alternative energy source that can be used by red blood cells and the nervous system (Whitney and Rolfes 1999:218). One key result of this change in body chemistry is the loss of appetite, which is theorized to be adaptive to a person without access to food because the search for food would be a waste of valuable energy.

From a western medical perspective, one of the most peculiar features of 'second-hair' illness is the emphasis both groups place on the "second-hairs" as the central diagnostic criteria and as the pathological agent. Both the Tzeltal and Mixe consider a case of c*ha'lam tsots* or *mäjts baajy* to have begun once the "short-hairs" appear on the scalp of the child.

Additionally, each group assesses the severity of the illness by the color of these "second-hairs": lighter colors indicating more severe illness. From a biomedical standpoint, dyspigmentation of the hair does proceed in a gradual fashion, lighter colors

indicating more severe protein malnutrition. Dyspigmentation is due to a lack of sufficient tyrosene, a protein important in the production of melanin. This disturbs melanogenesis, the process which is responsible for producing melanin in hair follicles, causing the hair to lose its color, the hair roots to shrink, and hair breakage and loss (Jelliffe 1966). Melanogenesis returns to normal following adequate protein intake. *Signa de bandera*, or "flag sign" is a rare form of dyspigmentation that is characterized by alternating bands of light and darker hair. This was observed in one patient from Tenejapa, and reported as common by two Tzeltal *curanderas.*

Although biomedicine does acknowledge these abnormal hairs as signs of kwashiorkor, it is not considered an important criterion in either the diagnosis of the condition or in its treatment. Despite this, there is evidence to suggest the scientific validity for the Tzeltal and Mixe focus on these abnormal hairs as the primary diagnostic criteria.

Bradfield, Bailey, and Cordano (1968) describe hair-root changes in Andean children with marasmic kwashiorkor. They found that the hair roots of children with marasmic kwashiorkor exhibited strikingly different physical characteristics. Instead of the usual coarse, thick black hair associated with this ethnic group, the hair was fine-textured, dry, lifeless and had a high degree of dysplasia, or abnormal development. These hairs were also brittle as the outer sheaths were reduced in thickness (Bradfield, Bailey and Cordano 1968).

While researchers have long observed changes in hair morphology during protein malnutrition, their observations were limited to dyspigmentation of the hair shaft, not the hair roots. These findings indicate that the hair roots undergo morphological changes

prior to the appearance of changes in the hair shaft, and that these early changes are noticeable only on close inspection of the base of the hair shaft.

I propose that the Tzeltal and Mixe have identified, as did Bradfield, Bailey, and Cordano (1968), an important early warning sign of protein malnutrition, and that by placing the hair root changes at the center of their explanatory model for these illnesses, the Tzeltal and Mixe utilize this observation to improve the reliability and accuracy of the diagnosis.

Bradfield, Bailey, and Cordano (1968) also report that morphological changes in hair roots (and consequently the shafts) are relatively slow to recover, taking on average 3 to 6 months to return to normal. This fact sheds light on our observation that children who had recovered from the worst of their symptoms still carry an ethnomedical diagnosis of c*ha'lam tsots.* It is for this reason that the Tzeltal do not consider a case of c*ha'lam tsots* to be cured until the "second-hairs" are gone, long after they would have been considered "cured" from a biomedical standpoint.

7.1.3 Course of the Illness

The Tzeltal and Mixe description of the course of illness are remarkably similar. Both groups reported a deterioration in the child's symptoms as their illness progressed. As the loss of appetite became almost complete the child's alopecia advanced, edema, beginning in the face and progressing to the extremities, worsened, and the child became increasingly irritable, wanting to cry all the time.

For the Tzeltal, one important sign that the illness is progressing is the change in diarrhea from the watery type, called *ja'ch'ujt*, to the lienteric type, called *bosbos tsa'nel*, or *jewjew tsa'nel*. In other words, the bowel movement changes from a mostly fluid,

clear diarrhea to one that contains whole, undigested food particles. The change from watery diarrhea to lienteric diarrhea occurs when the intestinal villi collapse, reducing the absorbing surface of the intestine, hastening the transport time of the foods, and compromising the time available for nutrient absorption (Chen 1983).

Both the Tzeltal and Mixe reported that weakness and apathy were common symptoms. This is commonly seen in kwashiorkor because essential blood proteins, including hemoglobin, are no longer synthesized, reducing the blood's capacity to transport oxygen, and ultimately weakening the child with anemia.

Proteins are also important in the transportation and storage of iron, and inadequate intake leaves iron free. The body naturally sequesters iron in the presence of bacterial infection as iron is a limiting factor in bacterial growth. Free-iron, as a result of protein deficiency, promotes bacterial growth, contributing to the severity of the child's overall health and nutritional status.

Edema, the hallmark sign of kwashiorkor, and a common sign reported by the Tzeltal and Mixe, is caused by a lack of essential proteins that regulate fluid balance. Once this balance is no longer maintained, fluids begin to leak out of cells into the interstitial space between the cells causing swelling (Klein 2000). This swelling is most noticeable in the child's face, causing a condition known as moon-face, and limbs.

Both the Tzeltal and Mixe reported a swollen, distended belly as a common sign of 'second-hair' illness. The Tzeltal *nukul ch'ujt* and the Mixe *ki'ix* are most likely the result of an enlarged liver, a condition known as hepatomegaly. Hepatomegaly arises when there is a shortage of the protein carriers that transport fat out of the liver. Without

these protein transporters the liver becomes enlarged with the fatty stores, causing the belly to bulge (Whitney and Rolfes 1999:178).

As this previous discussion has demonstrated, most of the signs and symptoms identified by the Tzeltal and Mixe EMs of 'second-hair' illness are central features in protein malnutrition. In many cases there is an almost one-to-one relationship between the ethnomedical and biomedical construction of the symptomology. Undoubtedly, the close agreement between the two models is the result of a shared emphasis on the empirical evaluation of the physiological manifestation of the illness in the cultural construction of the illness.

7.1.4 Prognosis

The Tzeltal and Mixe both agree that, without treatment, most children with c*ha'lam tsots* or *mäjts baajy* would likely die. This belief certainly reflects the high mortality rates of severe malnutrition.

7.1.5 Healing Strategies

The healing strategies employed by the Mixe and Tzeltal to treat 'second-hair' illness are the result of their emphasis on the "second-hairs" as the central pathological agent in this illness. Both groups consider the removal of the hairs as the basic goal of the therapeutic process. While the underlying medical reasoning is similar, each group employs a different strategy to remove the hairs. The Tzeltal remove the hairs by applying a medicinal plant poultice to the scalp, while the Mixe are more direct, preferring to simply shave off the offending hairs.

One important difference between the Mixe and Tzeltal healing strategies is the Mixe post-treatment prescription of eating greasy meats. This is likely the result of the

Mixe acknowledging that *mäjts baajy* has its roots in malnutrition. The Tzeltal do not have any dietary prescriptions that accompany the treatment for c*ha'lam tsots*, nor do they associate c*ha'lam tsots* with any nutritional disorder.

The Tzeltal employ numerous medicinal plants in the treatment of c*ha'lam tsots*. In fact, each healer has their own particular plant they claim is *the* cure for it. The high diversity of treatment options points to the likelihood that the Tzeltal are currently in an experimental phase with regards to developing the cure for c*ha'lam tsots*.

Trotter and Logan (1986) have proposed that the efficacy of a particular treatment is correlated to the degree of cultural consensus on its use. Plants that are widely agreed upon to treat a particular illness are likely to be efficacious; treatments with low consensus are most likely to be ineffective. Therefore, given the wide variety of plants used in the treatment of c*ha'lam tsots* it is unlikely that many of them are efficacious.

Indeed, from a pharmacological standpoint, none of the plants identified by the Tzeltal to treat c*ha'lam tsots* have any biochemical properties that could aid in the treatment of PEM (B. Berlin personal communication 2001). One plant, *sakil yakan k'ulub wamal* (*Verbena carolina*) is the most commonly used Tzeltal treatment for diarrhea (Berlin and Berlin 1996) and appearance in the list of c*ha'lam tsots* treatments is not surprising, though we would have expected to see more than three reports of its use. Although the treatments for c*ha'lam tsots* are likely of little use in curing the illness, it is important to note that, from the emic perspective, these treatments are empirically-based in that their intended purpose is to remove the main pathological agent responsible for the illness.

The diversity of treatments provides additional evidence supporting the claim that c*ha'lam tsots* is a new illness in the Tzeltal region. The lack of consensus on the medical plants used to treat c*ha'lam tsots* is likely the result of it being a relatively new illness for the Tzeltal as they are in the process of experimentation, trying a wide variety of treatments to see which work best.

7.1.6 The Empirical Basis for the Ethnomedical Model of 'second-hair' Illness.

The preceding discussion has shown that the Tzeltal and Mixe explanatory models for 'second-hair' illness contain a good deal of information that is derived primarily from the close and careful observation of the pathological basis of this disease. While the emphasis on certain characteristics differ occasionally between the ethnomedical and biomedical models, as a whole there is a close correspondence between the two models.

The Tzeltal correctly identify the primary risk factors for getting c*ha'lam tsots*: age and seasonal shortage of food. By focusing on the hair changes, they have identified important early-warning signs. Their model contains detailed knowledge of the progression of the illness; that it begins with watery diarrhea and progresses to lienteric diarrhea. Almost all of the signs and symptoms they identify as core elements of c*ha'lam tsots* are key features of kwashiorkor. While the Tzeltal treatment options are not efficacious from a western medical standpoint, they are logically consistent with what they know about the illness in that treatments target the central pathological agent.

By exploring nuances of the explanatory model, such as the change from watery diarrhea to lienteric diarrhea, and the appearance of *nukul ch'ujt*, or abdominal swelling, we can gain insights into the empirical basis for the Tzeltal understanding of c*ha'lam*

tsots, and the medical epistemology of their healing system. The evidence clearly indicates that, in the case of c*ha'lam tsots*, their ethnomedical knowledge is strongly grounded in observable, empirical facts.

7.2 A Comparison of the Epidemiology of 'second-hair' Illness.

One of the most interesting and unexpected findings to emerge from this research was the striking difference in prevalence of c*ha'lam tsots* and *mäjts baajy*. Although I expected *mäjts baajy* to be a rare illness, I did not expect to be unable to locate a single case. Conversely, I was surprised that so many Tenejapanecos were suffering from c*ha'lam tsots*.

Shortly after I became aware of the discrepancy in prevalency, I decided to focus some attention on uncovering possible reasons for it. I began interviewing local Mexican National Institute for Social Security (IMSS) *pasantes* and their regional supervisors to get an understanding of the general epidemiology of the region. I spoke with the Salesian nuns who ran a monastery and clinic in nearby Tlahuitoltepec and were responsible for early improvements in Mixe health. I tracked down *promotores de salud*, who are local health care "promoters" and auxiliaries to larger health care projects. And, perhaps most importantly, I spoke with local elders and municipal leaders to try and get an understanding of some of the important changes that have taken place in the past 30 years.

Initially, I felt that it was fairly obvious why the Tzeltal were suffering from chronic and severe PEM (these reasons will be discussed below) but was somewhat perplexed as to why the Mixe, an indigenous group with similar levels of poverty, has rid itself of this illness. More importantly, the difference in prevalence offered a prime

opportunity to explore some of the political-economic and ecological root causes of PEM in Mexico's indigenous communities.

Therefore, the following discussion will offer an explanation of the reasons why *cha'lam tsots* is common in the Tzeltal region and *mäjts baajy* had been eradicated by the Mixe. In the most general sense, there are two basic reasons for the difference in prevalence I observed: the failure of public health projects in Chiapas, and the influence of dietary delocalization on the Maya diet. Each of these reasons will be described in detail below.

7.2.1 Why public health projects work in Oaxaca and fail in Chiapas.

Efforts to improve health, sanitation, and nutritional status have met with differing degrees of success in Tzeltal and Mixe communities. Despite similar levels of poverty, marginalization, and degree of integration into the Mexican national economy, the Mixe nutritional profile is quite different from the Tzeltal. Much of the differences between the Mixe and Tzeltal health profiles can be attributed to the local success of a few health promotion and development projects.

Mixe have received, and have been receptive to, a number of development and public health projects that have improved basic sanitation and hygiene levels in the Mixe communities, even the more remote and outlying *agenicas*. Mixe historian Bernal Alcántara (1991) provides an overview of the earliest development programs, headed by the Salesians Missionaries of the Roman catholic church. In 1972 they established a mission hospital in the western Mixe municipal center of Tlahuitoltepec, and directed their activities at improving hygiene, providing safe drinking water, and educating mothers on proper infant nutrition. Many older informants reported that the efforts of the

Salesians had a significant impact on the living conditions, hygiene, and nutritional status of the highland Mixe.

The building of roads into the Mixe highlands during the early 1970's brought a dramatic change in Mixe health. During this time the National Indigenous Institute (INI) established the first medical posts in many communities. These clinics, staffed by full-time nurses, provided basic health care and carried out vaccination programs.

In the early 1980's, the Mexican National Institue for Social Security (IMSS) followed up on the early success of the INI and Salesian programs with a program (COPLAMAR) that built a network of rural clinics, staffed by a full-time physician and nurse. These clinics provide the bulk of western medical care in this region and carry out nutritional screenings, pre-natal exams, disease prevention workshops, and even family planning clinics (Lipp 1991). Each clinic is equipped with a pharmacy and an operating table to handle emergencies.

Building on the early success of the efforts of INI and the Salesians, investigators at CECIPROC, a project of the Instituto Nacional de la Nutrición "Salvador Zubirán", developed a program in the mid-1970's to promote health, sanitation and child nutrition in the highland Mixe area (Diez Urdanivia and Ysunza Ogazón 1996). These researchers discovered high rates of protein malnutrition in the highland Mixe communities and focused their efforts on both the assessment of nutritional status and the integration of protein-rich foods into the Mixe diet.

Due to the difficulty of obtaining high-quality proteins in this remote location, the CECIPROC crew focused initially on improving access to dairy and poultry products by supplying chicken and turkey chicks to Mixe households, often without cost. Their early

efforts met with little success and, in an evaluation of the project, they realized that the Mixe did not know how to cook with cheese, eggs, and milk, which was to provide the bulk of the animal proteins (Ysunza Ogazón et al. 1998; Reyes, personal communication 2001). They developed community education seminars where they would teach women how to use these "new" foods and incorporate them into their diet (Diez Urdanivia and Ysunza Ogazón 1996). Despite these initial difficulties the CECIPROC researchers have been quite successful at integrating milk, cheese, eggs, and poultry products into the traditional diet (Yzunza Ogazón et al. 1992, Sesia 1993).

My own observations, after living in these communities for several months, confirm these results. Rarely would a meal be served that did not have cheese, beans, poultry, or even beef. The local favorite *tlayuda*, a large tortilla filled with salsa, *epasote*, and other herbs, is now served with melted cheese inside, making it a sort of *quesadilla*. Fried cheese is commonly served for breakfast, especially to children. Eggs are common in all meals and are no longer imported to the communities but are raised locally. I have spoken with several elderly Mixe women about these dietary changes and they all confirm that, since the arrival of the roads in the early 1970's, the Mixe diet has been transformed and this transformation has improved their nutritional status.

The situation in Chiapas is quite different. No development projects have had the type of impact on health and nutrition that is evident in the Mixe region. Ethnoepidemiological surveys of the highland Maya undertaken by Berlin and Berlin (1996) reveal that gastrointestinal disease and respiratory infections comprise the bulk of illnesses episodes. This is not surprising, given the high levels of parasitism and poor

sanitary conditions characteristic of these communities. Malnutrition is also a serious problem, especially in the Tzeltal and Tzotzil communities.

Health services have developed slowly in highland Chiapas (Menegoni 1996). The first state-supported health care programs were instituted in the early 1950's by the National Indigenous Institute (INI). INI opened 13 health post and clinics in Tzeltal and Tzotzil communities and trained local health "promoters" in basic Western medical techniques. The Mexican Social Security Institute (IMSS-COPLAMAR) and the Coordinated Health Services (SSA) established 56 health clinics in highland Chiapas beginning in the 1970's, but, as in the Mixe region, the government-run programs are largely directed at curative rather than preventative services (Berlin and Berlin 1996). Some of these programs (IMSS-COPLAMAR and more recently PROGRESSA in particular) have been working to reduce the high levels of gastrointestinal disease by improving personal hygiene, promoting the use of latrines, and providing access to safe drinking water. Still, 38% of my study population did not use latrines.

The Tzeltal diet suffers from a lack of quality proteins. In an recent inventory of most commonly consumed foods, Berlin (1998) discovered that eggs and milk were the most commonly consumed high-protein foods, at only 7th and 8th in frequency of overall use, behind coffee, sugar, and even soft-drinks. Efforts to integrate cheese into the Tzeltal diet have met with little success (Berlin and Jara nd). My personal experience living in Tzeltal communities supports these findings. Milk, cheese and eggs are not part of the daily diet, and poultry and meat products are eaten only on ceremonial or important occasions.

A new project aimed at improving the nutritional status of poor Mexicans has been initiated by IMSS and SSA under the name PROGRESSA. One of its principal weapons against malnutrition is a powdered supplement called "polvo de papilla", or "powdered papilla" (Appendix I). This powdered supplement is designed to provide extra protein, vitamins and minerals to weaning age children in an easy to use powdered formula. Evaluations of this program have revealed that it has had little to no impact on the health and nutritional status of the program participants (Rivera et al. 2001).

One major reason why the program has not worked in Tenejapa is the lack of willingness of the program participants to utilize the nutritional supplements. Several *pasantes* in Tenejapa reported that, instead of feeding infants, the papilla was commonly used to fatten livestock prior to sale. They guessed that the papilla was not used because they do not know how to use it. I spoke with several Tzeltal about this practice and they reported that the fattened livestock could provide extra money to the household economy that could help in feeding the whole family. Investigators at CECIPROC reported that feeding the papilla to livestock was a problem in Totontepec prior to the implementation of educational programs aimed at educating mothers on the proper use and benefits of the papilla supplement.

Discussions with clinic doctors, or *pasantes*, revealed striking differences in this health resource utilization between the Tzeltal and Mixe communities. The Totontepec *pasante* reported good rapport with the community and that she was familiar with many of the town's inhabitants, as she had treated most of them at one time or another. She reported high use by the local populace.

In Tenejapa, *pasantes* reported that many locals would prefer to make the hour-long trip to San Cristóbal rather than use the local services. Indeed, during the clinical evaluations of c*ha'lam tsots* patients, many reported that they did not use the local IMSS clinics as they thought it was not a free service. According to *pasantes* and local informants, utilization of the free government clinics is low.

Topographical factors also play a role in the differences in utilization and success of health promotion projects between the Mixe and Tzeltal. As discussed before, the extreme vertical topography and lack of level ground necessitates that the highland Mixe live in concentrated settlements. Each Mixe community, even the outlying *agencias,* is densely settled and covers a much smaller area than Tzeltal *parajes* of equivalent population.

In contrast, the gentler Tzeltal topography, and generally better soil conditions, favors a more dispersed settlement pattern. While the *parajes* are socio-politically organized around a central plaza, typically containing the primary school and the obligatory basketball court, house compounds are widely dispersed, presumably to allow easier access to *milpa* plots.

The compact settlement pattern of the Mixe has significance for the efficacy of public health interventions as the majority of the populace is easy to reach given that they live in close proximity. Clean running water, sewage, and drainage systems are cheaper and easier to provide and maintain in concentrated populations. Medical care is also easier to supply to concentrated populations. Public health outreach projects and educational campaigns are more effective when the target group is easy to assemble.

In Totontepec, the majority of the population in the municipal center utilize the IMSS clinic because it is so easily accessible. Each *agencia* is visited weekly by the clinic doctor, who is able to see more patients because there is no need to travel long distances to visit individual homesteads. Many in Tenejapa complained that they would have to walk several miles to see a doctor, a task made ever more difficult when one is sick.

Although Oaxaca is as poor as Chiapas by most measures, and has an even larger indigenous population, the communal indigenous pattern of landholding remains strong. In Oaxaca, legal reforms by the state government have given indigenous communities rights of self-government according to their traditions. This helps preserve social cohesion in small communities and raises the overall standard of living. As a result, political parties, long a source of conflict in Chiapas, have been banned in Totontepec. Every three years, three municipal presidents are elected. Each takes office for one year and oversees the actions of the others for their remaining two years (Bernal Alcántara 2001). This oversight reduces the level of political corruption.

By contrast, politics in Chiapas is marked by a high degree of political feuding and corruption, often dividing whole communities along party lines. During my stay in Tenejapa conflict between rival political parties was intense. Rival party members would be dragged out of taxis at road-blocks and beaten as a message to their group. This type of political intimidation is not uncommon and is employed for various purposes, including boundary disputes between neighboring *parajes*. Political corruption is, unfortunately, endemic in Tenejapa. During the course of my fieldwork, there have been no fewer than two attempted coups against the municipal president for corruption and

embezzlement. The first president was tied up, naked, in the woods for several days before being allowed to address the charges.

Education is a high priority for both the Mixe and the Tzeltal, yet educational services are far superior in Totontepec. The municipal center has two primary schools (one private), two secondary schools and a "bachillerato", which is the equivalent of a high-school. Plans are in place for a new technical university to be built in Totontepec. In contrast, Tenejapa center has one primary school, one secondary school and no "bachillerato". Students have to travel to San Cristóbal to attend high-school. This is in spite of the fact that the population of Tenejapa is over four times the size of Totontepec. This educational advantage has likely had a significant positive impact on both the receptiveness to health interventions and the adherence to therapeutic regimens.

7.2.2 Dietary Delocalization and the Penetration of Junk Foods

> "Nothing weakens an immune system and overall health as efficiently as malnutrition, especially if families are, for economic reasons, substituting cheap fat and starch for more expensive proteins and fresh vegetables" (Garrett 2000:169).

As outlined in Chapter 2, the highlands of Oaxaca and Chiapas have undergone a profound economic transition since the late 1970's. The increased importance of migration, seasonal wage labor, and the production of commodity crops like coffee and sugar cane has had a significant impact on Mixe and Tzeltal economic and social life and has altered traditional patterns of consumption. Most affected by this shift towards a monetized economy has been the traditional diet.

The increased importance of cash crops such as coffee and sugar cane leads to increased participation in the market economy. As peasant farmers allocate more of their

production to cash crops, their use of costly inputs such as fertilizers and pesticides increases at a greater rate than their productive outputs. In essence, they exchange a stable low cost/low productivity agricultural system for a high cost/high productivity system in which their own returns continuously decrease as a result of unequal exchange in the market (Dewey 1979). The ever decreasing global price of coffee is evidence of these diminishing returns. Several farmers I spoke with in Tenejapa have begun to leave the beans on the plant due to the decreased price of raw coffee and the high cost of labor.

The dietary effects of the commoditization of the agricultural system are numerous. From an ecological standpoint, cash cropping reduces ecosystem diversity and the reduction of fallow periods that accompanies cash cropping is detrimental to the soil quality. The loss of diversity directly impacts the availability of wild uncultivated foods, which are an important nutritional resources for subsistence agriculturalists, especially at the end of the agricultural cycle and during famine. Most importantly, the shift away from subsistence production to cash cropping leads to the increased dependence on purchased foods (Dewey 1980, Pelto and Pelto 1983). This leads to poorer dietary quality, and ultimately lowered nutritional status. Indeed, nutritional surveys in the highlands of Chiapas have demonstrated that the Mayan diet suffers from several deficiencies, especially animal protein (Perez Hidalgo 1975; E. A. Berlin 1999 unpub. data).

Dietary delocalization refers to the process in which there is an increase in the importance of foods from outside the region in the local diet (Pelto and Pelto 1983). While food commoditization and dietary delocalization are associated with improved levels of nutrition in industrialized nations (by increasing diversity), it has negative

effects in developing countries (by reducing access) (Dewey 1980, Pelto and Pelto 1983, Daltabuit and Leatherman 1998).

Dietary delocalization and the penetration of "junk foods" into the Mayan diet has also been well documented. Daltabuit and Leatherman (1998) discuss the influence of the tourism-led economy on the diet of Yucatec Maya. As integration into the monetized economy has increased, *milpa* production has decreased and diets have shifted away from a base in local produce to commercialized foods. Although these processed foods have increased caloric intake, they have not improved nutritional status. They reported average weekly intakes of 7.4 soft drinks, 10.2 snack foods (cookies and chips), and 11.2 candies for school aged children (Daltabuit and Leatherman 1998). In general, compared with baseline data, they found increases in both child undernutrition and adult overnutrition, with consequent increases in obesity and diabetes.

The Tzeltal have embraced carbonated beverages as a substitute for *pox,* or cane liquor, which is an important element of all social and ritual activities. Although this has had a positive impact on levels of alcoholism, it has had a negative impact on infant nutrition, as most mothers see no danger in allowing their children to drink large quantities of this relatively cheap drink. It is not uncommon for weaning age infants to drink up to a half-liter of soda per day.

Berlin and Berlin (1998) report that approximately half of the most frequently consumed foods are not subsistence products. Soft drinks are the 6th most consumed product in the Tzeltal diet, ahead of milk, eggs, and bread. My experience in Tenejapa supports the findings of Berlin and Berlin. Whereas foraging for wild food foods used to be a common childhood activity, especially for boys, parents report that children are now

interested only in the occasional *peso* that they can spend on soda and candies at the neighborhood *tienda*.

In a situation of limited economic resources, this pattern of consumption reinforces the diminishment of nutritional status as consumption shifts from locally produced foods to national and global market products. Fueling these patterns of consumption are market forces and advertising which promotes the consumption of processed foods as markers of status. The increased preference of non-local foods, especially for sodas and sweets, reflects a general shift in food choice from low status/high quality foods to high status/low quality foods.

Dietary delocalization has also affected the Mixe diet, but its effects have been mitigated largely due to the success of efforts by CECIPROC and the Salesians. Mixe health promoter Eloisa Flores reported that "junk foods" like carbonated soda and candy have never had the type of impact seen in other parts of Mexico partly due to the remoteness of the Mixe region and the educational efforts of groups like CECIPROC and the Salesians. The success of their efforts is reflected in the low levels of serious malnutrition in the Mixe communities.

Ysunza Ogazón and co-authors, in a study comparing the nutritional status of Mixe, Zapotec, and Chinantec of the Sierra Juárez of Oaxaca, report no severe malnutrition among Mixe children under 5 years of age. Their Zapotec and Chinantec counterparts suffered higher levels of both mild and severe malnutrition (Ysunza Ogazón et al. 1992).

These findings were corroborated in interviews with physicians at the National Indigenous Institute's (INI) regional hospital in Ayutla. A recent, unpublished study

conducted by INI reported that although 48% of Mixe school children (aged 6-14 years) were undernourished, only 2% were moderately malnourished, and none were severely malnourished (Baltazar Jimenez personal commnication 2001). The physician in charge of the INI clinic in Ayutla reported that he had not seen a case of *kwashiorkor* in 15 years.

As evidenced by the high rates of c*ha'lam tsots*, severe malnutrition is a serious problem in the Tzeltal region. Although severe malnutrition is undoubtedly exacerbated by the high rates of gastrointestinal infections in young children, these changes that have altered the Tzeltal diet have been prime contributors as well.

In conclusion, the changes that have transformed rural Mexico for the past 30 years have undoubtedly impacted the Mixe and Tzeltal communities in different ways. This analysis proposes that the differences in prevalence of *mäjts baajy* and c*ha'lam tsots* is the result of the differential impact of these changes on these communities and the manner in which the Mixe and Tzeltal have adapted to these changes.

Development and governmental projects aimed at improving health status have experienced different outcomes in the two regions. The high level of political cooperation, dense settlements, and receptivity to western medical treatments have all contributed to the success of efforts in the Mixe region. The opposite has been the case with the Tzeltal. Their dispersed settlement pattern, political fragmentation and corruption, lack of basic sanitation, poor housing, and low utilization of government health resources, including the nutritional supplement "papilla", have all contributed to the high levels of severe malnutrition that this study has documented. Furthermore,

while the introduction of outside foods has largely benefited the Mixe, it has eroded the nutritional status of the Tzeltal.

This brief look at some of the major factors contributing to the differences in nutritional and epidemiological profiles of these two groups highlights the complex manner in which socio-economic, political, and ecological factors impact health status. The concluding chapter will consider avenues for research that will bring the analysis of these factors to bear on attempts to improve the nutritional status of these and other groups experiencing similar transformations of their social, political, and economic life.

CHAPTER 8

CONCLUSION

8.1 General Findings and Theoretical Significance

This concluding chapter will summarize the central findings of this research and discuss their significance for a biocultural medical anthropology. In addition, I will address the applicability of these findings, and the biocultural approach in general, to the development of cross-cultural public health interventions.

The principal goal of this research is to clarify the importance of biological signs and symptoms in the identification and cultural construction of 'second-hair' illness among the Tzeltal Maya and Mixe. What initially prompted this study was the discovery that the Tzeltal and Mixe (among others) each had illnesses with similar descriptions that they named "second-hair." I was intrigued by the proposition that, if these illnesses were indeed equivalent from an ethnomedical perspective (as they certainly appeared to be), then the biological pathology that underlie them should be the same as well.

As all previous research that described these illnesses dealt with them only in a peripheral manner (Heinrich 1994, Lipp 1991, Tenzel 1970, Mellado Campos et al. 1994), a proper comparison demanded two elements: a thorough "insiders" description of each illnesses, and a determination of their epidemiology and biomedical basis.

In order to facilitate the comparison between the Tzeltal and Mixe conceptualizations of these illnesses, the explanatory model methodology was used. This allowed me to directly compare key ethnomedical concepts cross-culturally. The analysis

described in Chapter 7 demonstrates that there is a high degree of overlap and correspondence between the two group's conceptualization of these illnesses. From an ethnomedical perspective, the two illnesses are virtually identical.

Another, more informal, test of equivalence is to present a Tzeltal Maya with a description of *mäjts baajy*, and see if they recognize it as c*ha'lam tsots*, and vice versa. In fact, I presented several Tzeltal and Mixe informants with descriptions of each other's illness and, without exception, all reported that the illness I described was the same as their 'second-hair' illness. With equivalence, from an ethnomedical perspective, established, the next task was to determine if these illnesses were the same from a biomedical perspective.

Through the collection of biomedical data I sought to identify the biological features of these illnesses that were common to both cultural groups. As the Mixe had eradicated *mäjts baajy*, I was only able to describe c*ha'lam tsots* from a biomedical perspective. These findings demonstrated that an ethnomedical diagnosis of c*ha'lam tsots* represented a clinical diagnosis of kwashiorkor-type protein-energy malnutrition. Ethnographic evidence supported this same diagnosis for the Mixe *mäjts baajy*.

The final step in the analysis explored areas of convergence and divergence between the ethnomedical models and the biomedical model. This analysis addressed the fundamental question driving this research: How does the biological dimension of illness affect its cultural construction? Taking advantage of the structure provided by the explanatory model approach, my analysis compared each component of the explanatory model with the corresponding information provided by the biomedical model.

This analysis revealed striking similarities between the two models. Features that were central to the ethnomedical model were also important in the biomedical understanding of the illness. For example, the Tzeltal report that the child's illness begins with a type of diarrhea known as *ja'chujt*, or "watery diarrhea". As the child's conditions deteriorates, the diarrhea changes to the lienteric (undigested) type known as *bosbos tsa'nel*. This change described by the Tzeltal is consistent with the pathophysiology of *kwashiorkor*, as the intestinal villi collapse in the advanced stage of *kwashiorkor*, inhibiting the digestion of food, giving the stools the distinctive "undigested" appearance. It is significant that the Tzeltal understand this change in stool morphology and identify it as a marker of advanced illness.

In general, with the exception of treatment strategies, almost all aspects of the Tzeltal and Mixe explanatory model for 'second-hair' illness are consistent with the biomedical model, indicating a high level of empiricism in their conceptualization of these illnesses. The high level of agreement between the two models indicates that the Tzeltal have drawn on their observations of the biological features of c*ha'lam tsots* for the cultural construction of this illness.

These findings about the biomedical basis for c*ha'lam tsots* and *mäjts baajy*, are significant for the anthropological study of ethnomedical systems as they allow us to evaluate the empirical basis for the ethnomedical diagnosis of 'second-hair' illness, and help to clarify the role of biological signs and symptoms in the cultural construction of illness. By revealing the generative processes of ethnomedical systems we can also come to a more accurate understanding of their epistemological basis (Barsh 1997).

From a methodological perspective, the biocultural approach developed in this research opens up the opportunity to evaluate the empirical basis of other ethnomedical syndromes, especially those currently designated "culture bound" (Simons 1985, Hahn 1995). This is especially important, as previous research (Berlin and Berlin 1996; Berlin and Jara 1993; and Heinrich 1994) has shown that many Tzeltal and Mixe illness categories and therapeutic regimens have a solid grounding in empirical medical knowledge. I suspect that relatively few studies have attempted to study the relationship between the biological basis of disease and its cultural presentation because of the lack of a frame of reference that allows for the comparison of traditional and biomedical knowledge.

This study has attempted to overcome this limitation through its innovative use of the explanatory model (EM) methodology (Kleinman 1986) as the foundation for comparison between the two medical systems. The value of this approach for biocultural studies is based on the fact that the illness concepts explored by the EM methodology are fundamental to all illnesses, regardless of cultural context. The universality of EM concepts makes them ideal for cross-cultural comparative research.

Another strength of the biocultural approach is its view of human illness as a biological, social, and cultural phenomenon (McElroy 1990). From this perspective, we can no longer study ethnomedical systems as simply semantic, or meaning-based systems (as is most often the case), but we must also come to terms with the biological, ecological, political, and economic factors that influence health and sickness. The analysis presented in Chapter 7 utilized a political-ecology approach in an attempt to

broaden our view of these illnesses by looking at the reasons why the Tzeltal suffer from high rates of c*ha'lam tsots* while the Mixe have eradicated *mäjts baajy*.

The political-ecology approach to the analysis of disease and illness blends the strengths of the human-ecology with political economy. While the human ecological approach focuses on factors such as demographic trends, and environmental degradation, and food availability, the political ecological approach focuses on market forces, such as shifting labor patterns, subsistence activities, and the influence of market forces on human health and nutrition. A political ecology approach tries to combine the strengths of each approach by looking at the dynamic interaction between social, economic, and political processes (DeWalt 1998).

Using this approach, it became clear that the changes that have transformed rural Mexican communities over the past 40 years have impacted the Mixe and Tzeltal in strikingly different ways. For example, the monetization of the rural economy has benefited the Mixe while marginalizing the Tzeltal, and while public health projects have succeeded in the Mixe region, they have failed in Chiapas. The factors responsible for the differential response to modernization are numerous, but each contribute to the overall picture. Even seemingly benign factors, such as a dispersed settlement pattern, contribute to the overall difference in health status between the two groups. Only by addressing the cultural, economic, political, and ecological factors influencing the prevalence of 'second-hair' illness can we come to an understanding of why these illnesses exist in the first place and how we can eradicate them.

8.2 Significance for Applied Anthropology and Public Health

The preceding discussion has demonstrated that the Tzeltal Maya and Mixe possess a significant amount of knowledge concerning of the factors that influence their own health and illness. However, such knowledge is often embedded in culturally constructed means of speaking about illness and often forms a major communicative barrier in indigenous attempts to seek treatment in a western style medical system (Berlin and Jara 1993). As historically, "health care providers have lacked the expertise, interest, and time to attempt an understanding of folk syndromes" (Berlin and Jara 1993:677), the application of this biocultural approach to the study of ethnomedical syndromes is crucial to public health efforts for it can demonstrate that they are "valid" health conditions, based upon detailed empirical knowledge, that are worthy of attention and treatment by biomedical health providers. All too often in the highlands of Mexico, such illnesses are quickly deemed "personalistic" and "spiritual" in nature, are discredited as valid health conditions, and subsequently go untreated.

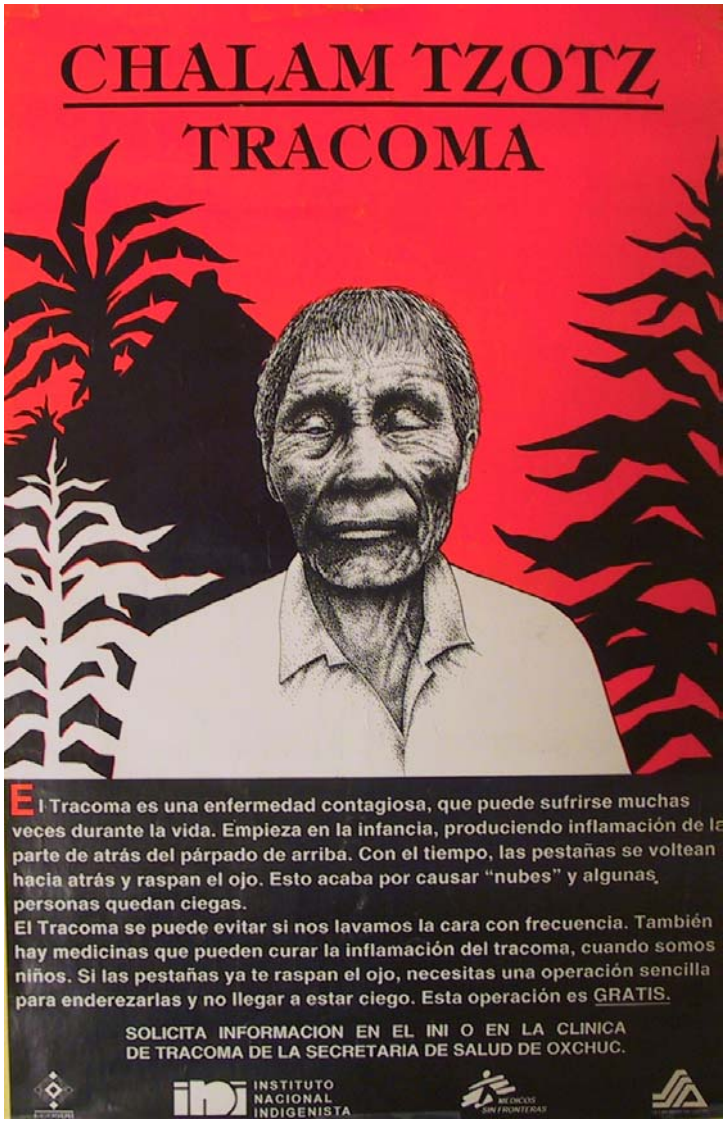
Efforts to integrate ethnomedical knowledge into public health projects have met with differing degrees of success in Mexico (Freyermuth Enciso 1993), most likely due to the general lack of attention to the biomedical equivalence of ethnomedical conditions. This fact was dramatically highlighted by an experience I had while conducting this research.

During my research in Tenejapa on c*ha'lam tsots*, I regularly spent time with IMSS doctors while they visited communities in their jurisdiction. I accompanied these doctors in order to get a better understanding of the epidemiological profile of the region and to talk to Tenejapanecos about my research into c*ha'lam tsots*. On one of these trips

I accompanied the local *pasante* to the *paraje* of Jomanichim, as he was going to administer vaccinations to the community's children and give a lecture on nutrition to the children's mothers, a group which totaled about 80. These lectures are a part of the PROGRESSA program's efforts to combat malnutrition in this region and I attended as I was curious about the mothers' receptiveness to the *pasante's* lecture.

As we entered the meeting room at the schoolhouse, we discovered that a crew from the well-respected organization *Medicos Sin Fronteras (MSF),* or Doctors Without Borders, had just visited the community as part of their campaign against Tracoma, a serious eye disease endemic to the region. The MSF team had left posters to spread the work about their efforts. The poster's title read "C*ha'lam tzots"*, which is the old orthography for c*ha'lam tsots*, and underneath this title was the word "TRACOMA", indicating that the two were equivalent conditions (see Figure 8.1). The MSF team had made an error as the proper Tzeltal ethnomedical term for tracoma is c*ha'lam tsots ta sit*, or "c*ha'lam tsots* of the eye". Evidently, the MSF team had not done their ethnographic homework when designing their media campaign against Tracoma. I decided to meet with them.

Figure 8.1: MSF's Tracoma Erradication Poster



I made an appointment to speak with the director of MSF's efforts in Chiapas, a British citizen named Paul McPhun. During our meeting I pointed out the error to Paul and explained that this error could have serious consequences for both the success of his project, as well as any future efforts to combat the "real" c*ha'lam tsots*, PEM. Surprisingly, he did not feel that this was a serious error and told me that perhaps I was making too much of it. Regardless, he promised to bring this issue up with the Mexican

researcher in charge of this particular project. During this meeting I also learned that MSF had just begun taping local radio and television commercials in Tzeltal and Tzotzil Maya about tracoma. Clearly their sphere of influence was large, and their message about c*ha'lam tsots* had the potential to reach a large part of the local population.

Several weeks later I visited Paul to check on the progress of our discussion. He reported that he discussed this error with the head of the tracoma project, Dr. Rafael Alarcon, and they came to the conclusion that the difference between c*ha'lam tsots* and c*ha'lam tsots ta sit* was negligible and, regardless, people would know which c*ha'lam tsots* they were talking about. They decided inaction was the best strategy.

At this point I was less concerned about the success of their project as I was with the potential for this confusion to cause harm. I pointed out to Paul the high rates of self-medication in these communities, and explained that there was a high likelihood that mothers with children suffering from the "real" c*ha'lam tsots* (PEM) would see these posters or hear from friends that the MSF doctors were treating c*ha'lam tsots* with Tetracycline ophthalmic ointment, the standard treatment for tracoma. The mothers had to simply go to the local pharmacy and buy a tube of Tetracycline and begin treating their malnourished child with antibiotics. The high potential for confusion between the two diseases would, at a minimum, delay the treatment of many malnourished children. In severe cases, this delay could lead to death.

Only after repeated arguments on the merits of correcting this mistake did the MSF director agree (reluctantly) to correct the error on the posters and in the radio and televisions spots. When I left the study site a month and a half later, however, no posters had been changed. I suspect that, despite their promises and reassurances, little will be

done to rectify this error. This is likely the result of the prejudice, common in public health and medical circles, that traditional medical knowledge is limited to notions of witchcraft, spirit possession, and soul loss. This research has attempted to fight this prejudice by demonstrating that traditional medical knowledge is much more "scientific" than previously thought. Attention to this knowledge will prove useful in guiding cross-cultural, epidemiological studies, and developing effective, culturally-relevant interventions.

In conclusion, I believe that this study is relevant to the goals of medical anthropology for it demonstrates that indigenous ethnomedical systems frequently possess detailed, empirical knowledge of the biological factors influencing health and sickness. Through careful attention to the cognitive models underlying illness beliefs and behaviors, medical anthropologists can significantly impact efforts aimed at identifying and improving the basic health care needs of the peoples that we study. The anthropologist Horacio Fabrega writes that medical anthropologists must "ground their analysis so that the results which they generate can be used by members of other disciplines equally committed to the study of medical problems" (Fabrega 1977a: 379). It has been the hope of this research that by addressing the multiple dimensions of this unique group of Mesoamerican illnesses, the analyses and conclusions that have been proposed will provide us with a better understanding of the people we study as well as allow others, equally committed to the welfare of those they study, to help alleviate the suffering caused by illness.

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APPENDICES

Appendix A: General Interview Questionnaire

Información Básica Sobre Informantes

Informed Consent:

Fecha de Hoy: _____/_____/_____ # de Ident._____

Nombre: _____ Sexo: _____M _____F

Nombre de Padre:_____

Nombre de Madre: _____

Fecha de nacimiento o edad: _____

Lugar de nacimiento: _____

¿Tiene Ud. hermanos y hermanas? Numero total:_____

Numero mayores: _____ Numero menores: _____

¿Cuantos personas vienen en su casa?_____

SES:
Tiene Ud….. (si, quantos)
Radio: _____
Televisor:_____
Coche o Camionetta:____

Educación
Quantos personas en su familia va a..
Primaria _____
Secundaria _____
Prepa _____
Otra _____
Quantos años de educación tiene?_____

Labor: Pregunatas para la jefe de la familia

Que trabajo tiene Ud.?

Trabaja Ud. en su propia milpa?

Gana Uds. dinero afuera de la casa?

Quantos personas en su familia ganan dinero afuera de la casa? Quien, y en que trabajo?

Appendix B: Medical History Interview

Historia Medica

de Ident._____ Nombre: _____

¿Cuando empezó su enfermedad de cha'lam tsots? (fechas aproximadas):

¿Como empezó? ¿Cuales fueron los sintomas cuando empezó? _____
_____

Tambien tenía:

___ diarrhea (con moco / liquido)
___ se evacua después de cada comida
___ comida mal digerida
___ cabello/pelo (espinas / corto / descolorado)
___ pérdida de cabello
___ suda en su cabeza
___ bajar de peso
___ gripe/catarro
___ calentura
___ lombrices (bichos)

¿Que characterísticas tiene (como se ve) su enfermedad ahora? (freelist) _____
_____

También tiene:

___ diarrhea (con moco / liquido)
___ se evacua después de cada comida
___ comida mal digerida
___ cabello/pelo (espinas / corto / descolorado)
___ pérdida de cabello
___ suda en su cabeza
___ bajar de peso
___ gripe/catarro
___ calentura
___ lombrices (bichos)

Hay otras personas en su familia que tuve of tiene cha'lam tsots? Si, quien_____
_____

¿Estaba enfermo antes? Si o No _____ ¿Con que?_____

(1) _____Cuando_____Tratamiento_____

(2)_____Cuando_____Tratamiento_____

(3)_____Cuando_____Tratamiento_____

Como fue el parto? _____

Fue despues de 9 meses _____

Fue en la casa? _____

Ha tenido todas las vacunas? _____

Hierve su agua? _____ Tiene latrina? _____

Appendix C: Dietary-Recall Questionnaire

Encuestra Nutricional

de Ident._____ Nombre: _____

Fecha de hoy:_____/_____/____

Infantes
Lactante: _____ Quantos tiempo? _____
Biberon que tipo de leche:_____
Frequencia/dia y cantidad_____

Otras comidad y bebidas y cantidad:
1._____ 2._____

3. _____ 4. _____

Ninos y Adultos
1. Que es su dieta normal para un dia?: Requerods dietas for las 3 dias pasado:

Dia 1

_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____

Dia 2

_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____

Dia 3

_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____
_____ cantidad_____ _____ cantidad____

Appendix D: Anthropometric Measurements

Medidas Antropometricas

de Ident._____ Nombre: _____

Fecha de hoy:_____/_____/____

Municipio y Paraje:_____

Sexo: _____M _____F Nació: día _____ mes _____año _____

Edad _____

Medidas Antropmetricas: por _____

Altura (cm): _____

Peso (kg.): _____

Circunferencia de:

Cabeza (cm): _____ Pecho (cm): _____

Medio Brazo (cm): _____

Pliege brazo (mm): _____

Notas:

Appendix E: Clinical Examination Datasheet

Clinical Examination

de Ident. Nombre:
Fecha de hoy:

Vital signs: Temp: BP: HR: RR:

Height: cm (%) Length: kg (%)
HC: cm (%) Length to weight ratio: %

General: apathy, lethargy, irritable, pale,

Skin: Follicular hyperkeratosis, dry, dyspigmentation, desquamation, circumoral pallor, purple patches, (well marginated, raised, purple, waxy plaques in diaper areas and sites of pressure such as elbows, knees, ankles, trunk), petechiae, purpura, ecchymoses, perifollicular hemorrhage, seborrheic dermatitis, scaling, flaking (flaky paint dermatitis)

HEENT:
Hair: lack of lustre, thin, sparse, altered texture ( ), dispigmentation, flag sign, easy pluckability, alopecia

Head: moon face, diffuse depigmentation

Eyes: pale conjuctiva, bitots spots, conjunctival xerosis, corneal xerosis, conjunctival pallor or injection

Ears: normal tympanic membranes, normal ear canal

Lips: angular stomatitis (both angles only), angular scars, cheliosis

Tongue: scalloped, scarlet, magenta, atrophic papillae, geographic, pigmented, swollen, painful

Teeth: mottled enamel, caries

Gums: spongy, bleeding, recession, pyorrhoea (suppuration of gum margins, red, easily bleed, no hypertrophy)

Neck: shotty LAN, supple, thyromegaly

Heart: RRR, no murmurs, S3, S4

Lungs: clear to ascultation bilaterally, wheezes,
rales (where:)

Abdomen: normal bowel sounds, distended, hepatomegaly,
splenomegaly, tender

Extremities: cyanosis, clubbing,
edema (where: , + ++ +++ ++++, pitting),
koilonychia (bilateral spoon-shaped nails in older childern/adults),
transverse ridging or grooving of nails.

Gential: hypogonadism, bilateral descended testes

Neuro: DTR's ( ),
motor strength ( ) gross sensation intact, ataxia,
EOMI, PERRLA, cranial nerves ( ), tetany

Musculoskeletal: costochondral beading, craniotabes, epiphyseal
enlargement, knock-kneed or bowed legs, bone tenderness, head lag,
winged scapula, open anterior fontanelle, fallen fontanelle, enlarged
fontanelle, Harrison's sulcus, pidgeon chest

Labs:
<u>CBC w/ differential</u>
Chem stick (glucose)
Basic chemistry panel (Na+, K+, CO2-, CL-, creatinine, BUN, glucose)
Serum Albumin and other serum proteins (pre-albumen, transferrin, transthyretin)

Serum zinc
Urinalysis
Liver function tests (AST, ALT, AP, bilirubin: direct/indirect)
Serum lipids (cholesterol)
Serum essential amino acids
Calcium, Magnesium, Phosphate
Stool

Hair Sample: y/n

Appendix F: Anthropometric Percentiles for Cases and Controls

Figure 1 Cases: Infant Weight for Age for Males (0-36 months)

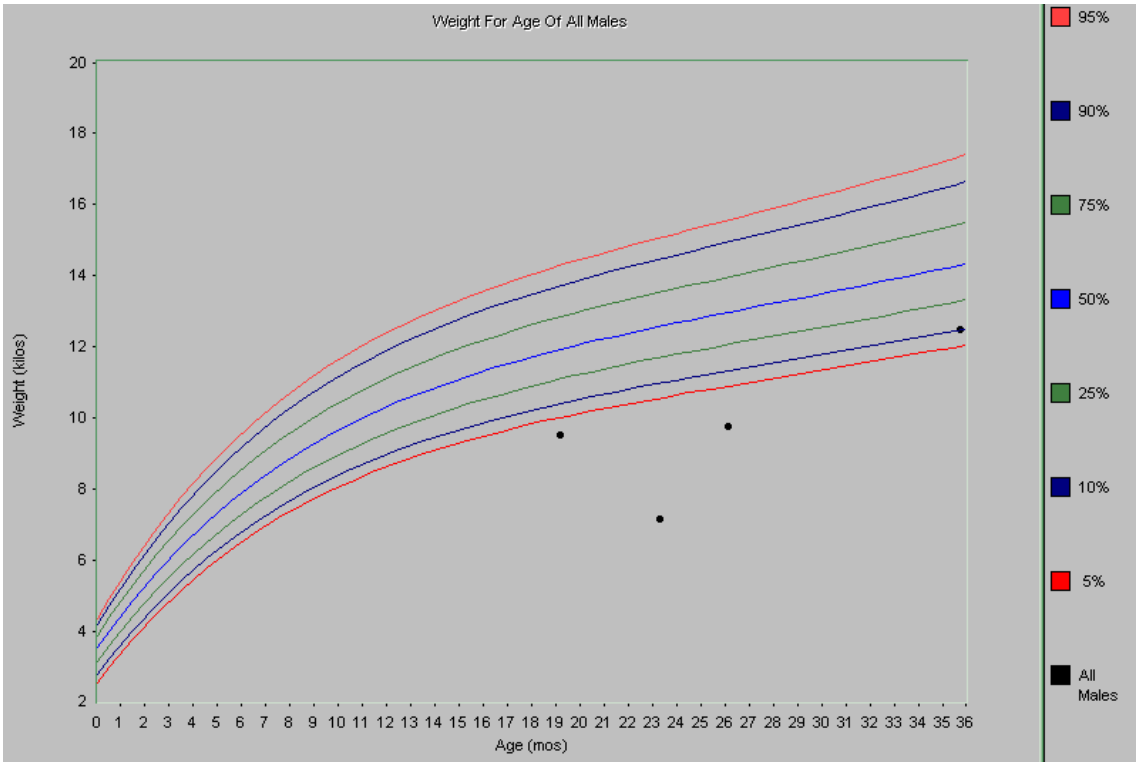


Figure 2. Cases: Infant Weight for Age for Females (0-36 months)

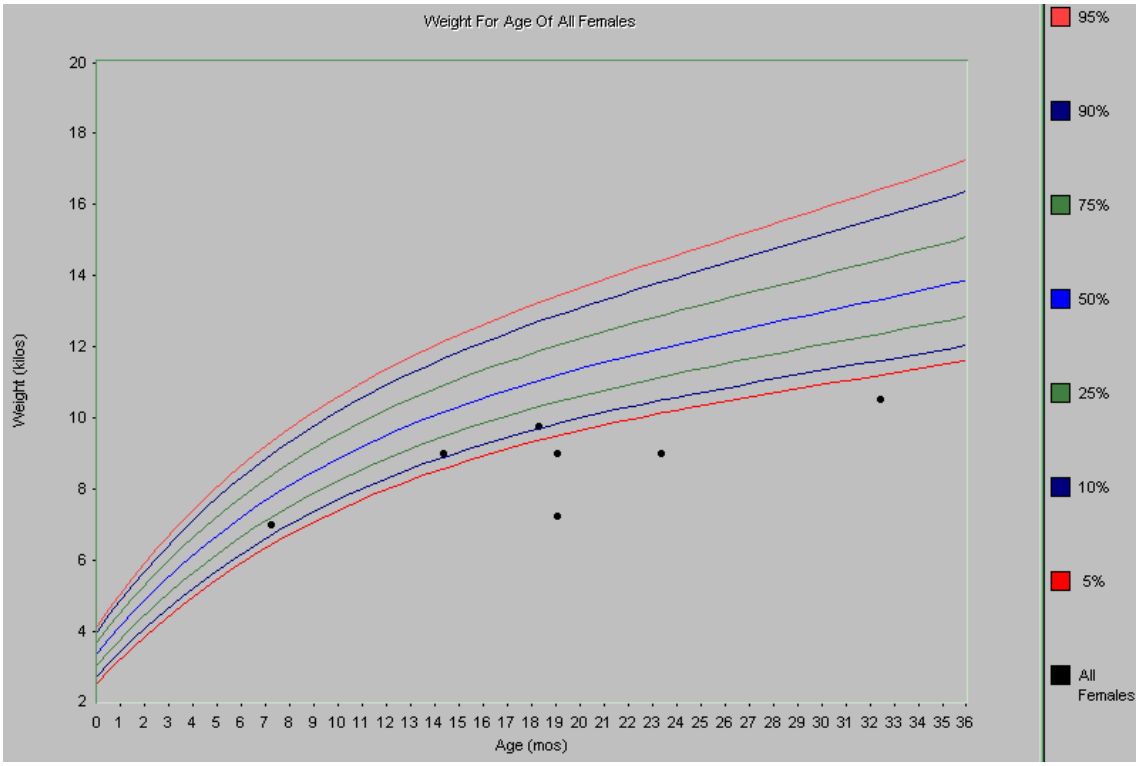


Figure 3: Cases: Adolescent Weight for Age for Males (2 - 20 years)

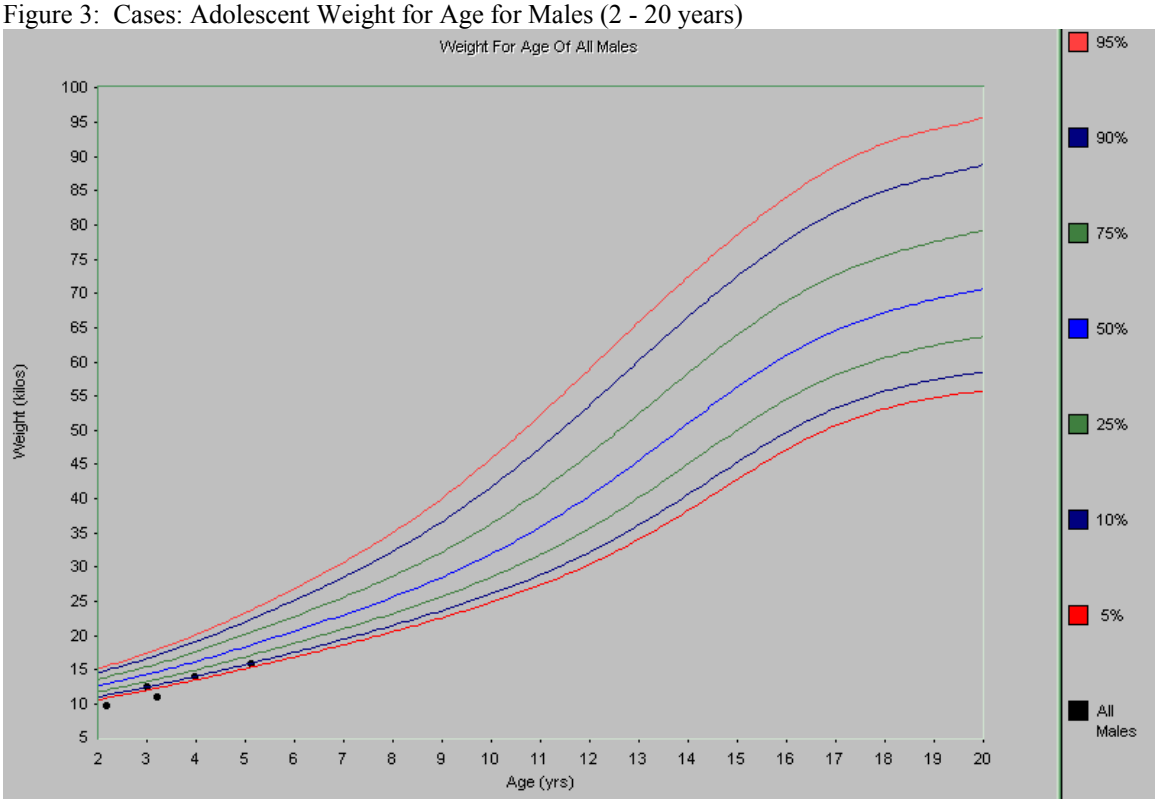


Figure 4: Cases: Adolescent Weight for Age for Females (2 - 20 years)

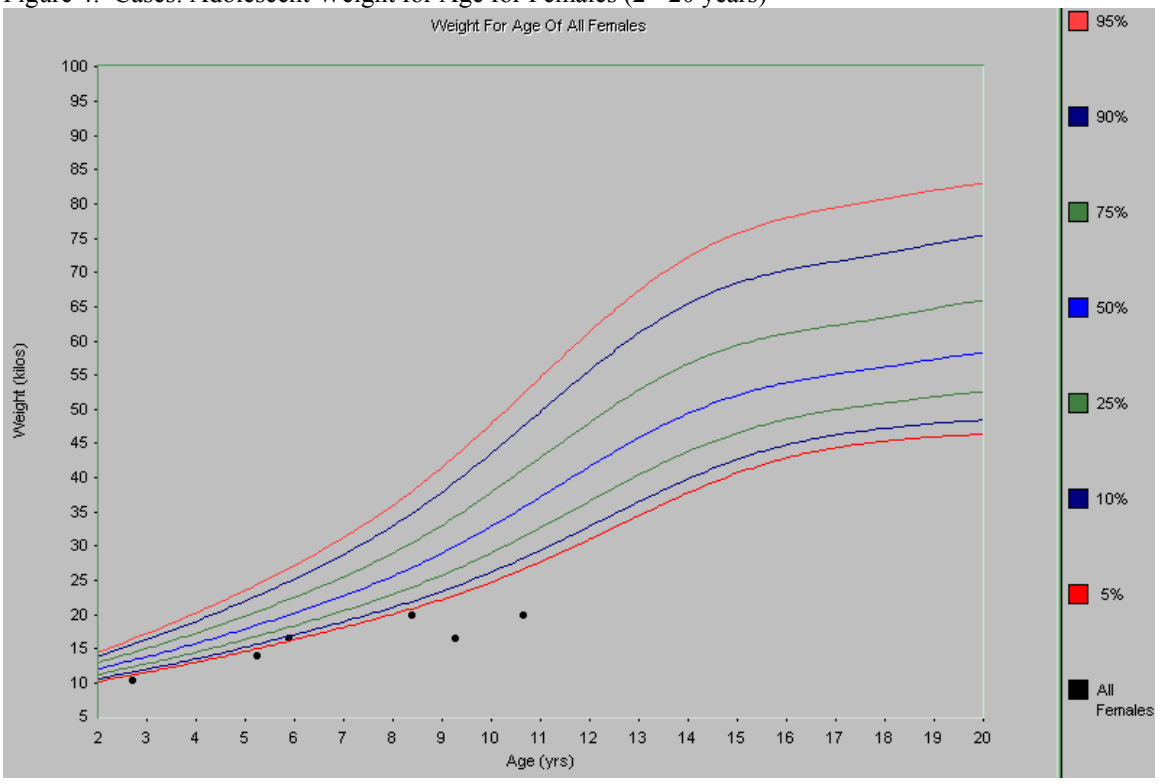


Figure 5: Cases: Weight for Length for Males (0 – 36 months)

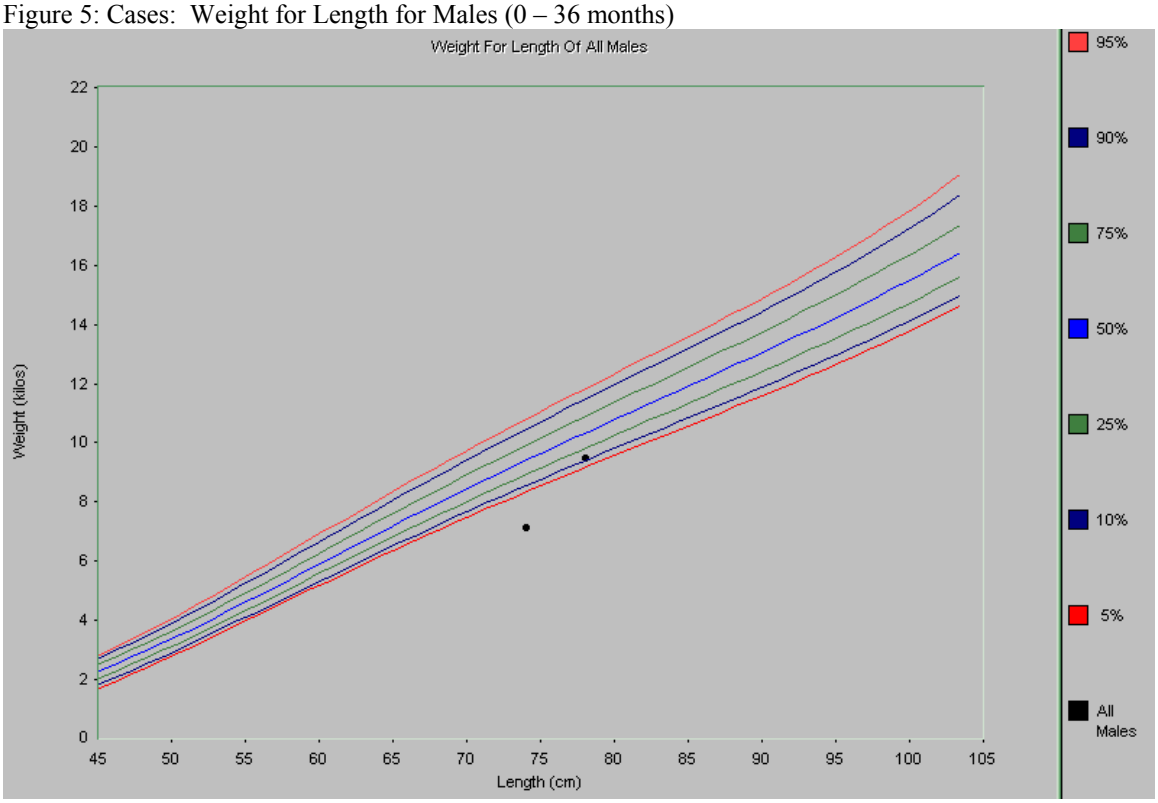


Figure 6: Cases: Weight for Length for Females (0 – 36 months)

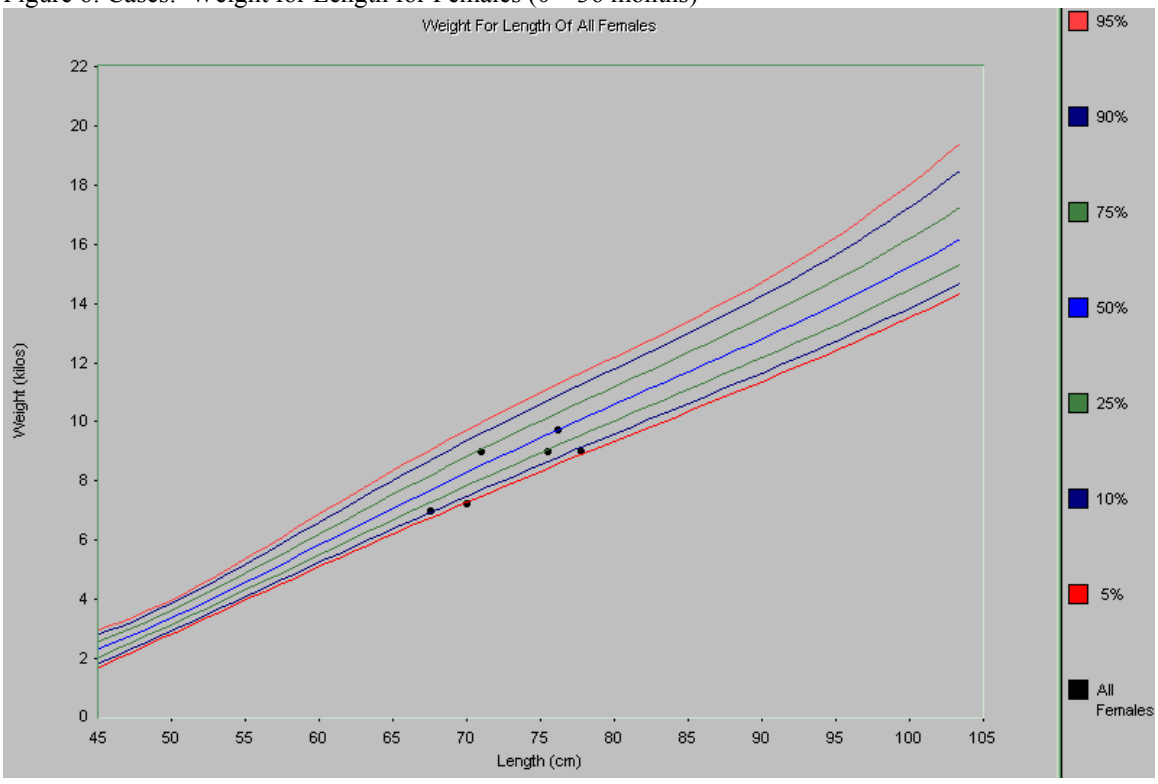


Figure 7.: Cases: Weight for Stature for Males (2 – 20 years)

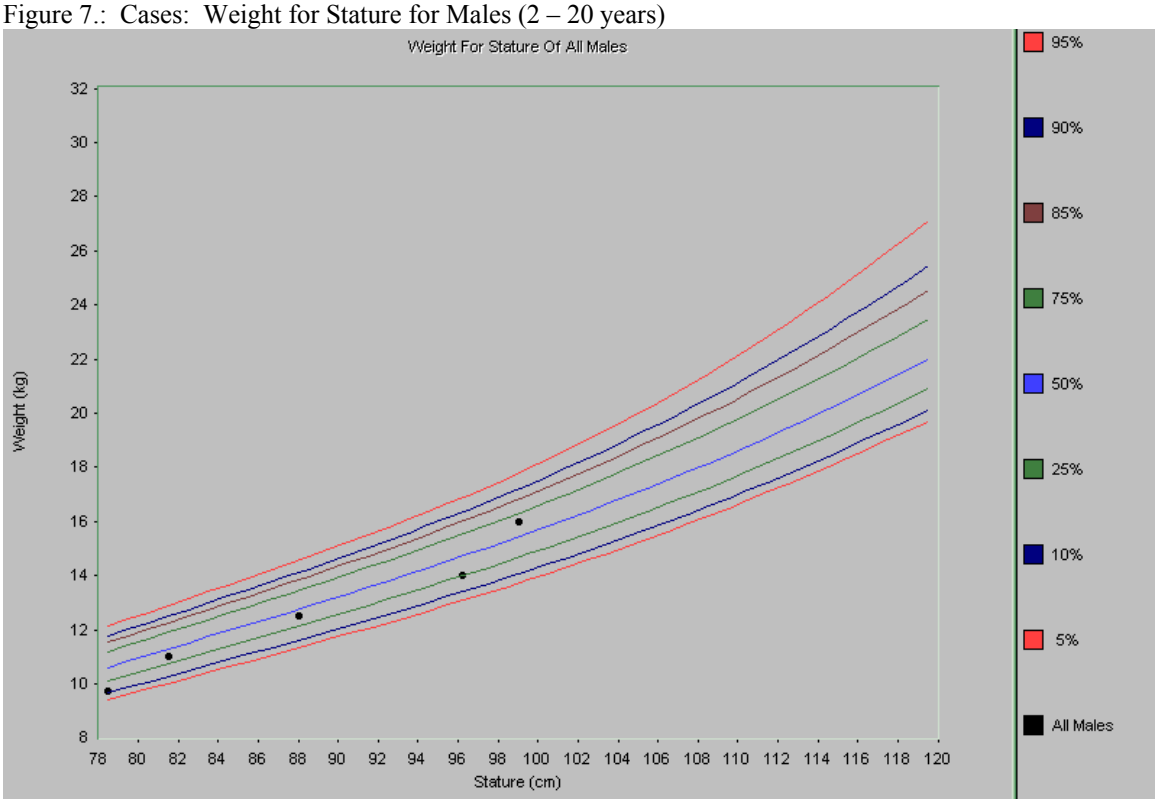


Figure 8.: Cases: Weight for Stature for Females (2 – 20 years)

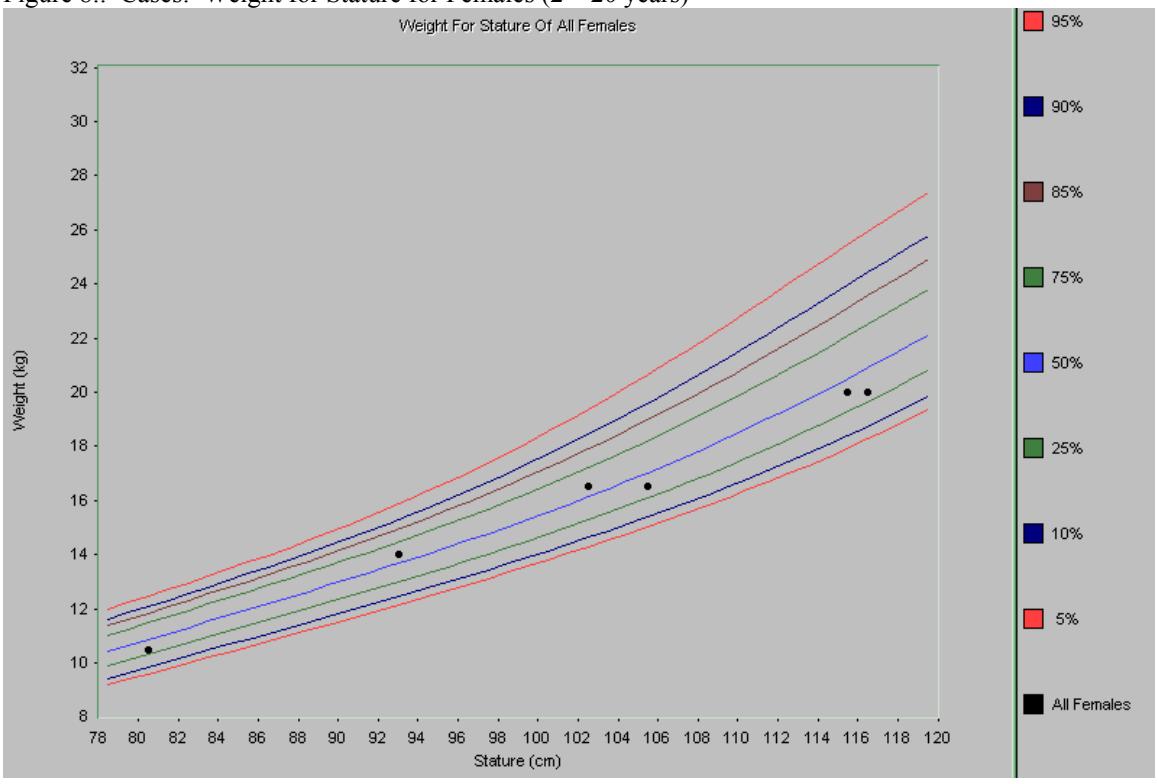


Figure 9.: Cases: Length for Age for Males (0-36 months)

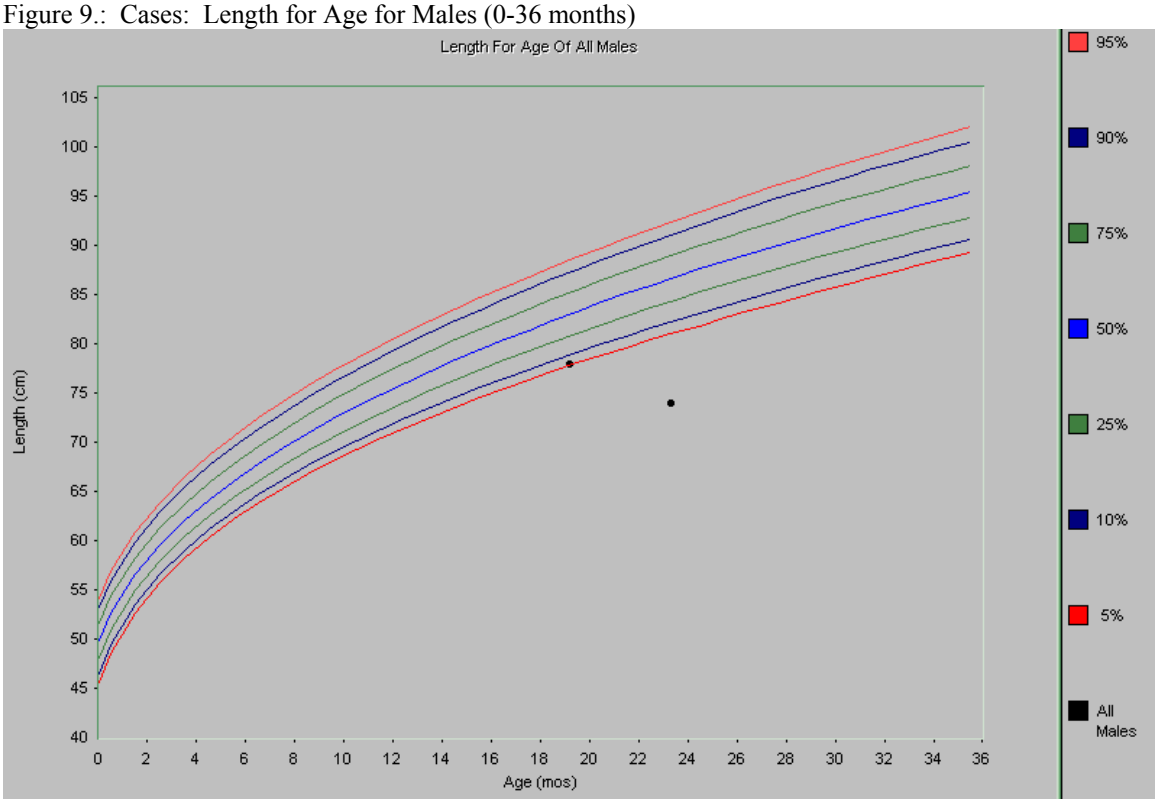


Figure 10: Cases: Length for Age for Females (0-36 months)

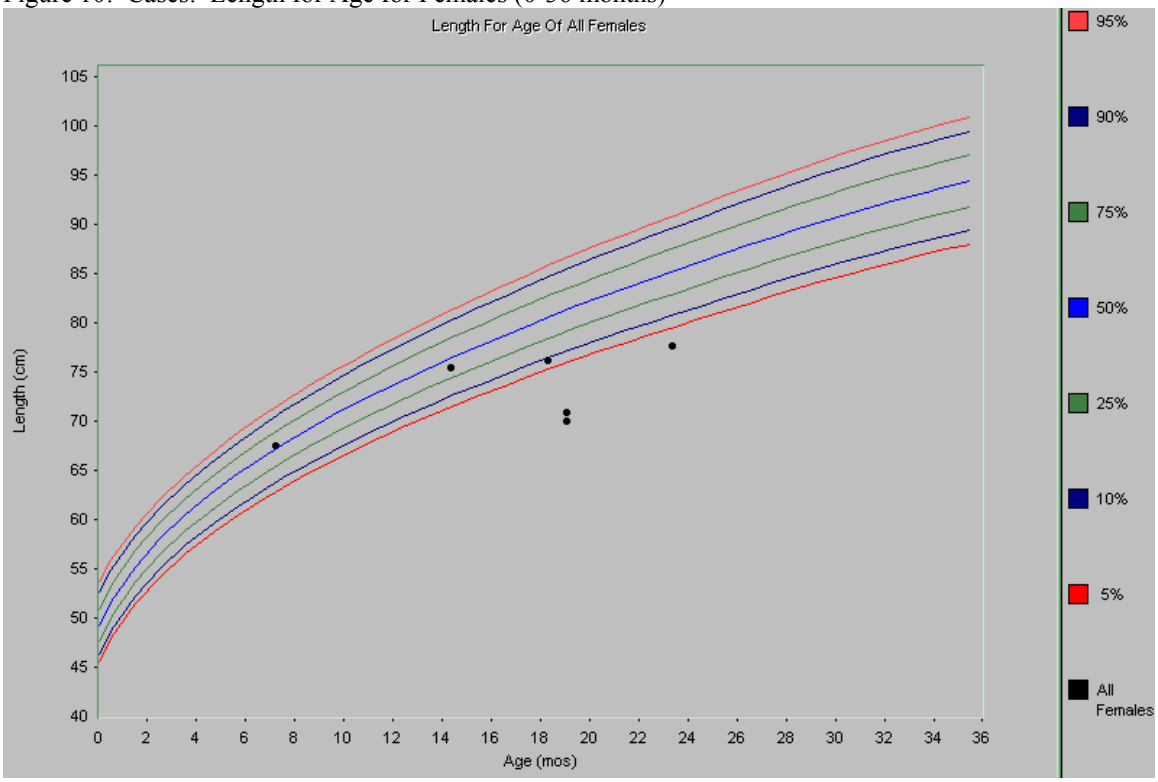


Figure 11. Cases: Stature for Age for Males (2 – 20 years)

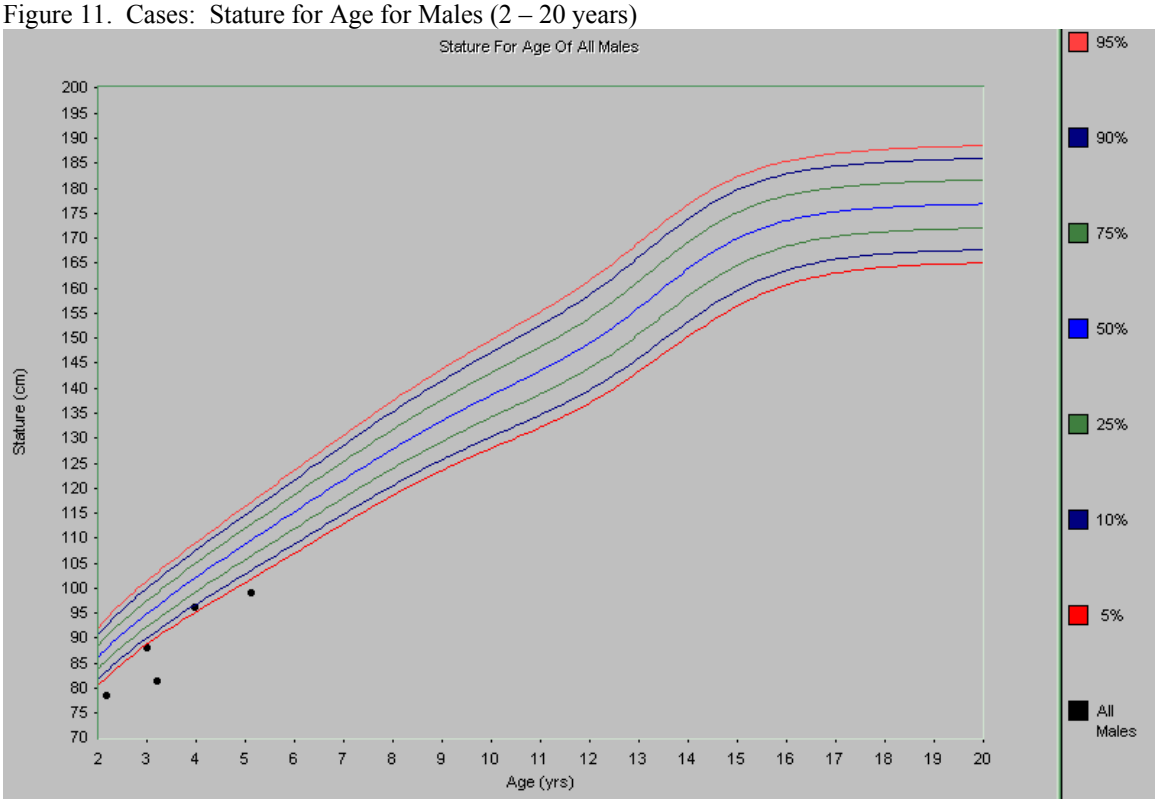


Figure 12. Cases: Stature for Age for Females (2 – 20 years)

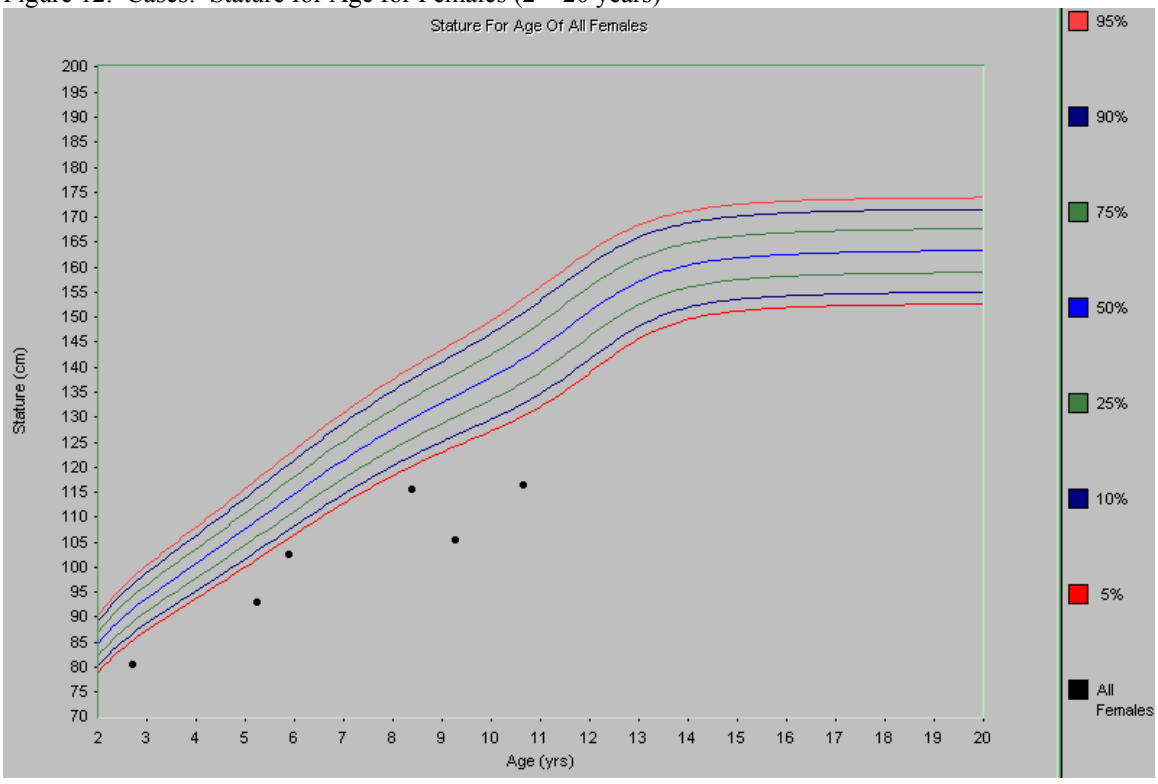


Figure 13: Cases: Body Mass Index (BMI) for Males (2 – 20 years)

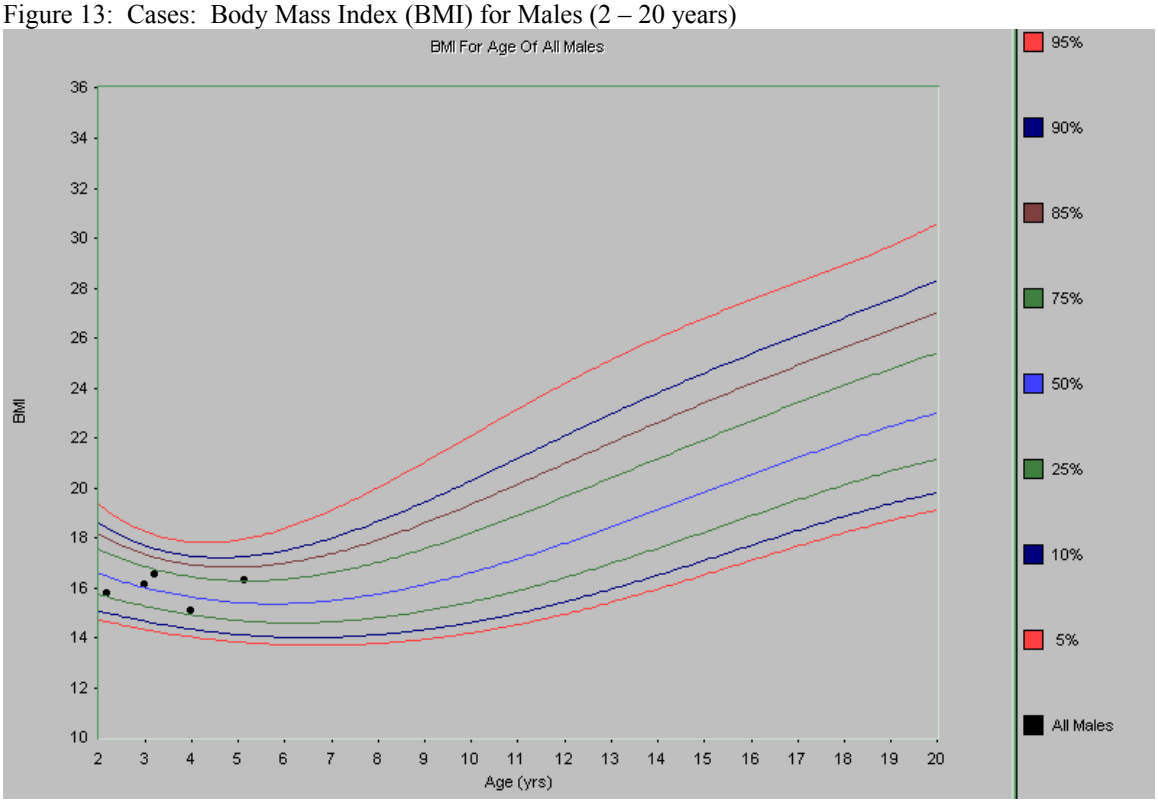


Figure 14: Cases: Body Mass Index (BMI) for Females (2 – 20 years)

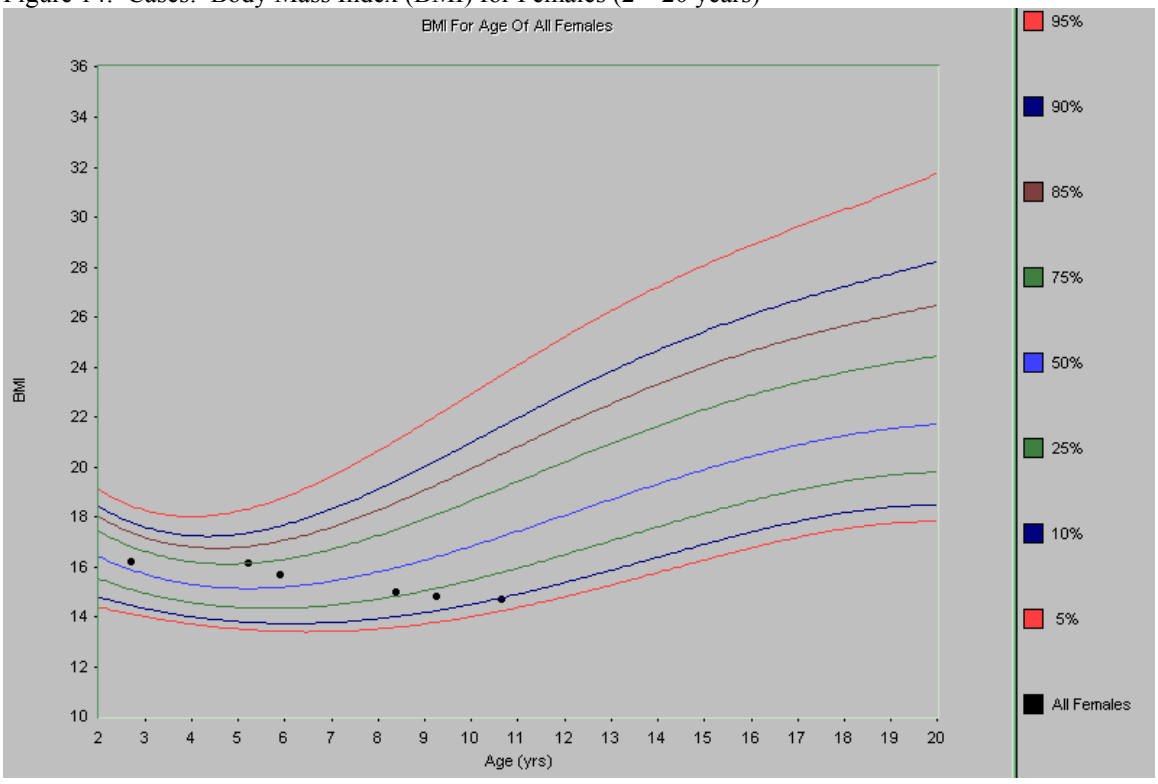


Figure 15: Cases: Head Circumference for Age for Males (0 – 36 months)

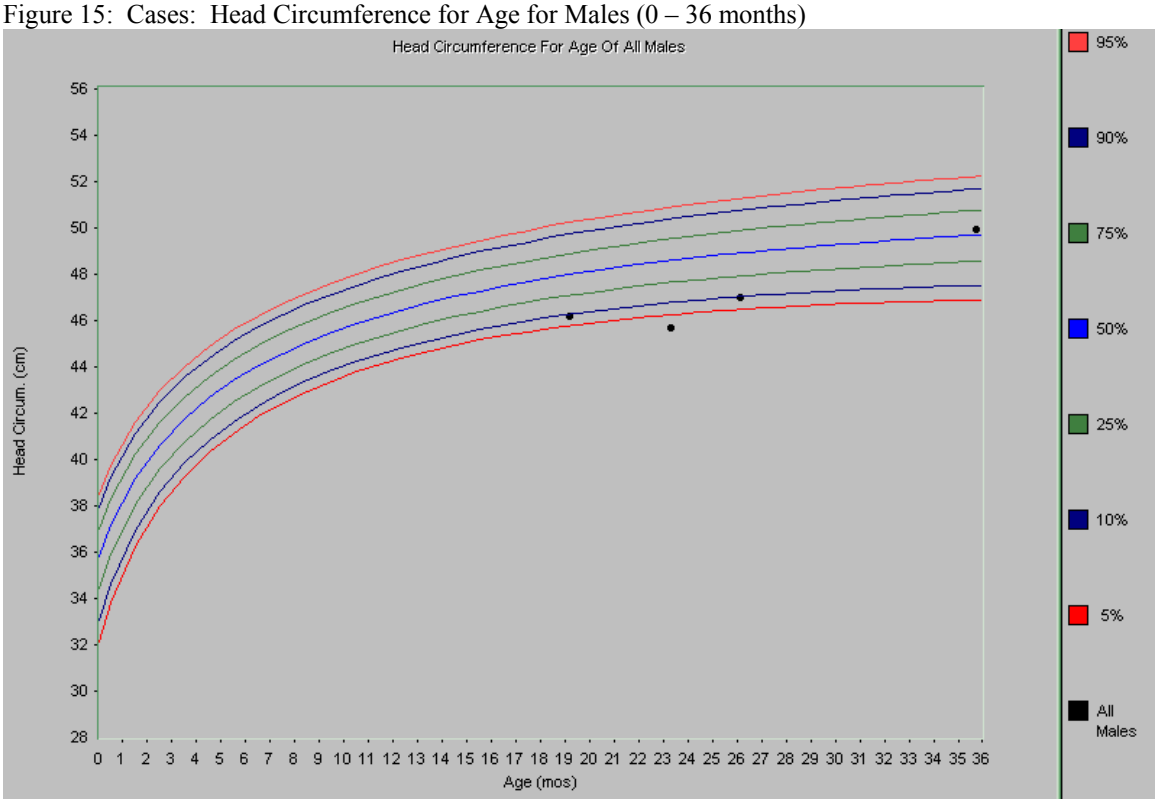


Figure 16: Cases: Head Circumference for Age for Females (0 – 36 months)

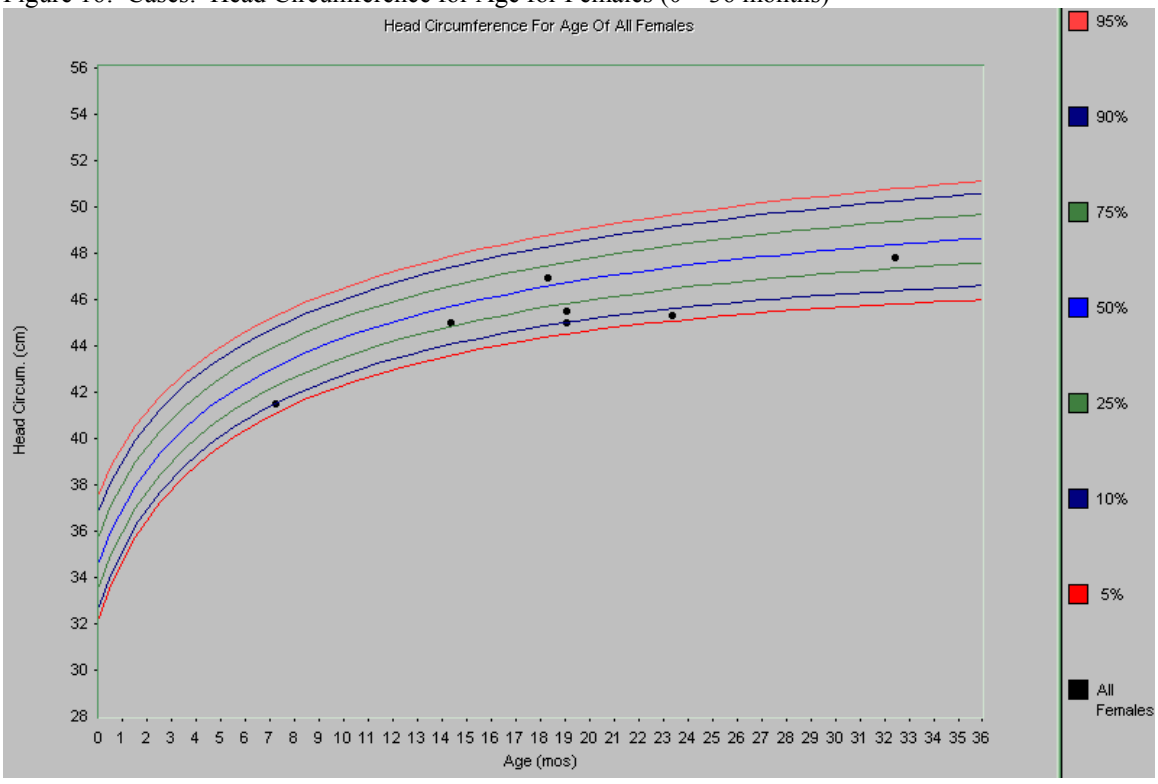


Figure 17: Controls: Infant Weight for Age for Males (0-36 months)

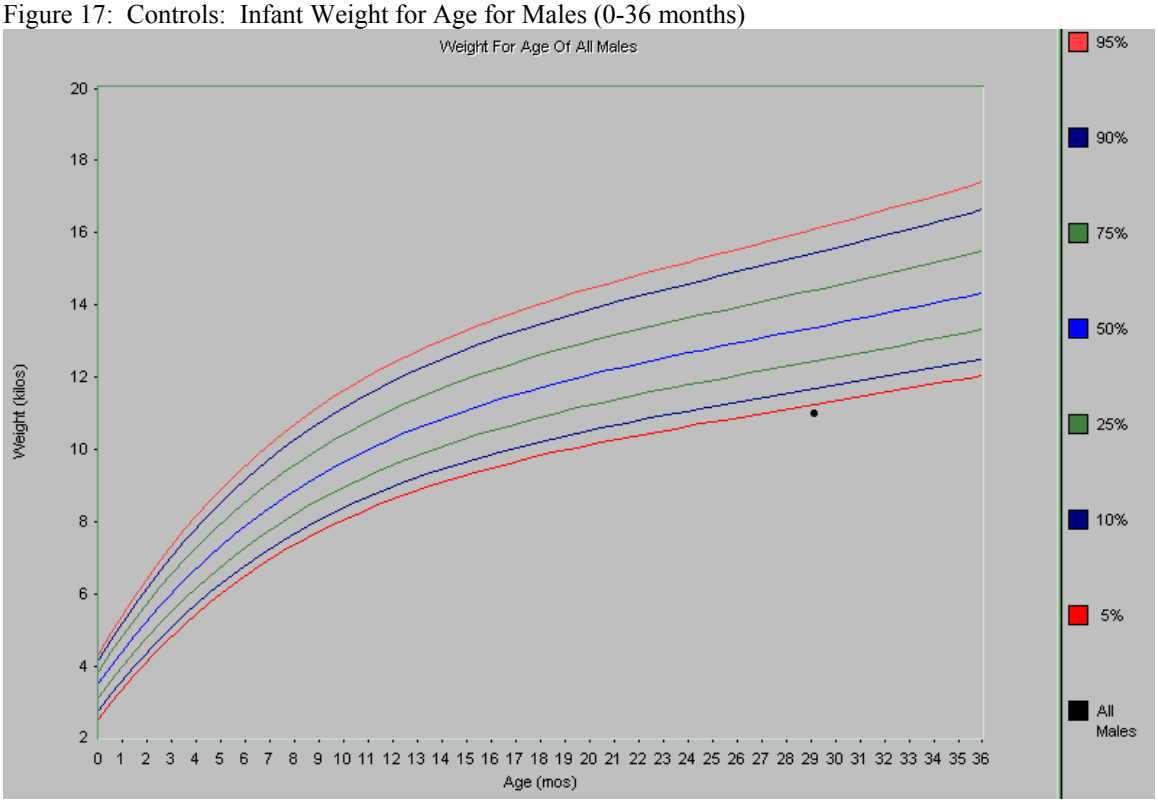


Figure 18: Controls: Infant Weight for Age for Females (0-36 months)

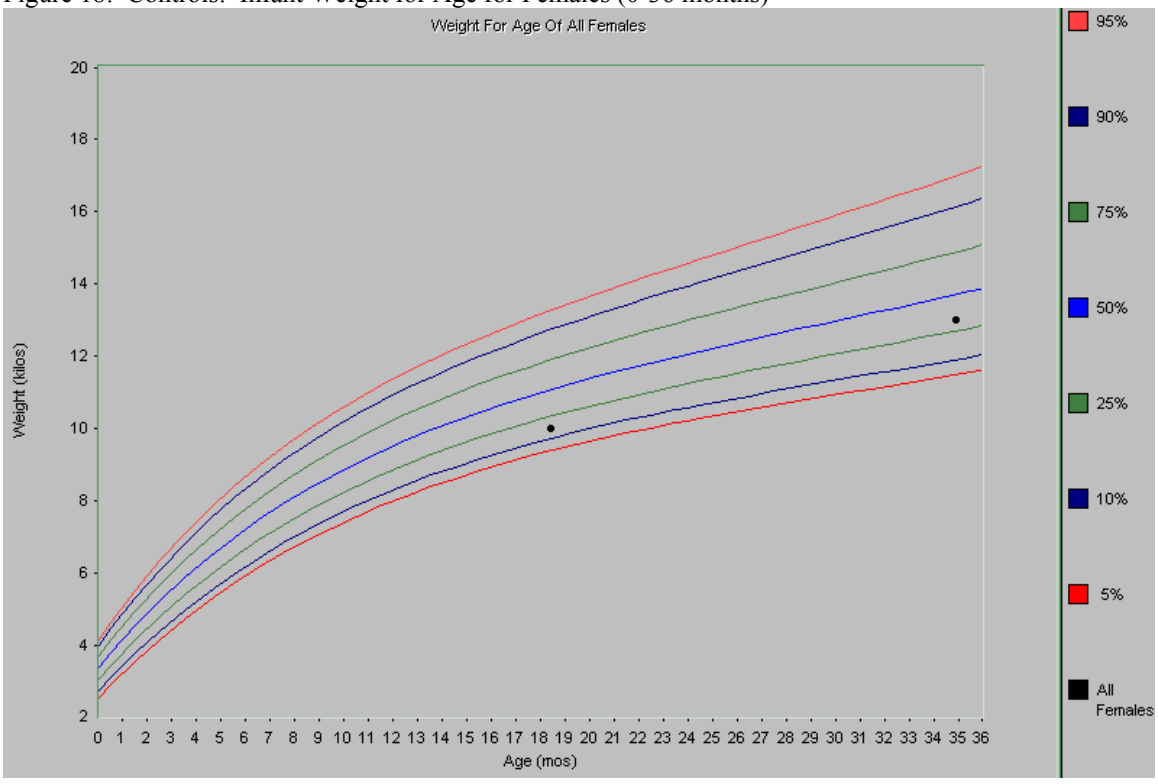


Figure 19: Controls: Weight for Age for Males (2 – 20 years)

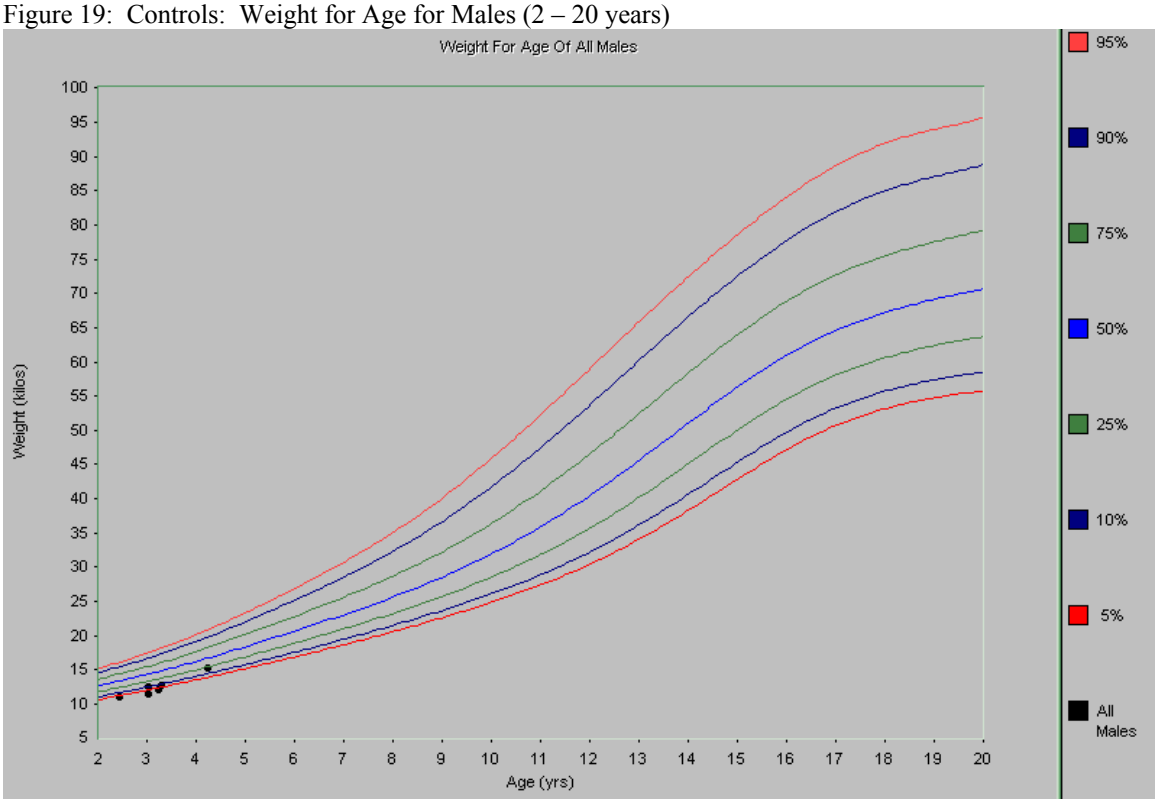


Figure 20: Controls: Weight for Age for Females (2 – 20 years)

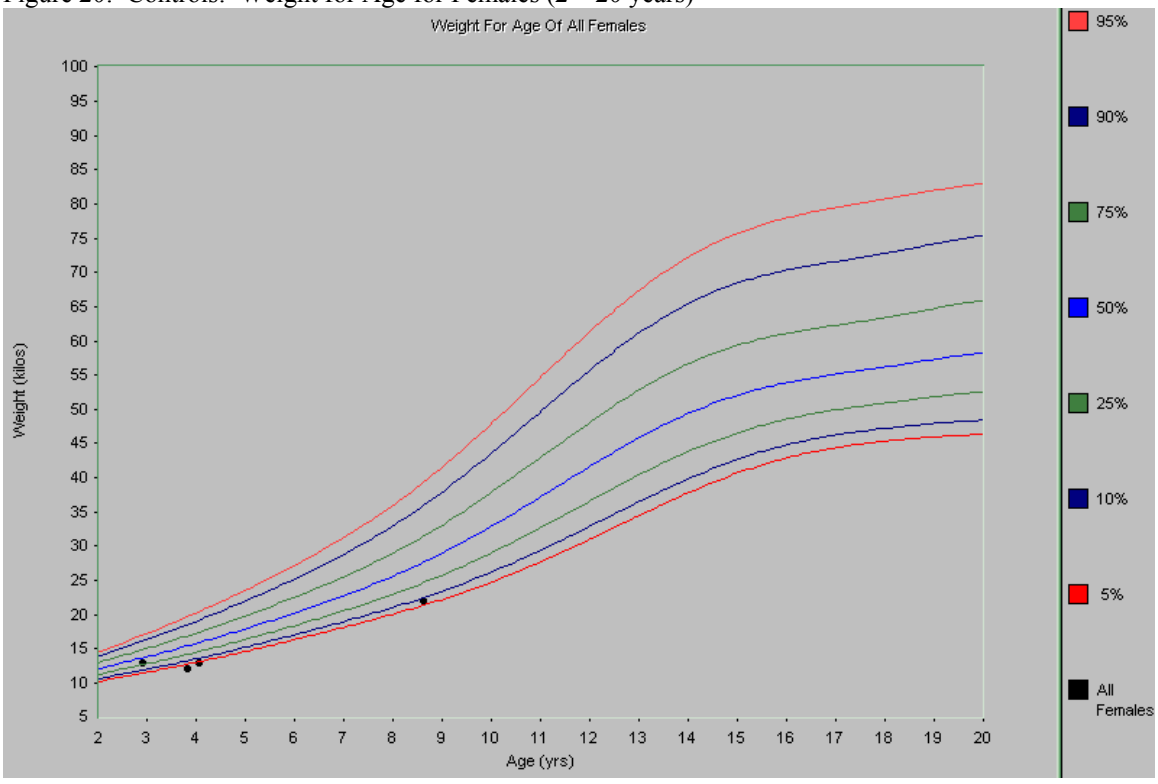


Figure 21: Controls: Weight for Length for Males (0 – 36 months)

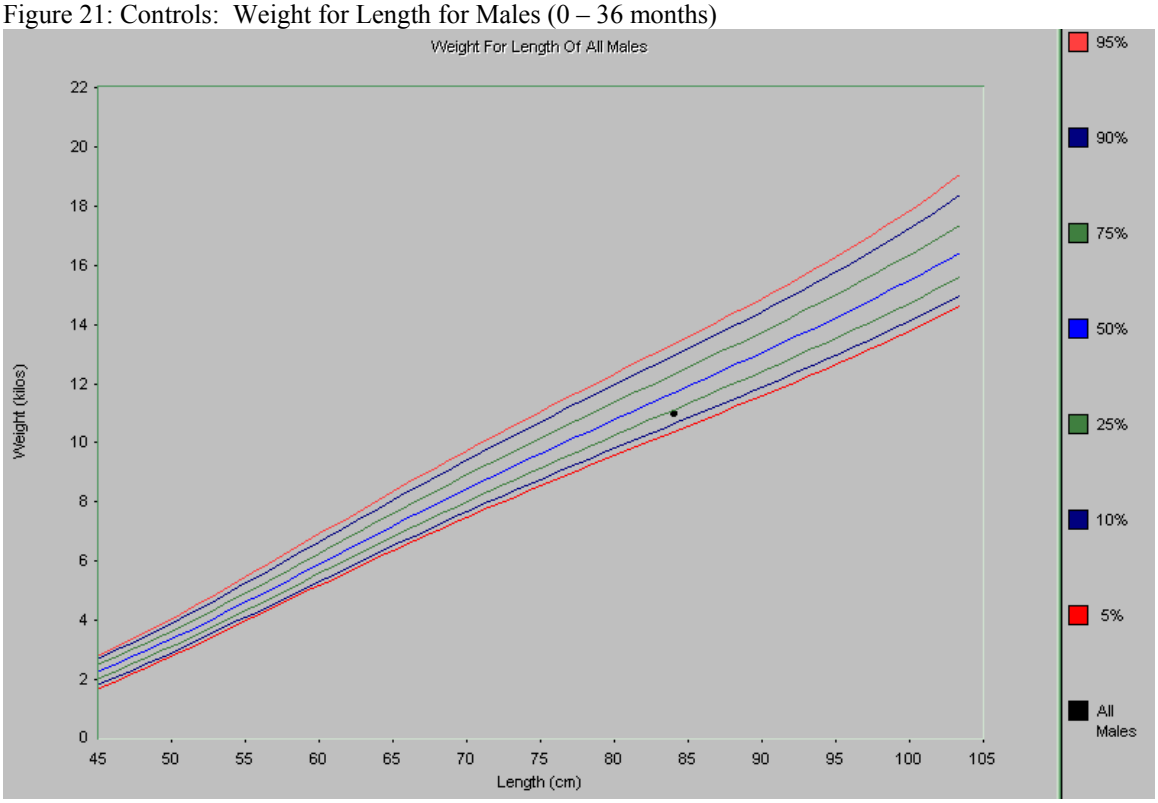


Figure 22: Controls: Weight for Length for Females (0 – 36 months)

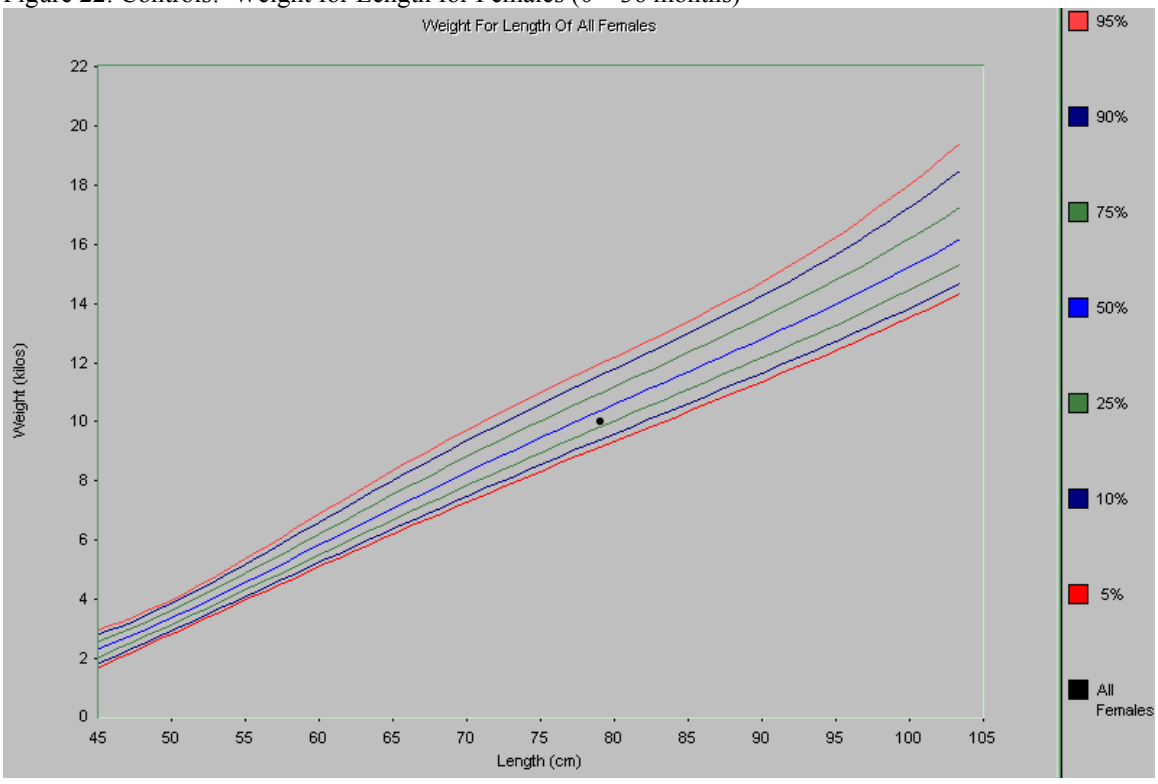


Figure 23: Controls: Weight for Stature for Males (2 – 20 years)

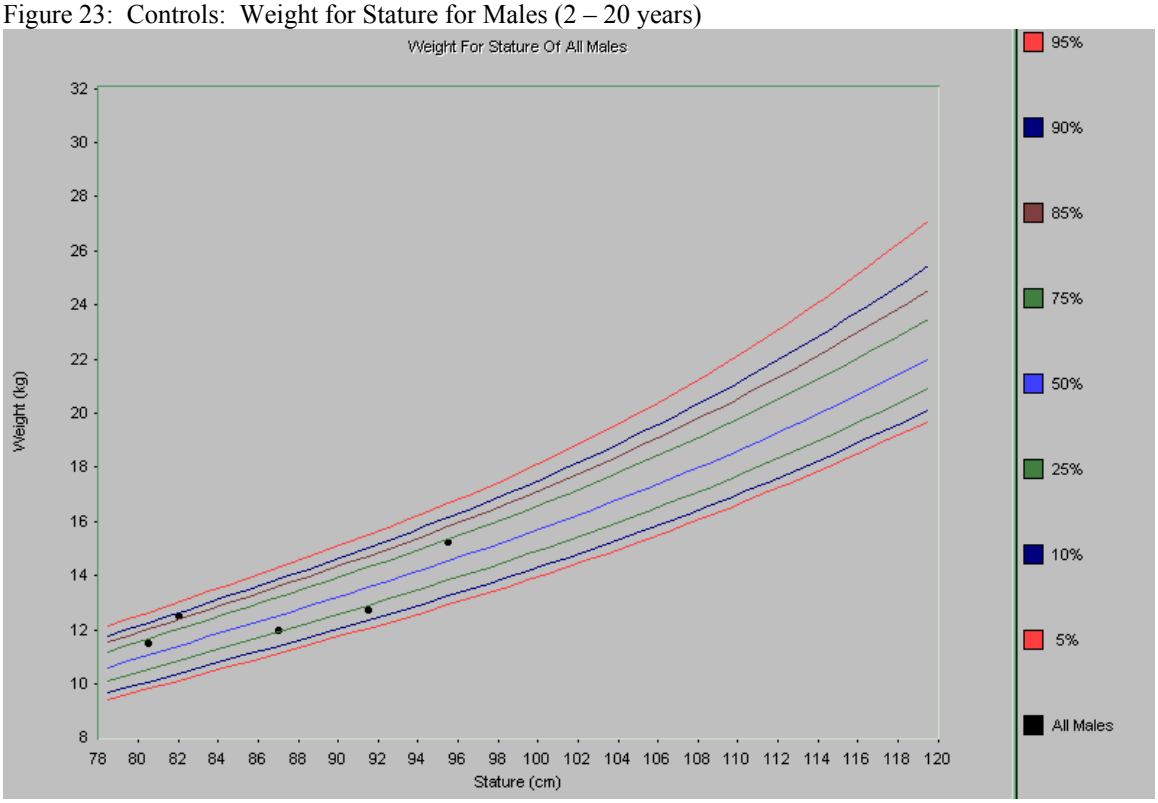


Figure 24: Controls: Weight for Stature for Females (2 – 20 years)

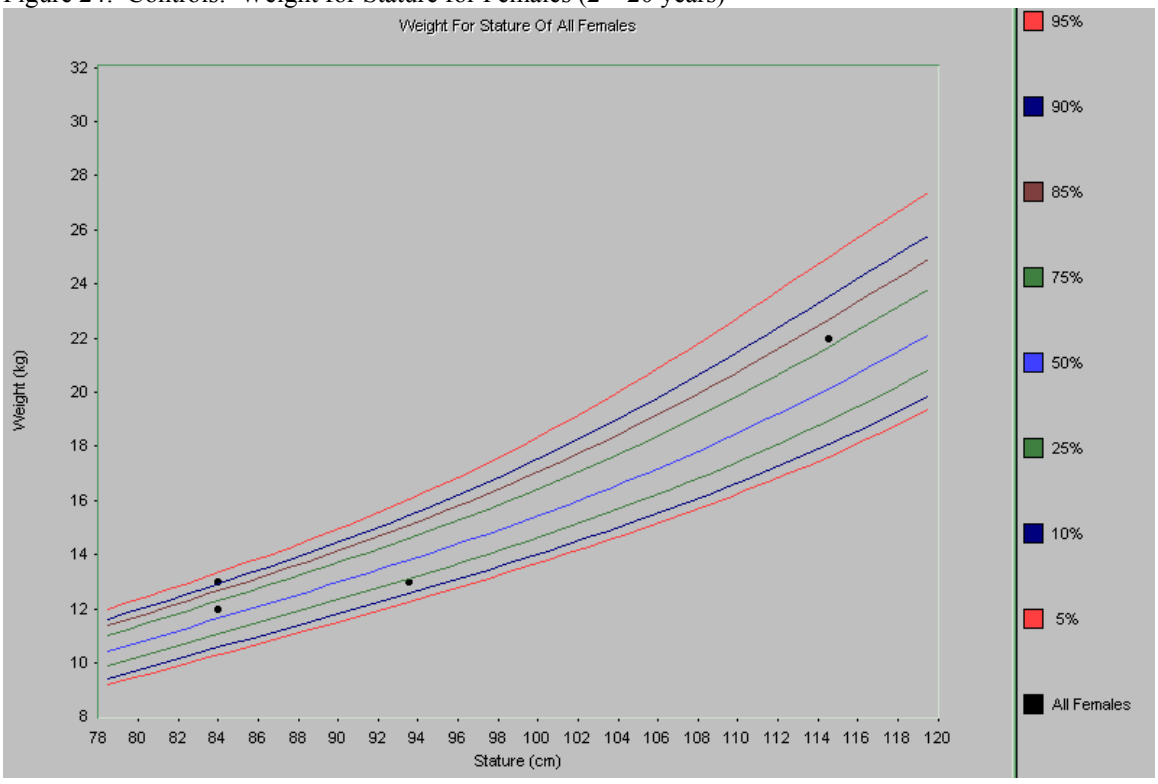


Figure 25: Controls: Length for Age for Males (0 – 36 months)

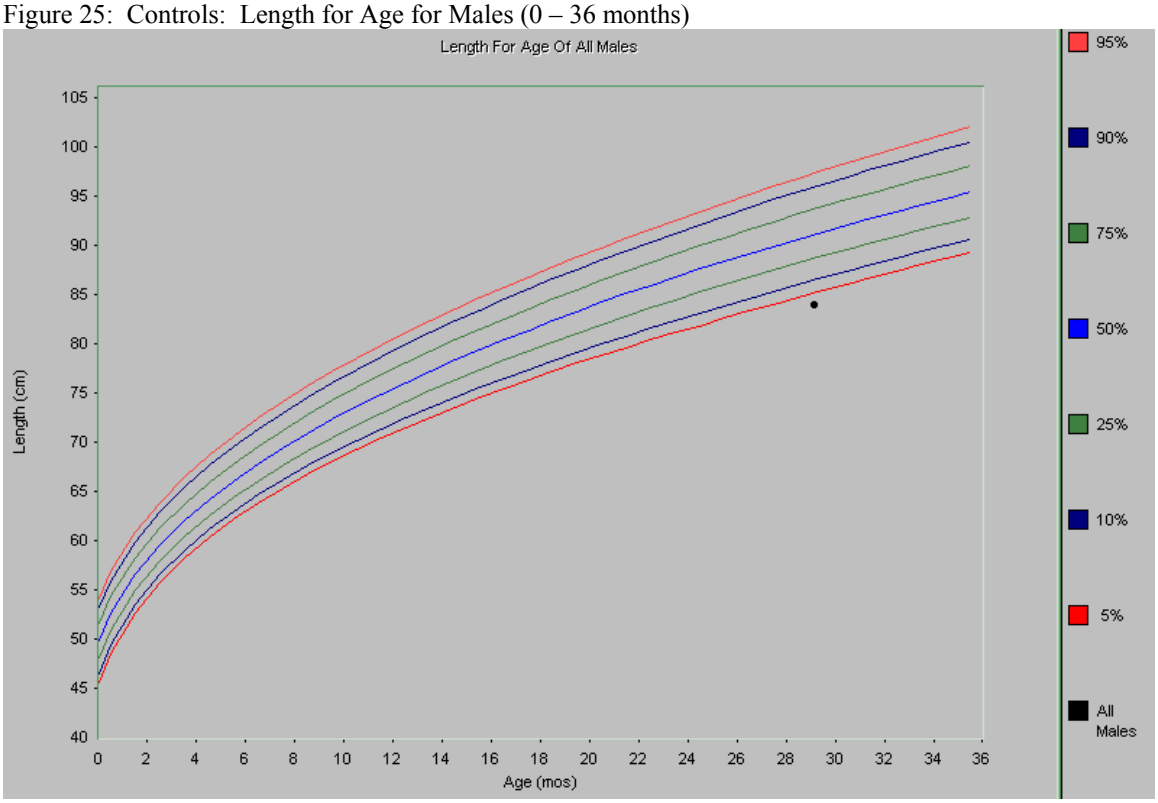


Figure 26: Controls: Length for Age for Females (0 – 36 months)

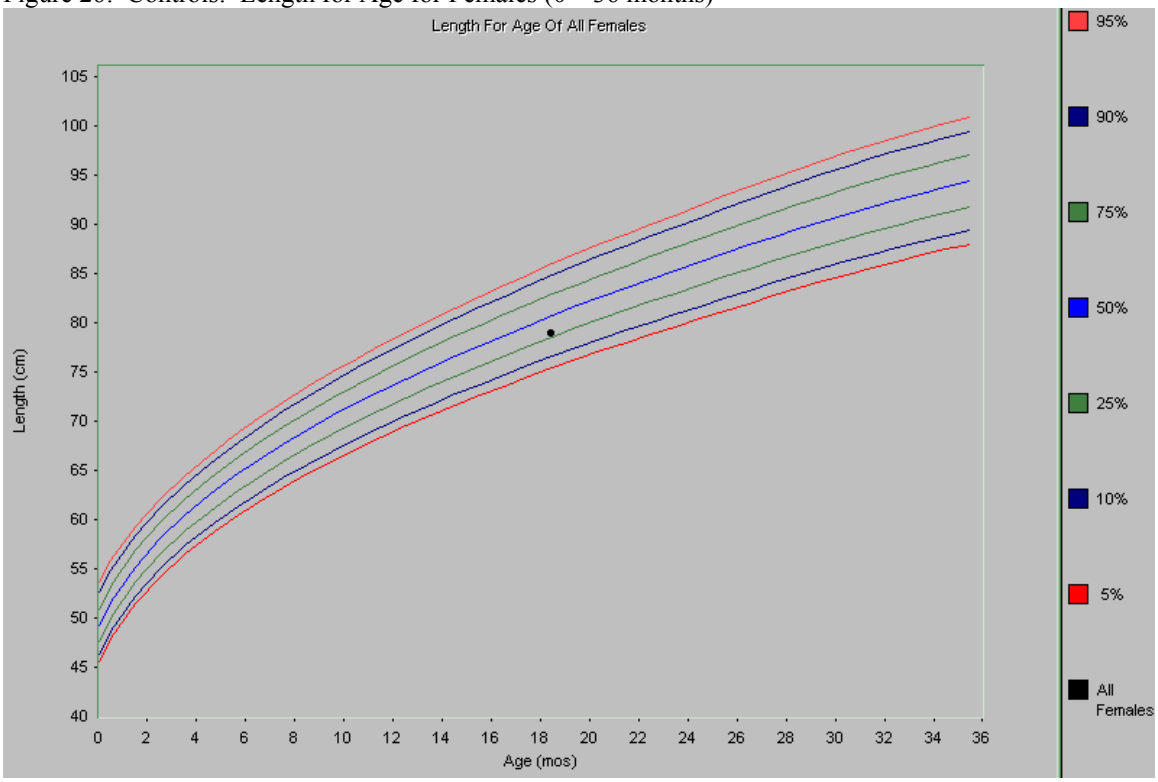


Figure 27: Controls: Stature for Age for Males (2 – 20 years)

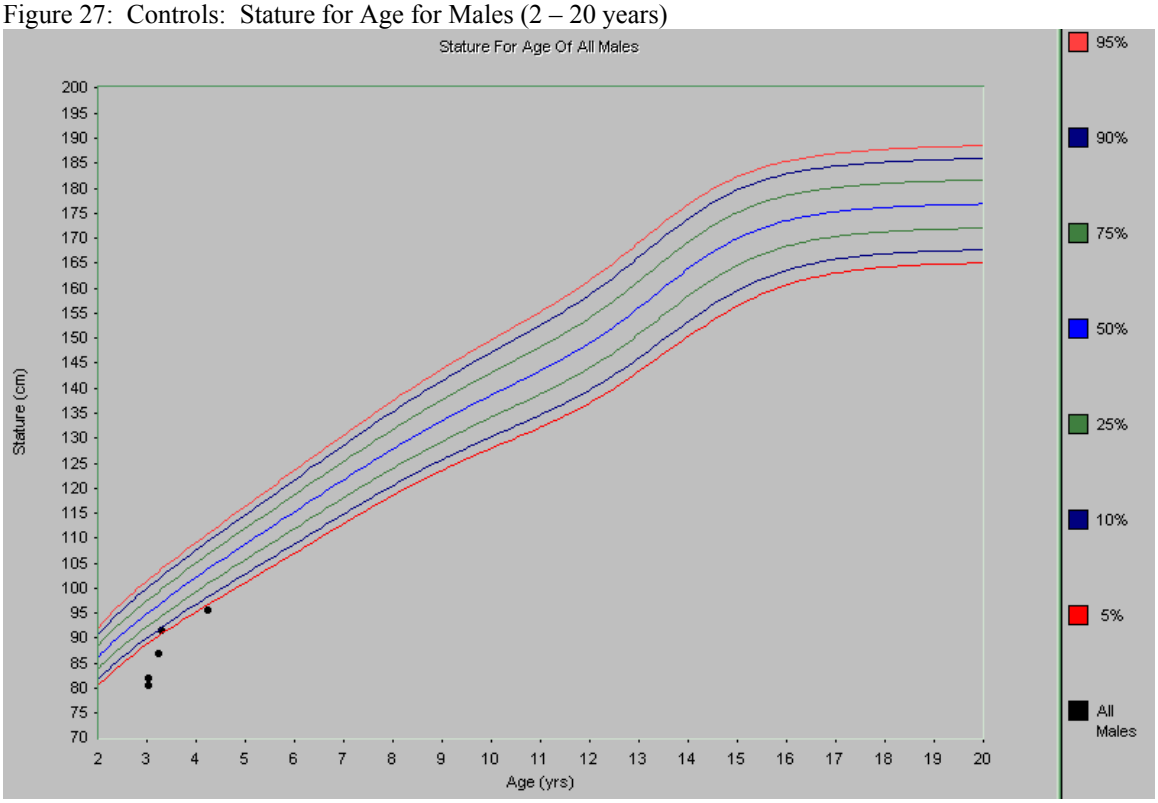


Figure 28: Controls: Stature for Age for Females (2 – 20 years)

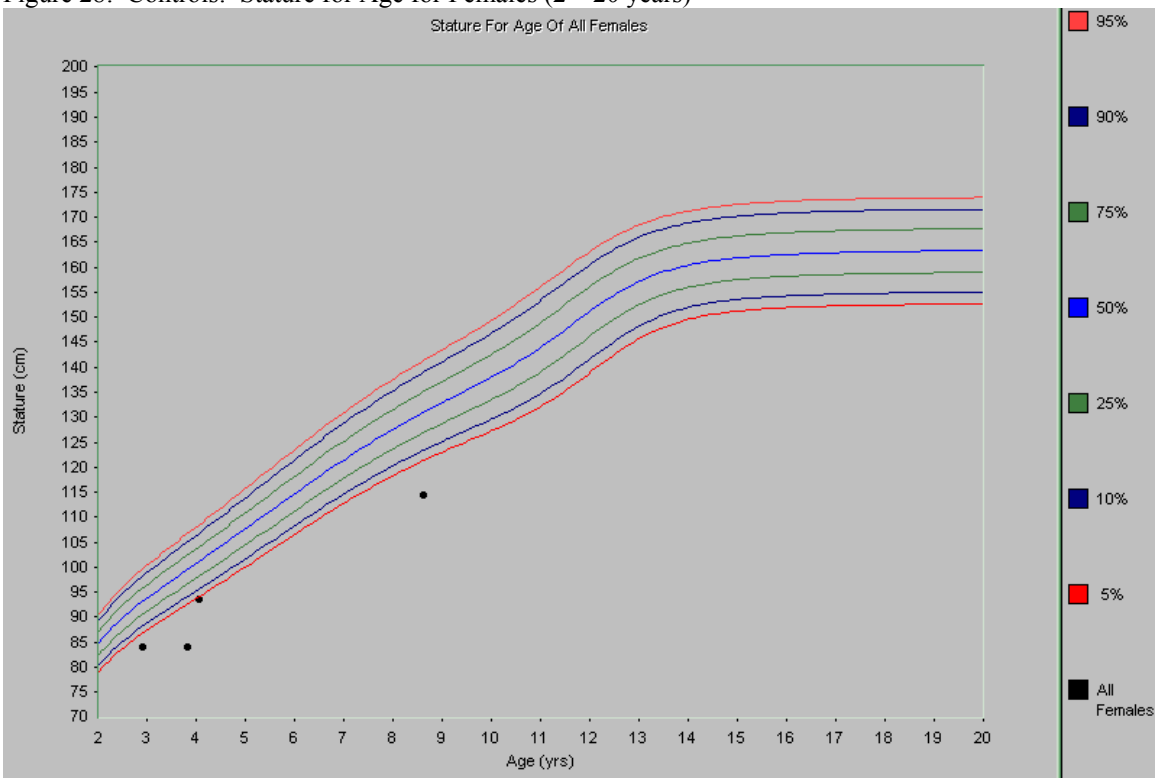


Figure 29: Controls: Body Mass Index (BMI) for Males (2 – 20 years)

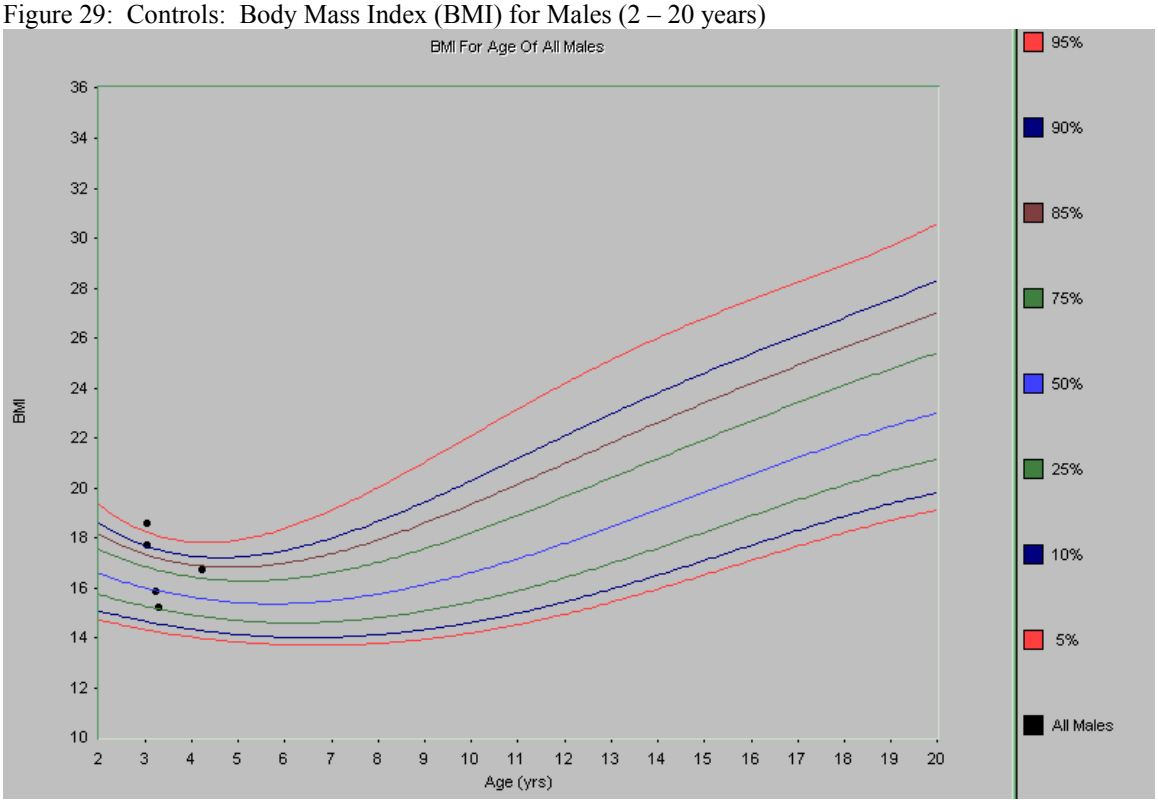


Figure 30: Controls: Body Mass Index (BMI) for Females (2 – 20 years)

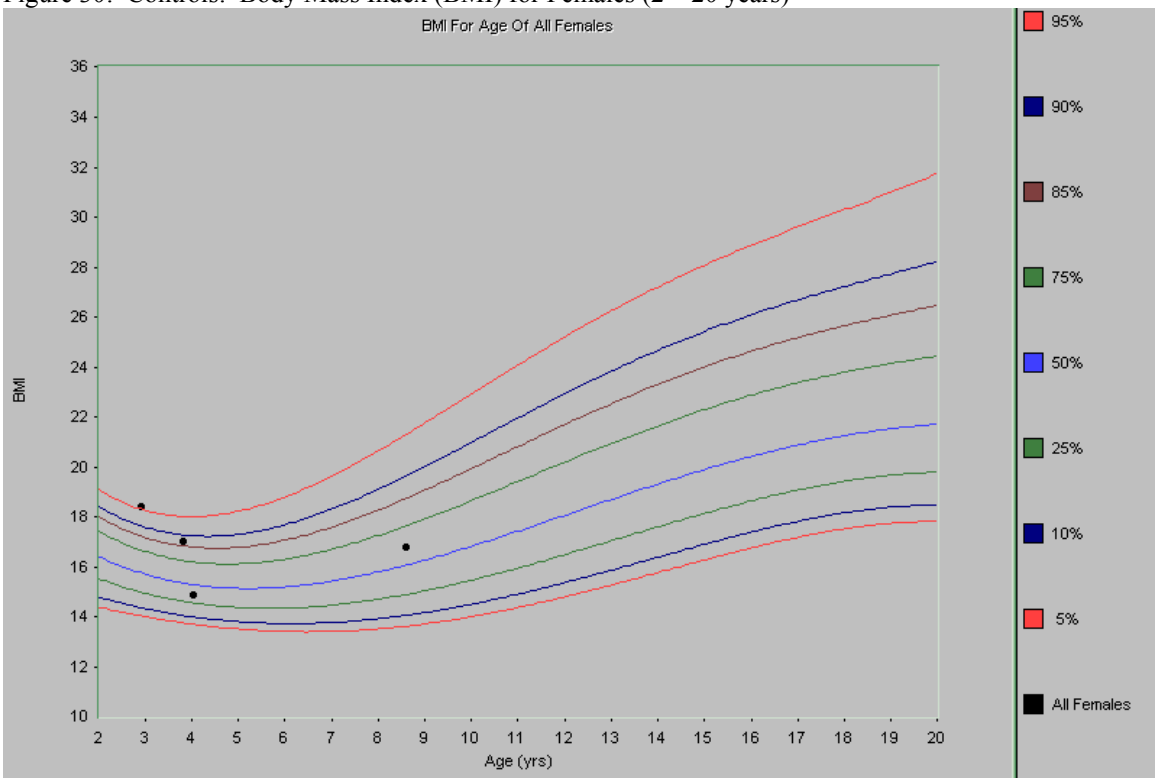


Figure 31: Controls: Head Circumference for Age for Males (0 – 36 months)

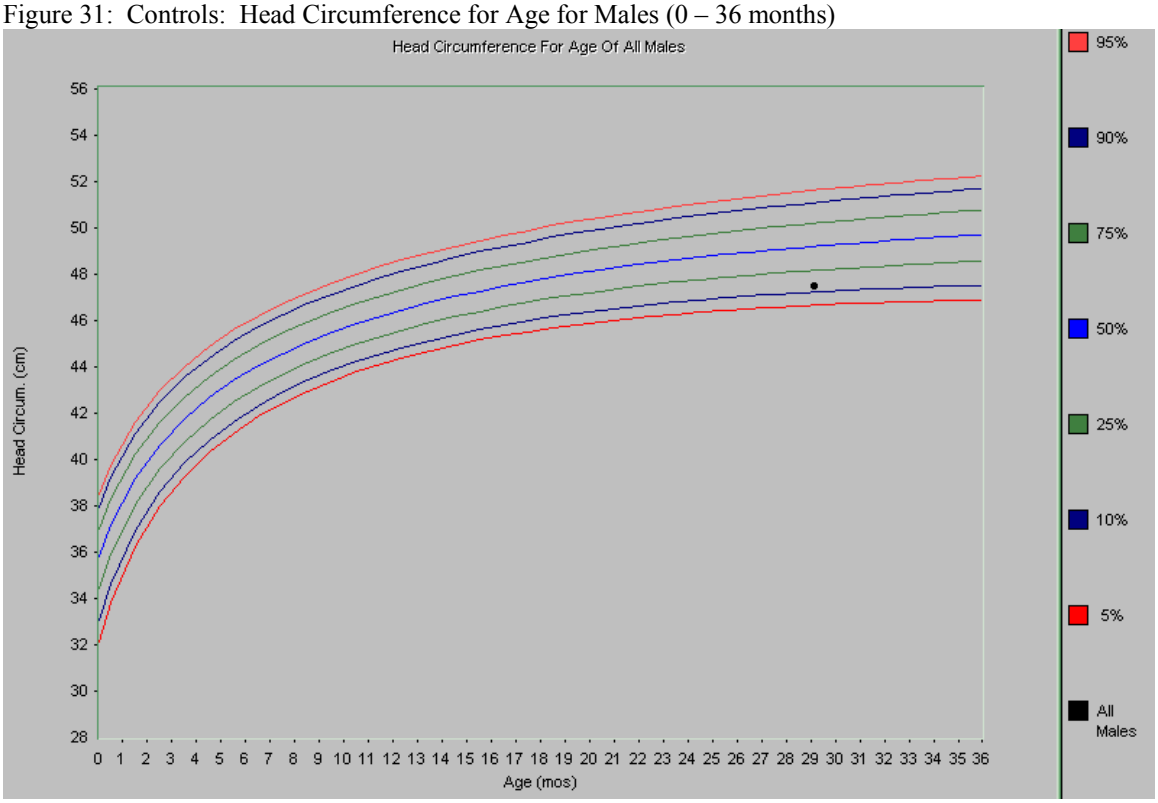
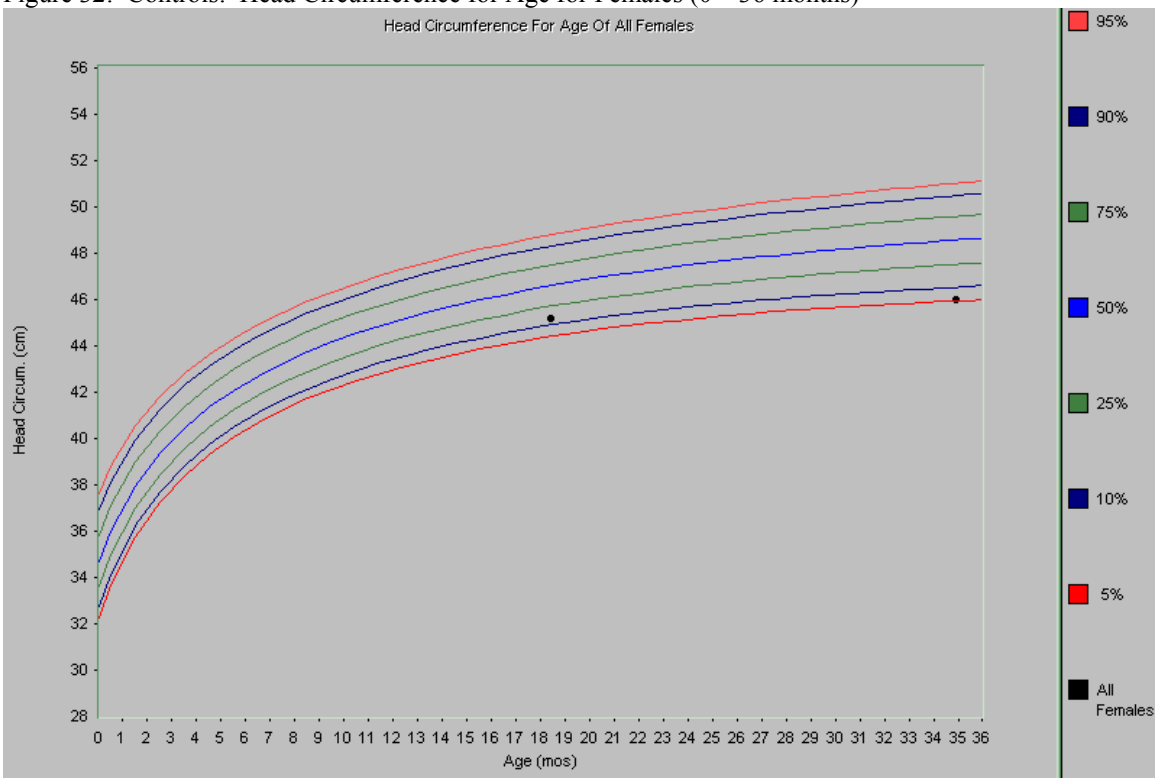


Figure 32: Controls: Head Circumference for Age for Females (0 – 36 months)



Appendix G: Growth Percentiles for Cases of C*ha'lam tsots*

Age	Sex	Weight/Age Percentile	Height/Age Percentile	Weight/Height Percentile	BMI /Age Percentile	Head Circumference/Age Percentile
24m	M	<5th	<5th	<5th	<5th	>95th
33m	F	<5th	<5th	50th	60th	<5th
23m	F	<5th	<5th	5th	n/a	>95th
15m	F	10th	25th	15th	n/a	25th<>50th
19m	M	<5th	10th	15th	n/a	<5th
4y 1m	M	50th	25th	90th	60th	n/a
5y 11m	F	5th	<5th	80th	60th	n/a
5y 3m	F	<5th	<5th	50th	75th	n/a
16m	F	<5th	<5th	25th	n/a	>95th
10y	F	<5th	<5th	35th	15th	n/a
8y	F	5th	5th	35th	25th	n/a
19m	F	<5th	<5th	>90th	n/a	10th
3y 3m	M	<5th	<5th	25th	75th	5th
9y	F	<5th	<5th	75th	50th	n/a
7m	F	>50th	50th	90th	n/a	>95th
36m	M	10th	<5th	50th	50th	50th
4y	M	10th	5th	25th	50th	n/a
18m	F	10th	10th	75th	n/a	15th
26m	M	<5th	<5th	25th	n/a	10th

* source: CDC, NCHS growth charts (revised November 28, 2000)

Appendix H: Calculating Upper Arm Muscle, Fat Area, and Arm Fat Index

Calculations of upper arm muscle and fat are based on measurements of the upper arm circumference and triceps skinfolds. The following calculations were used to calculate total upper arm area, muscle area, fat area, and the Arm Fat Index (from Frisancho 1990).

Total Upper Arm Area (TUA) = $C^2 / (4 \times \pi)$
Where C = upper arm circumference

Upper Arm Muscle Area (UMA) = $[C - (Ts \times \pi)]2 / (4 \times \pi)$
Where Ts = triceps skinfold thickness

Upper Arm Fat Area (UFA) = TUA – UMA

Arm Fat Index (AFI) = (UFA - / TUA) x 100

Appendix I: The PROGRESSA "Papilla" Supplement