

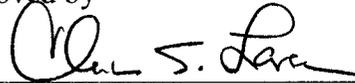
A Bioarchaeological Perspective on Wari Imperialism in the Andes of Peru:
A View from Heartland and Hinterland Skeletal Populations

by
Tiffany A. Tung

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Anthropology.

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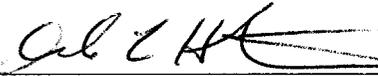
Approved by



Advisor: Distinguished Professor Clark Spencer Larsen



Advisor: Assistant Professor Brian R. Billman



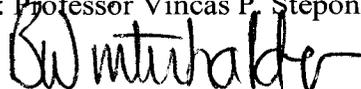
Reader: Associate Professor Dale L. Hutchinson



Reader: Associate Professor Margaret Scarry



Reader: Professor Vincas P. Steponaitis



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ABSTRACT

Tiffany A. Tung

(Under the direction of Clark Spencer Larsen and Brian R. Billman)

This dissertation uses bioarchaeological data from three skeletal populations to evaluate the impact of Wari imperialism on heartland and hinterland communities during the Middle Horizon Period (AD 550 – 1000) in the Andes of Peru. It is hypothesized that Wari conquest contributed to different levels of morbidity, violent injury, and distinct forms of community organization and ritual practices among communities from the site of Conchopata (Wari heartland) and Beringa and La Real (Wari hinterland). This hypothesis is tested through analysis of human skeletal remains, archaeological context, and comparisons to other Andean skeletal populations.

Differences in community organization are reconstructed through age-at-death and sex profiles. Patterns of morbidity are assessed by observing for skeletal lesions indicative of childhood iron deficiency anemia. Injury morbidity and mortality patterns related to violent interactions are examined by documenting the frequency and patterning of cranial depression fractures, “parry” fractures, and peri-mortem trauma. Wari ritual practices are evaluated through analysis of human trophy heads and their associated ritual contexts. Finally, strontium isotope data from burials and trophy heads from Conchopata are evaluated to determine if they were natal members or immigrants and if the trophy head victims were from the local or foreign region.

This study demonstrates that the demographic composition of the three populations were significantly different, suggesting that the communities were structured in distinct

ways. Data on cribra orbitalia and porotic hyperostosis, indicators of childhood anemia, show that the Conchopata community experienced significantly lower rates of anemia than those in the hinterland. Cranial trauma frequencies are not significantly different among the three populations, but the locational patterning of head wounds differs among males, but is similar among females. Trophy head data indicate that members of the Wari empire mutilated human bodies and used them in ways that differed from other Andean societies. The trophy heads from the hinterland demonstrate that some aspects of heartland Wari ritual practices spread to other regions. Finally, strontium data suggest that the individuals sampled for this study were life-long local residents, but the trophy head victims came from a variety of locales. In sum, the data presented in this dissertation indicate that subject populations were differentially affected by Wari imperialism.

Dedicated to the memory of my grandparents:

Nei C. Chu
Shu Tsien Tung
Isabelle Mowbray Starke
Alvin J. Starke

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LIST OF ABBREVIATIONS

EA *Espacio Arquitectónico* (architectural space)

HE *Hallazgo Especial* (special find)

LIP Late Intermediate Period

MNI Minimum Number of Individuals

MH Middle Horizon

Chapter 1 Introduction

1.1 Introduction to the Research Problem

This dissertation tests the hypothesis that archaic forms of imperialism and conquest differentially affect the health status and lifeways of communities within an empire's heartland and hinterland. Testing this hypothesis is achieved through bioarchaeological analysis of human skeletal remains representing contemporaneous populations that were subject to the same imperial forces. While human skeletal remains are commonly examined to assess aspects of health, this dissertation is concerned with more than health and disease. The osteological data are used to address archaeological questions about the role of warfare and violence in imperial expansion, the impact of imperialism on ancient ritual practices, and the movement of people during periods of conquest. Thus, it will be shown that the frequency and patterning of certain diseases and other indices of morbidity, which bioarchaeological analysis can document, provide significant insights into imperial effects on health status and lifeways (Larsen, 1990; Larsen, 1994; Larsen, 2001b; Larsen and Milner, 1994; Larsen et al., 1992; Owsley, 1992; Stodder and Martin, 1992; Ubelaker, 2000; Ubelaker and Newson, 2002; Walker and Johnson, 1992). But, it also elucidates how other aspects of community life, such as ritual practices and migration patterns, were affected during periods of imperial expansion and conquest. Below is a brief overview of the ways in which imperialism and conquest can affect subject peoples. This is followed by a short discussion that situates this study within a specific geographical and historical context: the

Peruvian Andes during the era of Wari imperial expansion in the Middle Horizon Period (AD 550 – 1000). These themes are elaborated in Chapters 2 and 3.

The development and expansion of an empire can affect the health and lifeways of individuals in myriad ways (Larsen, 1990; Larsen, 1994; Larsen, 2001b; Larsen and Milner, 1994). These effects vary within and between populations, and the impacts can be to an individual's detriment or benefit. Imperial conquest can create or exacerbate violent conflict, leading to injury or death (Carneiro, 1970; D'Altroy, 1992; Earle, 1997; see contributors in volume by Ferguson and Whitehead, 1992; Hassig, 1988; Lambert, 1994; Larsen et al., 1996). Imperialism can also adversely affect the nutritional status of a populace by control of agricultural production, unequal distribution of foodstuffs, heavy tribute demands, and the homogenization of diets (Armelagos, 1994; Cohen, 1989; Costin and Earle, 1989; Crosby, 1986; D'Altroy, 1992; Earle, 1997; Hassig, 1985). Additionally, changes in settlement densities as a result of changing social conditions can produce environments conducive to the spread of pathogens (Cohen, 1989; Larsen, 1997:37-38; Ubelaker, 1992:211) (but see Benfer, 1984). Imperial policies or changing political conditions may also alter the demographic composition of a community, through prejudicial treatment of particular subgroups, producing changes to their health status that can lead to differential morbidity and mortality (Benfer, 1984; Milner, 1991; Milner et al., 2000; Owsley, 1992; Walker and Johnson, 1992) or through the relocation of certain population subgroups (D'Altroy, 1992; D'Altroy, 2002; Larsen, 2001a:23; Premo, 2000; Worth, 2001).

Conversely, state policies can have beneficial effects on community health. State governance can aid in stabilizing a region and curtailing violence by arbitrating local tensions and monopolizing the legitimate use of force (Costin and Earle, 1989; Steponaitis, 1991).

Nutritional status can improve as a result of state administration or changing social conditions through well-organized agricultural planning, storage facilities, and increased access to diverse food sources (Benfer, 1984; Costin and Earle, 1989; Hastorf, 1990; Hastorf, 1993; Neves and Costa, 1998). Of course, state governance also can differentially affect each of these health indices and affect various segments of a population in distinct ways. Moreover, as archaeologists have documented, imperial policies may vary between the heartland and hinterland (D'Altroy, 1992; D'Altroy, 2002; Earle, 1997; Schreiber, 1992), leading to differences in health between distinct populations (see contributors in volumes by Larsen, 2001b; Ubelaker and Newson, 2002 Verano, 1992 #11865).

For this study, bioarchaeological data from three skeletal populations associated with an early Andean empire—the Wari—are examined to delineate imperial effects on community health and organization during the Middle Horizon Period (AD 550 – 1000). Previous archaeological studies have documented the growth and extent of Wari control, as well as concomitant changes in iconography, architecture, urban planning, settlement patterns and other aspects of material culture, all of which serve to elucidate social and political transformations during this time (Cook, 1992; Cook, 2001; Czwarno et al., 1989; Isbell, 1984; Isbell and Cook, 1987; Isbell and McEwan, 1991b; Isbell and Schreiber, 1978; McEwan, 1996; Schreiber, 1987; Schreiber, 1992; Schreiber, 2001; Stone-Miller and McEwan, 1990; Williams, 2001). Despite these pioneering investigations, however, no studies have analyzed Wari-era skeletal remains to assess the health status of both heartland and hinterland populations, nor have skeletal remains been examined to address questions about different forms of social organization in distinct populations within the Wari empire. Thus, this dissertation helps fill a critical gap by elucidating Wari imperial effects on the

lives of people from both biological and archaeological perspectives. It addresses questions such as: Did population profiles differ among communities in the heartland and the hinterland? What was the pathogen load among subject communities? How many people were injured by violence, and what were the social contexts within which violence occurred? How was the human body used in rituals, and did such uses differ among communities? Did people migrate to Wari imperial centers? and, Did Wari imperial agents capture people from distant regions for use in rituals involving human sacrifice? These questions relate to the hypothesis that Wari imperialism differentially affected the health status of communities and contributed to distinct lifeways and forms of community organization.

1.2 The Hypotheses

Through bioarchaeological analysis of 604 skeletal individuals from three archaeological sites, the health profile of Wari heartland and hinterland populations are considered within the framework of three broad hypotheses. The first suggests that periods of imperial domination and foreign influence in peripheral regions were associated with upheaval and unrest, partially due to the creation of new political alliances, the extraction of tribute in the form of labor, goods and food, and a climate of tension with the potential for violent conflict (Ferguson and Whitehead, 1992) (Earle, 1997; Hassig, 1985; Hassig, 1988). The second argues that times of imperial domination may have been characteristically stable in some parts of the empire, such as they were for the Roman Empire and the Inka Empire (i.e., *Pax Romana* or *Pax Inkaica*) (D'Altroy, 1992; D'Altroy and Hastorf, 2001; Earle, 1987; Earle, 1991; Hastorf, 1993). Perhaps the development and expansion of the Wari Empire led to a *Pax Wari* in parts of the Andes six centuries before the Inka Empire achieved this in

certain regions during the Late Horizon (AD 1450 – 1532). Finally, the third postulates that periods of imperial domination were not experienced uniformly by all segments of the population; the conditions of life may have varied depending on one's age, sex, and social status, as well as on the community's political and economic connections to the imperial power (D'Altroy, 1992; D'Altroy, 2002; Hastorf, 1993; Schreiber, 1992) (also see contributors to volume by Larsen, 2001b; Larsen and Milner, 1994; Verano and Ubelaker, 1992).

To test these general hypotheses, several lines of evidence must be assembled. Therefore, additional "second-tier" hypotheses are tested to gain a nuanced picture of the many ways in which the Wari empire affected the health and community organization of heartland and hinterland populations. Because imperial policies may relocate population subgroups or may differentially affect morbidity and mortality (see Chapter 3), it is hypothesized that demographic compositions will differ among communities in the Wari empire. Also, childhood health status is expected to differ among the heartland and hinterland (discussed in Chapter 3). It is also hypothesized that skeletal trauma indicative of violent conflict will show distinct frequencies and patterns between the three skeletal series because some communities may have been involved in warfare, raiding, or other violent activities, while others were not. Skeletal trauma from accidental injury is expected to differ between the heartland and hinterland because some high status individuals at the heartland site (Cook and Benco, 2002; Cook and Glowacki, 2003; Isbell, 2001; Isbell and Cook, 2002) may have been involved in less strenuous or physically risky activities relative to their counterparts in the hinterland. Ritual practices, as gleaned through analysis of the human remains used in the rituals, are expected to differ among the sites; at the heartland site of

Conchopata, it is hypothesized that foreign individuals' decapitated heads were used in rituals. Finally, it is expected that individuals buried at Conchopata were from the local region and do not represent immigrants from distant locales. (Each of these hypotheses is discussed in more detail in Chapter 3.) In the concluding chapter, these multiple lines of evidence will be marshaled to reconstruct a general picture of the quality and ways of life for different communities living under the Wari empire.

1.3 The Archaeological Context

The data evaluated to address the hypotheses derive from three contemporaneous archaeological sites: a Wari heartland site in central, highland Peru, and two hinterland sites in the Majes valley of southern Peru (Figure 1.1). These sites are:

- 1) Conchopata: a large, urban Wari site in the Ayacucho basin (i.e., the Wari heartland).
- 2) Beringa: a village site with domestic and mortuary contexts in the middle Majes valley.
- 3) La Real: a ceremonial and mortuary site also in the middle Majes valley.

In the Wari heartland, the urban site of Conchopata is located only 12 kilometers from the Wari capital and is the second-most important site in the core of the Wari empire (Isbell and Cook, 2002). The site includes architectural and artifactual remains indicating myriad functions, ranging from domestic to administrative, ritual, mortuary, and ceramic production activities (Cook, ; Cook and Benco, 2002; Cook and Glowacki, 2003; Isbell and Cook, 2002; Pozzi-Escot B, 1991). (The site of Conchopata is discussed in Chapter 2.)

In the hinterland, excavations directed by the author have shown that Beringa was a village with domestic and mortuary architecture and numerous Wari artifacts, occupied by

both commoners and local elites (Tung and Cook, n.d.). In contrast, the site of La Real, located eight kilometers downriver from Beringa, was a ceremonial and mortuary site with no associated settlement (de la Vera Cruz Chávez and Yépez Alvarez, 1995). La Real had greater quantities of Wari goods relative to Beringa, and those artifacts were of higher quality; thus, it appears that high status individuals were interred at this ceremonial and mortuary center (de la Vera Cruz Chávez and Yépez Alvarez, 1995). (Each site is described in more detail in Chapter 2.)

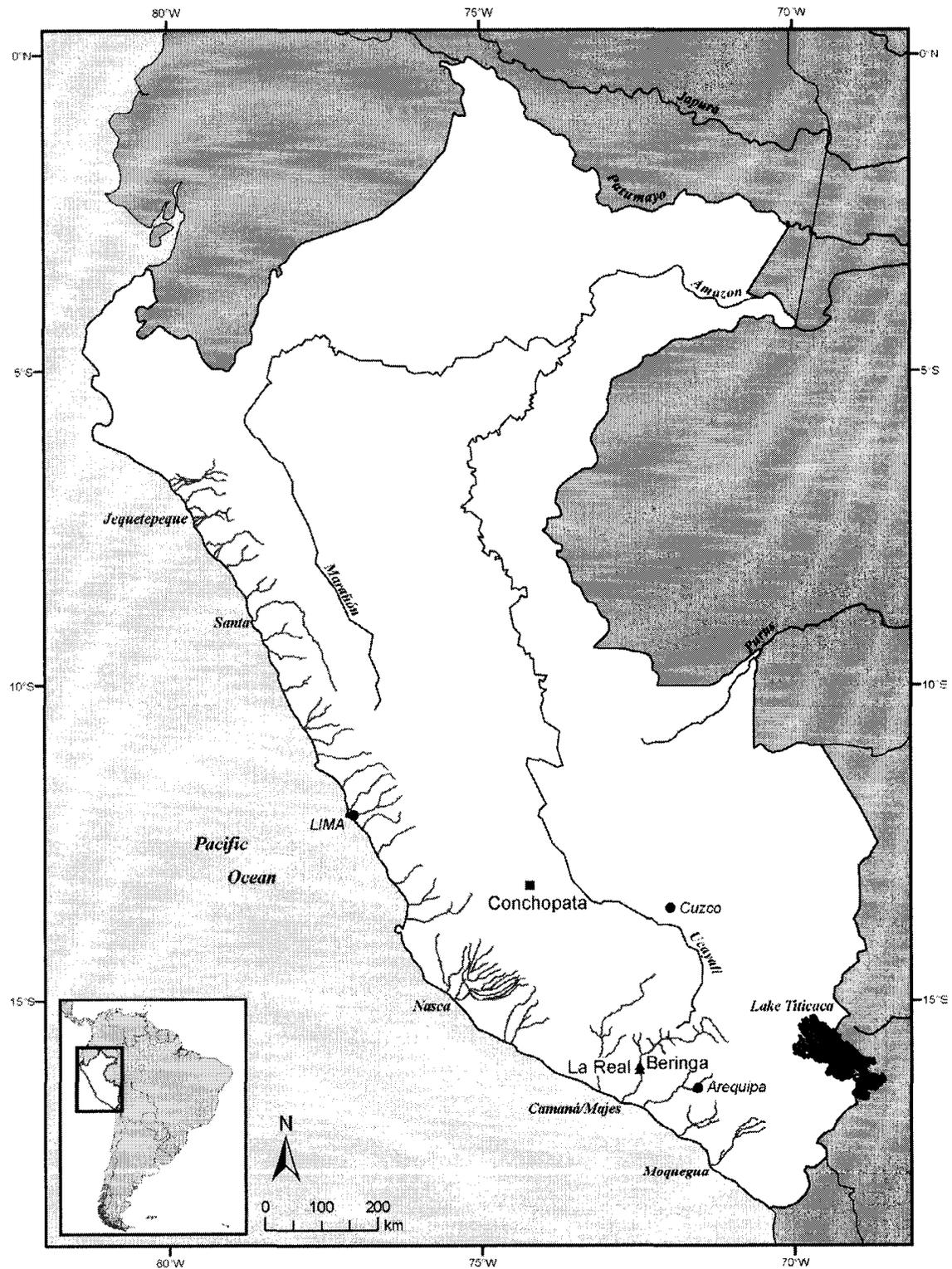


Figure 1.1. Map of Peru showing the three study sites: Conchopata, Beringa, and La Real.

1.4 Materials and Methods

There are skeletal remains of at least 689 individuals from the three archaeological sites, and of these, 604 could be securely dated to the pre-Wari and Wari periods; skeletal data from these 604 individuals form the basis of this dissertation. (Sample sizes are discussed in detail in Chapter 4; also see Table 4.1.) Due to extensive looting at the three sites, many skeletal elements are commingled and other individuals are incomplete. Thus, only a portion of the sample derives from complete and well-preserved skeletons. Nevertheless, as this dissertation demonstrates, incomplete and commingled human remains from archaeological contexts provide a plethora of biological data that, in aggregate form, can address crucial questions about the impact of imperialism. All bioarchaeological data were collected from the human skeletal remains using the standards for data collection established by Buikstra and Ubelaker (1994), which are in turn based upon numerous previous studies on physical anthropological methods. (Methods are discussed in detail and citations are listed in Chapter 4.)

1.5 Organization of the Dissertation

This dissertation is organized to emphasize the biological data in their archaeological contexts in order to address anthropological questions regarding the impact of Wari imperialism. To achieve this bridging of archaeological and biological data, Chapter 2 presents the basic Andean chronology, the background of the history of Wari studies, and competing theories regarding the nature of the Wari empire. Chapter 2 also provides an overview of the current state of knowledge regarding the origins and expansion of the Wari empire. This is followed by descriptions of the two study regions (i.e., Wari heartland and

southern hinterland) and the three archaeological sites (Conchopata, Beringa, and La Real). Chapter 3 presents a bioarchaeological perspective on imperialism, including a discussion of the five skeletal indices that are examined in this dissertation and the specific hypotheses to be tested. This chapter also presents information from Andean ethnohistory and ethnography as a means to contextualize the skeletal data more fully. Chapter 4 (Materials and Methods) includes a summary of the skeletal sample sizes and a detailed discussion of the bioarchaeological methods used in this study. (Archaeological excavation methods are presented in Appendix II.)

Chapters 5 through 9 include the bioarchaeological results from each site as well as discussions and comparisons of those data. Chapter 5 presents the demographic distribution of each of the three skeletal populations, followed by a discussion and comparison of those distributions. Chapter 6 includes the frequencies of cribra orbitalia and porotic hyperostosis among juvenile and adult crania from all three sites, as well as a discussion and comparison of those frequencies. Chapter 7 presents the results on cranial and postcranial trauma frequencies and locational patterning of wounds among the three series; this is followed by a discussion and comparison of the trauma data. Data on Wari trophy heads are presented in Chapter 8, and the modification styles from each site are compared to each other. Chapter 9 comprises the results from the strontium isotope analysis of enamel and bone pairs from individuals and trophy heads from the site of Conchopata. Chapter 10 presents the synthesis and conclusions. Finally, the three appendices describe the archaeological excavation methods employed at each site, the context for the radiocarbon dates from Beringa, and the minimum number of individuals (MNI) and age and sex distributions for each architectural space at Conchopata.

Chapter 2 Background on the Wari Empire, the Study Areas, and the Sites

2.1 Introduction

When the Marquis Don Francisco Pizarro decided to establish this city in this province, he founded it not where it is now, but in an Andean village known as Huamanga ... The largest of those streams is called Viñaque [at the site of Wari], where there are some large and very old buildings which, judging by the state of ruin and decay into which they have fallen, must have been there for many ages. When I asked the Indians of the vicinity who had built that antiquity, they replied that other bearded, white people like ourselves, who, long before the Incas reigned, they say came to these parts and took their abode there. This and other ancient buildings in this kingdom seem to me not of the sort the Incas built...

Pedro de Cieza de León, [1553] 1959

When Pedro de Cieza de León came across these ancient ruins in the central Andes, he was correct in attributing them to peoples that predated the Inka. Indeed, the site he described was the capital city of the Wari Empire—one of the first expansive states to flourish in the Andes from AD 550 – 1000, several centuries before the Inka (see Figure 2.1). However, after Cieza de León’s 16th century visit to the ancient structures at the site of Wari—eponymic for the culture—the site remained virtually unknown until Julio Tello, the “father” of modern Peruvian archaeology, published images of Wari statues in his book, *Antiguo Perú* (1929). Tello also described the site in a newspaper article for a Lima newspaper in 1931 (Tello, 1970). Despite these early accounts, it wasn’t until the 1950s that archaeological investigations and scholarly publications about the site of Wari began (Bennett, 1954; Rowe et al., 1950). Partially because of this delayed discovery, the Wari

Empire is relatively understudied compared to the later Inka Empire (AD 1450 – 1532). Moreover, violent conflict between the Maoist rebel group the Shining Path and the Peruvian military from the 1970s to the early 1990s prevented many scholars from conducting research in the Ayacucho region where the Wari capital was located. Since the capture of the Shining Path leader, Abimael Guzman, in 1992, however, numerous excavations at heartland Wari sites have been initiated, rapidly increasing our knowledge of this Middle Horizon empire and its people (e.g. see Anders, 1991; Cook, 2001; Cook and Benito, 2002; Isbell and Cook, 2002; Isbell et al., 1991; Ochatoma and Cabrera, 2002; Schreiber, 1992).

2.2 Andean Chronology

The Andes have been occupied for at least 12,000 years, and for the last 3000 years the region has been characterized by a cycle of “horizons,” or times of widespread homogeneity in art, architecture, and culture, interspersed with periods of distinct, heterogeneous cultures (Table 2.1) (Willey, 1991). The Early Horizon (800 BC – AD 1) was the first time that an artistic theme, or horizon style, was widely dispersed in the Andes. The particularly common icon—a “staff deity”—was representative of a unified cultural tradition stemming from the pilgrimage center at the northern highland site of Chavín de Huantar (Burger, 1992), and it surpassed local boundaries and unified distinct areas in ways that were never before experienced in the Andes.

Table 2.1. Andean chronology.

Name of time period	Empire(s)/Polities	Dates
Late Horizon	Inka	AD 1450 – 1532
Late Intermediate Period	Regional polities	AD 1000 – 1450
Middle Horizon	Wari and Tiwanaku	AD 550 – 1000
Early Intermediate Period	Regional polities	AD 1 – 550
Early Horizon	Chavín	800 BC – AD 1

As influence from Chavín began to wane, independent polities arose with distinct artifactual styles that were not unified by any one cultural theme. This era, known as the Early Intermediate Period (EIP) (AD 1 – 550), was characterized by several powerful regional polities, such as the Gallinazo-Moche on the north coast (Billman, 1999) and the Nasca culture on the south-central coast (Silverman and Proulx, 2002).

In the central highland Andes of the Ayacucho Basin, where the Wari Empire emerged, the Early Intermediate Period Huarpa society (i.e., pre-Wari) was characterized by numerous habitations and large sites, the latter of which have been interpreted as possible political centers or large villages. Lumbreras originally interpreted Huarpa as a state-level society (Lumbreras, 1974), but later re-evaluated the data and concluded it was organized as chiefdom (Lumbreras S, 2000a). This is in line with interpretations by Schreiber (Schreiber, 2001). Recent excavations by Juan Leoni at the Huarpa site of Ñawinpuyko have shown there was probably some degree of social differentiation expressed through architecture and spatial organization, but more data are needed before the nature of Huarpa society can be adequately characterized (Leoni, 2002). It appears that Huarpa underwent significant cultural, political, and social changes that led to the emergence of Wari, or a proto-Wari

phase, around AD 500 – 550; however, the Huarpa to Wari transition did not necessarily correlate with the broader Andean Early Intermediate Period to Middle Horizon transition (Leoni, Pers. Comm, 2003). Nevertheless, while research by Leoni and others begins to more fully characterize the nature of Huarpa society, there is consensus that the Huarpa sites began to coalesce around the 6th century AD, giving rise to the empire known as Wari (Leoni, 2002; Lumbreras S, 2000a; Lumbreras S, 2000b; Schreiber, 2001).

The Middle Horizon (AD 550 – 1000) marks a time of great cultural unity and homogeneity in the Andes. This “horizon” was initiated by a series of changes in art, architecture, and socio-political organization that extended from modern-day Bolivia and northern Chile in the south, to Jequetepeque in the north (Figure 2.1). These pan-Andean changes stemmed from two major cultural centers: the Tiwanaku sphere in the southern Andes of the Lake Titicaca Basin in modern-day Bolivia, and the Wari sphere in the central highland Peruvian Andes of the Ayacucho Basin (Figures 2.1 and 2.2). The two dominant polities appear to have controlled separate geographical regions, except in the Moquegua valley in southern Peru where Tiwanaku and Wari settlements coexisted (Feldman, 1989a; Moseley et al., 1991; Williams, 2001).

The ubiquitous iconographic motif of the Middle Horizon, namely the “Front Face Staff Deity,” is a mythical being with ray appendages surrounding the head; it holds a staff in each extended hand and trophy heads sometimes dangle from the end of the staff (Cook, 1994). This supernatural being appears in many Wari and Tiwanaku media demonstrating some level of cultural unity between the two polities (Cook, 1994). The geographic distribution of this iconographic signature and other Wari goods, such as ceramics, textiles, and particularly architectural designs, help delimit the extent and intensity of Wari influence

throughout the Andean region. Moreover, the timing of Wari fluorescence and Wari demise can be inferred from the dissolution of these same characteristics.

By about AD 1000, the Wari and Tiwanaku empires declined, and in the wake of this power void, in the subsequent Late Intermediate Period (AD 1000 – 1450), several sovereign, regional polities once again developed. This period lasted approximately four centuries until the onset of the Late Horizon (AD 1450 – 1532) when the Inka Empire expanded out of the Cuzco valley, conquering the largest territory and incorporating the greatest diversity of people of any Andean empire. The Inka Empire flourished until the arrival of the Spanish in 1532.

2.3 History of Wari Studies

2.3.1 *What's in a Name?*

The term Wari means honored ancestor (Schreiber, 2001) and appears to have been attributed to the capital site after it was initially called Viñaque by Spanish chroniclers. The exact timing and reason for the “name-change” is not well documented, but according to Rowe and colleagues (1950: 121), García Rosell noted in 1942 that “it was in 1888 that the site now called Huari [Wari] was identified with Cieza’s Viñaque ruins.” García Rosell provides no citation for this information, so the source for this particular name remains unknown (Rowe et al., 1950). There are two spellings for the name: Wari and Huari. The former was the preferred spelling by Julio Tello (Rowe et al., 1950) and will be used throughout this dissertation except when citing people who use the latter.

2.3.2 *Identifying Wari as an Empire*

Before archaeologists recognized Wari as an independent, expansive empire during the Middle Horizon, and prior to its identification as the source for a widespread ceramic tradition, many believed that Wari was a branch of the Tiwanaku Empire from the Lake Titicaca Basin. The similarities between Wari and Tiwanaku iconography, though sometimes presented in different media, led many to posit that coastal Wari ceramics were part of the Tiwanaku tradition. Specifically, Wari ceramics from Pacheco and other south and central coastal sites were called the “Coastal Tiwanaku” style in order to reflect their presumed connection to the site of Tiwanaku.

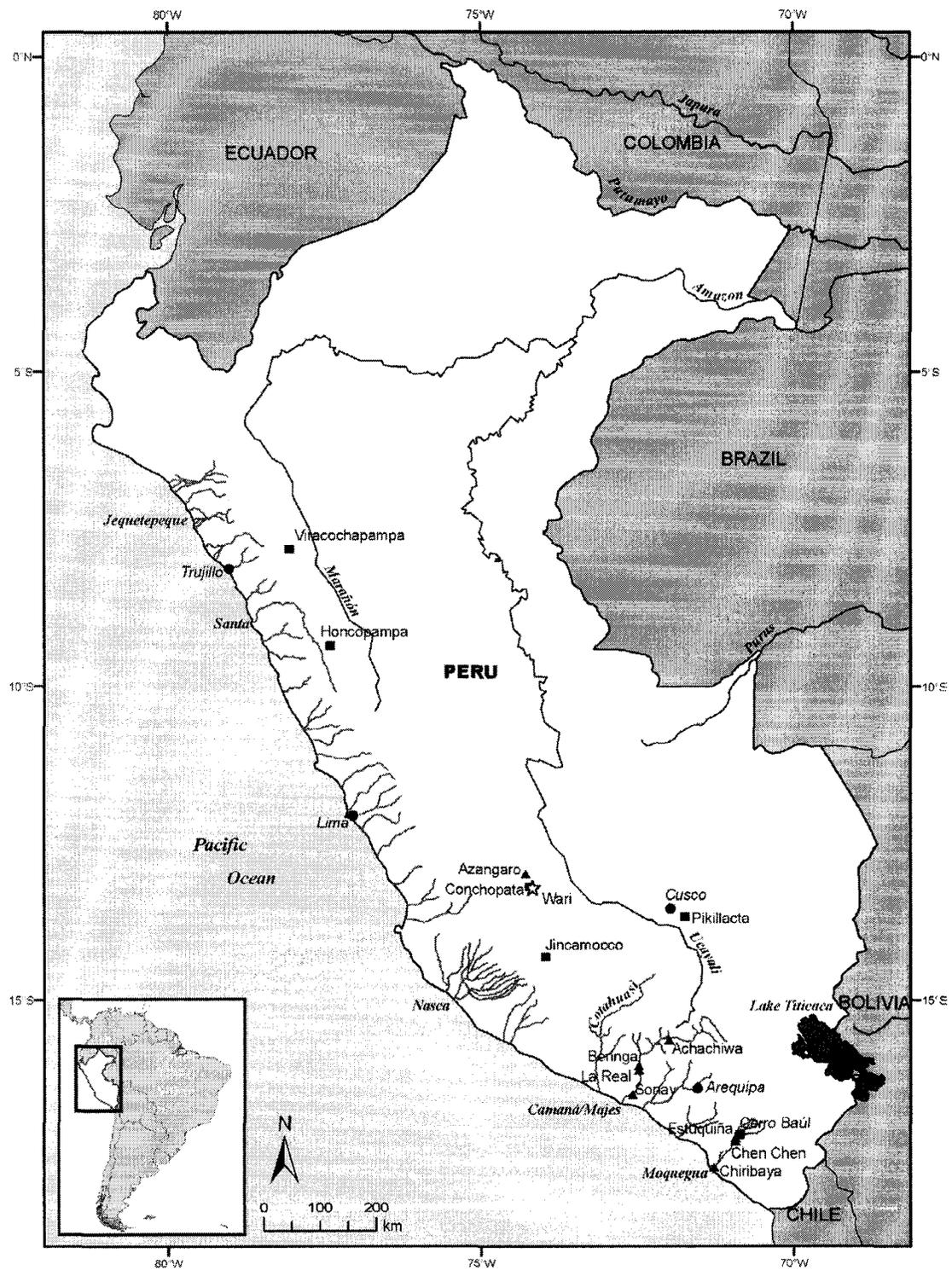


Figure 2.1. Map of Peru showing the location of Conchopata, Beringa, La Real, and other major sites and valleys discussed in the text. (Map by S.A. Wernke.)

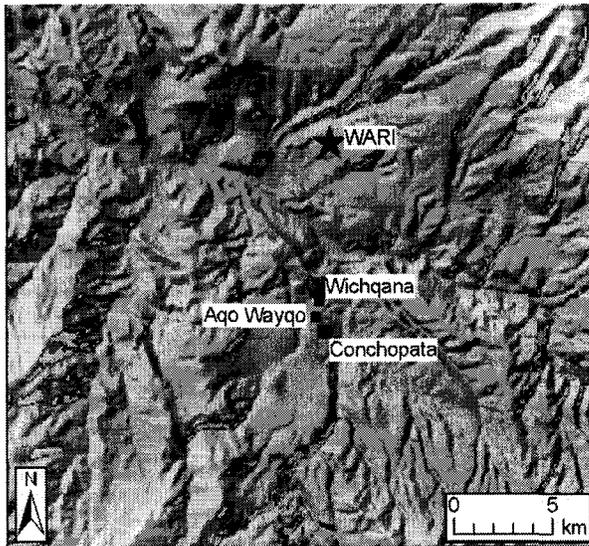


Figure 2.2. Map of Wari sites located in the Ayacucho Basin of the central Andes. (Map by S.A. Wernke.)

Based on analysis of several ceramic collections, Tello suggested as early as the 1930s that the Coastal-Tiwanaku style was derived from Wari, not from Tiwanaku (Isbell and McEwan, 1991a). While this part of his argument was accurate, he incorrectly suggested that the entire Nasca style (AD 1 – 600), which predated Wari, also grew out of the Wari ceramic tradition. This miscalculation overshadowed his correct assessment that Wari was the origin of the Coastal-Tiwanaku style (Isbell and McEwan, 1991a). As a result, it took two more decades before the coastal styles were correctly attributed to Wari and another few years before it was posited that Wari was an independent, conquest empire.

John Rowe (Rowe, 1956) was the first to publish the suggestion that Wari and Tiwanaku were distinct empires and to posit explicitly that Wari may have been the source for the intrusive styles found throughout vast regions of the Andes. He noted that the “Tiahuanacoid Huari pottery which appears intrusive in local sequences... suggests a parallel with the homogeneity [and distribution] of Inca pottery” (Rowe, 1956:150). In other words,

the vast distribution of the “Tiahuanacoid-Huari” styles indicates that whatever site was the source, it must have represented an expansive empire akin to the Inka. In response to his own inquiry regarding which site held this honor, he stated, “...it is most unlikely that the capital was at Tiahuanaco... The most likely candidate in our present state of knowledge is Huari, which is the largest and most spectacular site where the right kind of pottery is found” (Rowe, 1956:150). Thus, the notion was born that Wari was an expansive empire, responsible for the wide distribution of Wari-derived ceramics and architecture. This also implied that the site of Wari (and neighboring Wari sites) was the source of a political administration capable of expanding and maintaining one of the first states in the Andes, six centuries prior to the Inkas.

2.4 Competing Models to Explain Wari Political Organization

Rowe’s assertion that Wari was an expansive empire has been widely supported by archaeological data from subsequent excavations, and ongoing studies continue to undergird his early claims. Nevertheless, various interpretations persist regarding the political organization of Wari:

- 1) Wari was a subsidiary of the Tiwanaku Empire.
- 2) Wari was one of many autonomous Andean polities with no great power over any other region.
- 3) Wari was a politically centralized empire that incorporated numerous communities into its domain.

2.4.1 *Wari as a branch of Tiwanaku*

The first interpretation maintains that Wari was a subsidiary of the Tiwanaku Empire, just as early scholars had posited. Carlos Ponce, a Bolivian archaeologist who has conducted research at Tiwanaku, is the strongest advocate of this view (Isbell and McEwan, 1991a).

Ponce views the similarities between Wari and Tiwanaku iconography as evidence for a pan-Andean tradition reflecting political unity during the Middle Horizon, in which Wari was part of a greater empire—the Tiwanaku. This perspective has relatively little supporting data (Czwarno et al, 1989; Isbell and McEwan 1991; Schreiber 1992) and does not figure into this study.

2.4.2 Independent polities during the Middle Horizon

The second interpretation views Wari as one of many independent polities that flourished during the Middle Horizon. Supporters of this perspective doubt that the Wari sphere of influence was geographically great or ideologically dominant (Bawden and Conrad, 1982; Conrad, 1981; Donnan and Mackey, 1978; Shady Solis, 1989; Shimada, 1990). Bawden and Conrad argue that “Middle Horizon unity has been greatly exaggerated, and we should probably think in terms of a series of regional states or spheres of influence” (1982:31). This was echoed by Czwarno who stated: “[the Middle Horizon] may have represented the fluorescence or consolidation of a number of autonomous states, of which Wari was one... no particular state was pre-eminent over the others” (1989:138).

This view finds support among many Andeanists who work in the north coast of Peru (Isbell and McEwan, 1991a). They see no evidence for direct Wari control in the north and argue that northern indigenous polities maintained local control during the Middle Horizon. Although the site of Viracochapampa in Huamachuco in the north was built in the Wari masonry style, John Topic classifies it as a “hybrid Huamachuco-Huari site,” not a “totally intrusive [Wari] site” (Topic, 1991a:161). Similarly, others have long argued that the site can not claim Wari as its architectural prototype (Conrad, 1981; Moseley, 1978:530).

The notion that several autonomous polities existed during the Middle Horizon includes a multitude of views on the nature of their interactions. For example, John and Teresa Topic have suggested that the site of Wari and its related sites were a confederation composed of kin groups and lineages (Topic, 1991a; Topic and Topic, 1985; Topic, 1992; Topic, 1991b), while Ruth Shady has posited that Wari was not expansionist, but rather engaged in long-distance trade with distant polities, each of which maintained autonomy (Shady and Ruiz, 1979; Shady Solis, 1982; Shady Solis, 1988). Another related view has identified Wari and other important Middle Horizon sites as a group of somewhat autonomous oracles. The site of Pachacamac just south of modern-day Lima may have been the primary oracle with a loosely connected hierarchy of provincial and local shrines distributed across the landscape (Shea, 1969). Although details of the nature of interaction between Middle Horizon polities differ, the general idea among these scholars is that no state was dominant over another.

2.4.3 *Wari as a Politically Centralized State*

The third interpretation identifies Wari as a politically centralized state with an extended administrative structure and its capital at the site of Wari in the central, highland Andes. From the capital, the Wari expanded to incorporate vast regions of the Andes, encompassing nearly all of modern-day Peru, excluding the Amazon and the area immediately around Lake Titicaca (Menzel, 1977; Schreiber, 1998). Some have suggested that Wari expansionism stemmed from militaristic actions (Feldman, 1989b; Isbell, 1991:) (Larco Hoyle, 1948:37; Menzel, 1964:67; Rowe, 1956), perhaps combined with “religious propaganda” (Menzel, 1964:68), while others question the veracity of the militaristic model (Topic, 1991b). Nonetheless, while details of the nature of Wari expansion remain ill-

defined for some regions, many Andeanists agree that Wari was an expansive empire, incorporating diverse and sometimes distant polities into their ideological, political, and/or economic sphere (Brewster-Wray, 1989; Cook, 1992; Cook, 2001; Cook and Glowacki, 2003; Feldman, 1989a; Isbell, 1984; Isbell and Cook, 1987; Isbell and Cook, 2002; Jennings and Craig, 2001; Larco Hoyle, 1948; Lumbreras, 1974; McEwan, 1983; McEwan, 1991; Meddens, 1991; Moseley et al., 1991; Ochatoma and Cabrera, 2002; Schreiber, 1987; Schreiber, 1991; Schreiber, 1992; Schreiber, 2001; Williams, 2001). This last interpretation appears to be best supported by the archaeological data.

2.5 Origins of the Wari Empire

Details regarding important aspects of the cultural and ideological origins of Wari remain elusive. The southern capital of Tiwanaku could be the source for some ideological characteristics of Wari, insofar as they are revealed through the religious icon of the “Front Face Staff Deity.” Menzel (1964:67) has suggested that Wari developed out of the Tiwanaku religious tradition, either through direct indoctrination or through Wari pilgrims who visited Tiwanaku and returned with the religio-cultural messages from the south. She reasons the introduction of these foreign traditions ushered in major cultural changes and the creation and expansion of the Wari Empire. However, others have questioned this assertion and posit another scenario: perhaps religious iconography used by both Wari and Tiwanaku derive from some older, shared source (Isbell and Cook, 2002). In this case, significant aspects of Wari iconography would not be considered derivative of Tiwanaku, nor would it be that Tiwanaku ideology initiated the Wari cultural horizon. A yet undiscovered source may have been the origin for the distinctive Wari-Tiwanaku Middle Horizon style. Additionally, as discussed above, the preceding Huarpa culture in the Ayacucho basin eventually transformed

into what we now identify archaeologically as Wari sometime around AD 500 – 550.

Ongoing research by Juan Leoni and colleagues continues to elucidate these in situ origins of the Wari empire.

2.6 Timing of Wari Development and Expansion

2.6.1 *The Wari Imperial Core*

Andean scholars once suggested that Wari did not initiate imperial expansion until AD 700 – 750, after which time the Wari empire collapsed two centuries later, in AD 900 (Menzel, 1964; Menzel, 1968). However, new evidence indicates that Wari expansion to distant regions may have begun earlier (around AD 650) and lasted longer (until AD 1000) both in the imperial heartland and the southern hinterland (Ketteman, 2002; Malpass, 1998; Tung and Cook, n.d.; Williams, 2001). Radiocarbon data from this investigation support this assertion, particularly as it pertains to evidence for Wari expansion to the south around AD 650 (discussed below).

The Wari empire grew out of the preceding Huarpa culture of the Early Intermediate Period when three Huarpa sites coalesced into one large city—the capital of Wari (Schreiber, 2001) (Figure 3.1). Twelve kilometers from the capital, the Wari site of Conchopata also developed out of preceding Huarpa settlements (Figure 2.2). Wari characteristics (e.g., iconography and architecture) were visible at Conchopata by about AD 550, around which time the site began to develop into the “second city” in the Wari imperial core (Silverman and Isbell, 2002).

Additional Wari sites and several Wari administrative centers are located throughout the central, highland Andes, demonstrating the extent and intensity of Wari control in this

region (Anders, 1991; Isbell, 1977; McEwan, 1996; Ochatoma and Cabrera, 2001; Schreiber, 1991; Schreiber, 1992). The Wari site of Azángaro, located 15 kilometers northwest of the Wari capital, appears to have been constructed around the 9th century AD to facilitate oversight of irrigation networks and agricultural production; it also may have served a calendrical/ceremonial purpose within the Wari Empire (Anders, 1991:168) (Figure 2.2). Jargampata, located about 25 kilometers east of Wari, is the smallest of the Wari centers in the core, likely serving as an agricultural collection center with local peasants producing for the Wari State (Isbell, 1977:56). The small Wari site of Aqo Wayqo, located a couple of kilometers from Conchopata, shows domestic occupations at the onset of Wari development (Ochatoma and Cabrera, 2001). Aqo Wayqo was probably the residential site for peasant agriculturalists who provided agricultural resources to the Wari state (Ochatoma and Cabrera, 2001:197-98).

In the more distant Carhuarazo (Sondondo) valley, about 125 kilometers south of the Wari capital, the Wari site of Jincamocco was constructed in the late 8th century (\pm 100 years) (Schreiber, 1992:193). Based on a survey of the valley and excavations at Jincamocco, Schreiber (Schreiber, 1992:258) argues that the site was “a regional administrative center, [and] the focus of Wari control over this valley.”

2.6.2 *Wari in the Northern Andes*

While indigenous groups in the north may have maintained some level of autonomy during the Middle Horizon, there is no doubt that Wari intruded into the local scene and harnessed local labor for the construction of buildings in the Wari-masonry style. For example, the site of Honcopampa, located along the western slopes of the Cordillera Blanca (Figure 3.1), appears to have been a Wari administrative site with Wari-style patio groups

and D-shaped structures in the Purushmonte central sector of the site: the architectural signatures of the Wari Empire (Isbell, 1989). Moving farther to the north, the large site of Viracochapampa in Huamachuco was constructed in the Wari architectural tradition (Topic, 1991a), though Topic (Topic, 1991a) downplays the evidence of Wari control in these foreign building traits. In contrast, others insist that the large, uncompleted site of Viracochapampa illustrates Wari administrative presence in the region (Jennings and Craig, 2001; Schreiber, 1992). Data supporting this latter view were added as a postscript to Topic's 1991 article, in which he noted "that a small compound built with Huari-style masonry is present in the maize growing area" (Topic, 1991a:163). Furthermore, "appreciable concentrations of Huari pottery" were recovered from the site of Cerro Amaru, across the Rio Grande from Viracochapampa (Topic, 1991a:141) (see Figure 2.1 for the locations of Wari sites). While foreign pottery alone does not signify imperial control in a region, the suite of data just discussed point to Wari administrative presence in the north, or at least a very strong influence.

2.6.3 Wari in the South-East and Southern Andes

To the south-east of Wari and Conchopata, in the modern Department of Cuzco, the second largest site in the Wari Empire—Pikillacta—was constructed as an administrative site complete with elite residences and ceremonial sectors (McEwan, 1991:117). Pikillacta was occupied as early as AD 600 (McEwan, 1996:181), indicating that this followed initial Wari occupations at the sites of Wari and Conchopata. This suggests a fairly rapid expansion of Wari influence and ideology from the imperial core to distant regions towards the south.

Wari presence also stretched to the southwest of the capital, all the way to the Pacific coast. In the Nasca valley, the site of Pacheco revealed a huge offering of Wari ceramics

(nearly three tons), including oversized Wari ceramic urns that were intentionally smashed in ritual ceremonies (Menzel, 1964). The great quantity of ceramic offerings suggests that this locale may have served as a pilgrimage center or major oracle within the Wari sphere. Interestingly, Wari ceramic iconography was greatly influenced by the preceding Nasca polychrome ceramics, leading Menzel (Menzel, 1964) to suggest that the two polities were closely connected. Clearly, Nasca designs influenced Wari material culture, but the direction of influence eventually reversed, and the Wari empire conquered Nasca, introducing new ritual practices at the site of Pacheco. After the abandonment of Pacheco in the early Middle Horizon, Schreiber (Schreiber, 1999:169; Schreiber, 2001:90) argues that Wari co-opted a coca-growing area in the upper Nasca valley, where a small Wari enclosure, known as Pataraya, marked the limits of Wari control in the Nasca drainage. Silverman (2002:273-274) also has documented a possible Wari administrative center in the middle Ingenio valley (within the Nasca region), further supporting the notion that Wari conquered this region. In sum, Wari presence in the Nasca region contributed to shifts in settlement patterns and alterations in material culture and mortuary practices (Menzel, 1964; Schreiber, 1998; Schreiber, 1999; Schreiber, 2001; Silverman and Proulx, 2002); also, as will be discussed in subsequent chapters, the health status of Nasca populations changed during the time of Wari intrusion (Drusini, 2001; Kellner, 2002).¹

In line with the southward Wari expansion, the site of Cerro Baúl in the Moquegua valley marks the southernmost Wari site in the empire (Moseley et al., 1991; Williams,

¹ Wari conquest of the Nasca region is particularly relevant to this study because recent bioarchaeological research by Drusini (2001) and Kellner (2002) have documented the health status of Nasca populations before and during Wari conquest (discussed in subsequent chapters), thus providing comparative data for this dissertation. Sites in the Nasca valley and the Majes valley are located in the south-central Andes in near-coastal environments (~50-70 kilometers from the coast) (See Figure 2.1).

2001). This large, significant site represents a Wari intrusion into the Tiwanaku imperial zone, thus representing the only known area where major Wari and Tiwanaku settlements coexisted (Moseley et al., 1991; Williams, 2001). Cerro Baúl was an administrative, residential, and ceremonial site located atop a prominent mesa with commanding views of the valley (Williams, 2001). Its residential compound was occupied as early as AD 600 – 650, and in the 9th to 10th centuries Cerro Baúl underwent a reconstruction phase that coincided with a general reorganization of the Wari administrative infrastructure (Williams, 2001).² Cerro Baúl was finally abandoned around AD 1000, at the end of the Middle Horizon (Williams, 2001).

Wari presence has also been documented in this project's study area—the Colca-Majes-Camaná drainage—a valley with a Pacific outlet located about halfway between Pacheco in the Nasca valley and Cerro Baúl in the Moquegua valley (Figure 3.1). Although Wari influence is clearly documented throughout much of southern Peru, it would not have been equal in all valleys or sections of valleys. Instead, it probably resembled “a mosaic of strategies of control” (Schreiber, 1992:69); particular valleys would have been heavily administered by the Wari state, while some would have been only partially integrated, and yet others would have remained marginal. The next section will discuss the archaeological data from the Majes valley and neighboring regions that were available prior to this study.

2.7 Background on the archaeology of the Majes Valley

2.7.1 Overview of Previous Archaeological Studies

² Although no Wari cemetery has yet been identified in this area, a large Tiwanaku cemetery, Chen Chen, has been excavated, so bioarchaeological studies of human remains from that site have provided a picture of health and lifeways among the Middle Horizon Tiwanaku-affiliated populations (Blom, 1999; Blom et al., 2004); those results will be compared to the results in this study in subsequent chapters.

The expansion of the Wari Empire from its capital in the Ayacucho Basin, to Viracochapampa in the north, to Pacheco on the coast, and to the site of Cerro Baúl in the south, together illustrate the broad extent of Wari influence in the Andes. Wari influence also reached the Majes valley where two of the three sites in this study—Beringa and La Real—are located.

Although Wari influence has been documented in the middle Majes valley, details of the timing of this influence are nonexistent and archaeological context is limited. Nevertheless, preliminary studies have provided the foundation for establishing Wari's presence in the region. For example, Lumbreras (1974) identified Wari ceramics of the Viñaque style in Majes, suggesting Wari influence in MH 1b and 2 (ca. AD 700 – 900). Also, small-scale excavations by undergraduate students from the Universidad Católica de Santa María (Ratti de Luchi Lomellini and Zegarra Arenas, 1987) and by de la Vera Cruz Chávez (1989) from the Universidad de San Agustín de Arequipa documented Wari ceramics at Beringa and other Majes valley sites. A reconnaissance in the middle Majes valley in the 1980s also recovered numerous Wari ceramics, particularly from Beringa (García Márquez and Bustamante Montoro, 1990), and excavations at La Real uncovered a plethora of Wari ceramics and textiles, including finewares that could be imports from the imperial center (de la Vera Cruz Chávez and Yépez Álvarez, 1995). Finally, local museum collections present elaborate Wari ceramic finewares, including oversized face-neck jars in imperial styles, reportedly collected from the middle Majes valley. Unfortunately, no provenience is available for museum collections, and until this study, no radiocarbon dates were available to establish the timing of Wari influence in the middle part of the valley.

The coastal stretch of the Majes valley, known as Camaná, is about 70 aerial kilometers from the study area. The archaeology of this area is better known than the mid-valley. In fact, survey and excavation projects have documented Wari presence here (Malpass, 1998; Manrique and Cornejo, 1990). For example, based on Wari orthogonal architecture at the site of Sonay, Malpass (1998) has suggested that it was a Wari administrative compound. Two radiocarbon assays indicate that it was built around AD 900 and abandoned about a century later. Thus, Wari administrative presence in the coastal area of Majes appears late in the Middle Horizon and terminates quickly.

Other Wari occupations are documented at nearby sites such as Quilca Pampa in the middle Sigwas Valley (one valley south of Majes) (De la Vera Cruz Chavez, 1996) and at Pampa la Estrella in the Uchumayo valley just outside of Arequipa (Cardona, 2002) (Figure 2.1). At this site, Cardona notes the presence of Q'osqopa sherds (a local, albeit poorly defined, Wari-influenced ceramic style) and documents a series of agglutinated structures that resemble the Wari orthogonal style (Cardona, 2002:72).

Wari centers have also been tentatively identified at higher altitude areas of the valley, but ambiguity persists regarding these claims. For example, Achachiwa in the Colca valley, directly upriver from the study location (De la Vera Cruz Chavez, 1996; Sciscento, 1989),³ and Numero 8 in the Chuquibamba Valley, a highland tributary of the Majes (Sciscento, 1989), have been identified as possible Wari centers. Pablo de la Vera Cruz (1989) originally described Achachiwa as a local site, while Sciscento (1989:268) suggested that Achachiwa may have been the center for a “Wari administrative unit that included the entire Majes River drainage.” Eventually, de la Vera Cruz (1996) agreed with Sciscento’s

³ The site of Achachiwa is also known as Trinchera (Doutriaux, 2003:55).

interpretation. However, Schreiber (Schreiber, 1992:104) doubts that Achachiwa was a Wari provincial site, and Wernke (2003), who recently conducted an archaeological survey in the middle Colca valley considers Achachiwa a local fortified settlement, not a Wari center. Finally, Doutriaux (2003) surveyed the site earlier this year and collected Middle Horizon ceramics that seem to be of a Wari-influenced style, but she observes no architectural details reminiscent of Wari.

Overall, there appear to be no Wari administrative sites in the central Colca valley (the highland portion of the Majes drainage), and the local Middle Horizon ceramics are only broadly derivative of regional Wari styles (Wernke, 2003). Interestingly, this region may be the limit of Wari influence in the southern highlands because it appears to constitute an overlapping boundary between Wari and Tiwanaku (Wernke, 2003). While Wari-influenced ceramics are present in the central Colca, no Tiwanaku ceramics or sites have been documented (Wernke, 2003), yet the bulk of obsidian at the Tiwanaku capital was derived from the Chivay source in the central Colca (Burger et al., 1998; Burger et al., 2000), suggesting trade links between the Colca valley and the Tiwanaku sphere. In other words, mild Wari influence is present in the local ceramic tradition, but connections with Tiwanaku are apparent based on evidence for intensive economic trade (i.e., obsidian).

Finally, in the high-altitude Cotahuasi valley, located one valley north of Majes, Jennings (2002:191) suggests that two sites (Collota and Netahaha) display evidence for Wari influence in their architectural designs, but concludes they were administered by local elites, not Wari agents. Among the 1165 diagnostic sherds analyzed from the entire Cotahuasi survey area, only six percent (70/1165) are Wari-influenced sherds (these are

called *Canllapampa* by Jennings) (Jennings, 2002:263-264).⁴ Thus, it appears that Wari influence was mild in this high altitude region relative to the middle valley of Majes, but Wari influence is apparent nonetheless.

2.7.2 *Interpretation of the Data from Previous Archaeological Studies*

The archaeological data suggest direct Wari administrative control in coastal Majes (Camaná), limited indirect influence in the highlands, and indirect, but strong influence in the middle Majes valley. On the coast, the Wari administrative compound of Sonay demonstrates Wari administrative control, albeit of short duration since the compound was not built until the last century of the Wari reign (Malpass, 1998). In contrast, the absence of Wari centers and the dearth of Wari ceramics from high altitude sites in the south-central Andes (e.g., the Colca, Chuquibamba, and Cotahuasi valleys) indicate limited Wari influence. It appears that these highland communities were marginal to the southern Wari sphere relative to those in the coastal and middle portions of the Majes valley.

In the middle Majes valley, it appears that local groups were not under direct Wari administrative control, as no Wari administrative center has ever been documented here. Nonetheless, Wari influence was strong. The quantity of Wari ceramics and textiles exceed a few eccentric pieces, so Wari influence surpassed isolated incidences of trade. Indeed, the vast assemblages of Wari artifacts and high status goods at several Majes sites suggest that Wari wielded influence through local elites in the Majes valley. High status goods, such as Wari ceramic finewares, Wari feathered textiles, tie-dyed textiles, and gold embossed plaques from La Real, Beringa, and other Majes sites indicate that the relationship between

⁴ The percentage of Wari-influenced ceramics was calculated by this author by taking the number of reported *Canllapampa* ceramics and dividing it by the total number of diagnostic ceramics reported by Jennings (2002). If other diagnostic ceramics were recovered, but not reported, then the frequency would change accordingly.

Wari rulers and local elites may have been based on an established exchange system of prestige goods. Thus, this newly constructed politico-economic arrangement between the Majes and Wari groups may have altered local political and social arrangements and affected the health status of members within each community.

2.8 The Environmental and Archaeological Context of the Three Study Sites

2.8.1 *Conchopata*

Conchopata is located in the southern end of the Ayacucho valley, in the central, highland Andes (see Figures 2.1 and 2.2). The site is approximately 2700 m.a.s.l. and is situated atop a large north-south running mesa sided by the Quebrada de Huatatas on the east and the Quebrada de La Totorila on the west. Surrounding valleys and slopes are intensively cultivated, though the mesa upon which Conchopata is located is not. Flora around the site consists of maguey trees (a kind of agave) and cactus species. Rainfall in the region averages 500 to 1000 mm a year, and average temperatures hover between 54 to 65 degrees Fahrenheit (Pozzi-Escot B, 1991), though temperatures rise somewhat during the winter (dry season) from June to August.

The site of Conchopata is located just 12 kilometers from the Wari capital and covers at least 20 hectares (Isbell and Cook, 2002). Occupation began late in the Early Intermediate Period during the Huarpa phase, around AD 425, and new evidence suggests that occupation continued until approximately AD 1000, at the end of the Middle Horizon (Isbell and Cook, 2002; Kettelman, 2002).

Recent excavations by the Conchopata Project, directed by William Isbell and Anita Cook, have provided much information about this important Wari site. Conchopata includes

large patio groups, mortuary areas, and D-shaped and circular ritual structures (Figure 2.3), similar to those at the Wari capital (Isbell and Cook, 2002). The civic-ceremonial buildings that are so common at Conchopata appear to be part of a sacred landscape that represents Wari imperial ideology and state sanctioned belief systems repeatedly found at Wari sites (Anders, 1989; Cook, 2001; Schreiber and Gibson, 2002). The large patios likely served as public spaces for state-sponsored feasting ceremonies (Cook and Glowacki, 2003), and the ritual structures were used for ceremonies involving the ritualized destruction of beautifully decorated, oversized ceramic urns (Cook, 2001) and human trophy heads (Ochatoma and Cabrera, 2002; Tung, 2003).

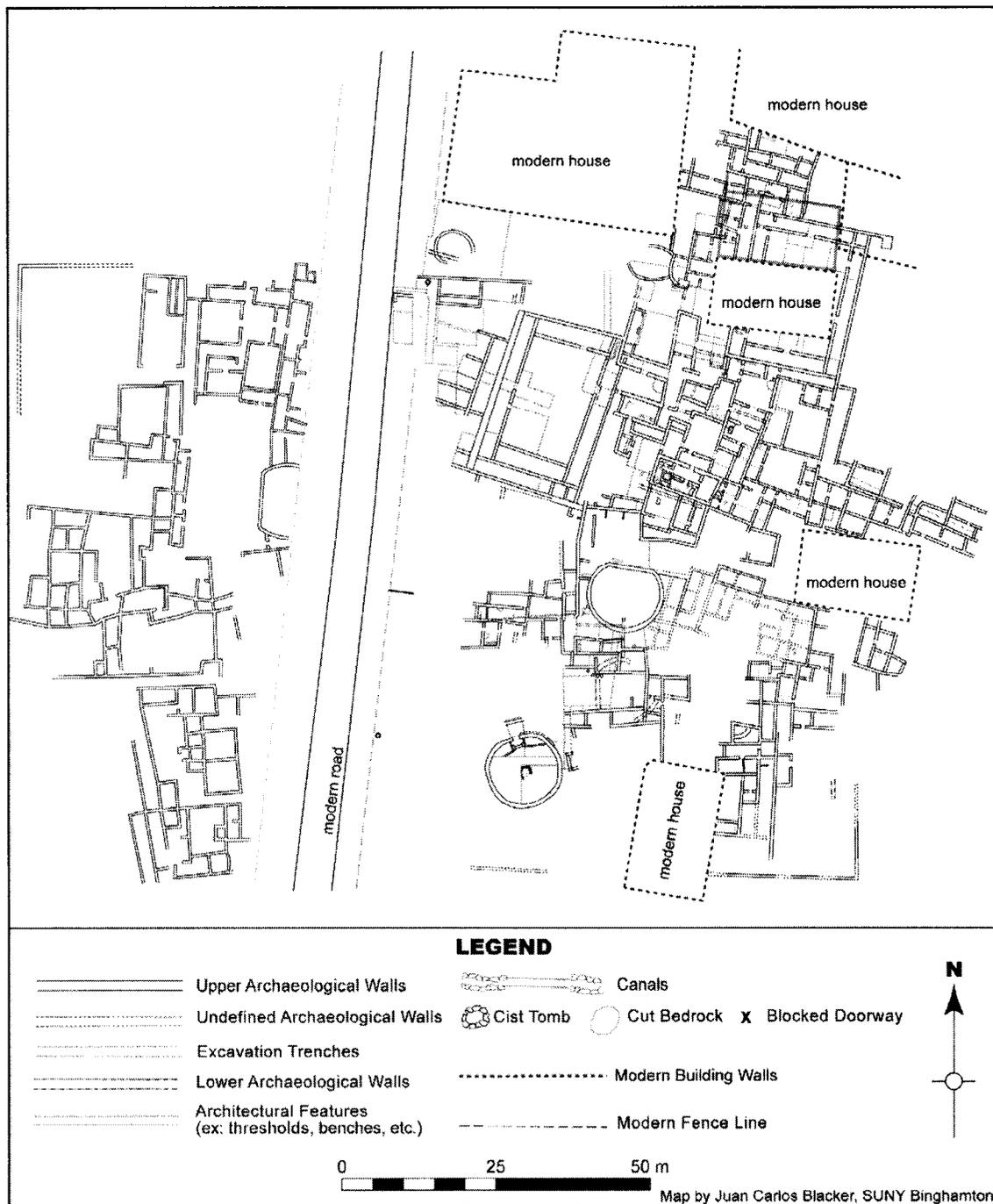


Figure 2.3. Map of Conchopata. (Map by Juan Carlos Blacker).

Excavations by Ochatoma and Cabrera have uncovered several of these oversized ritually destroyed urns and trophy heads from a D-shaped structure at Conchopata

(Architectural Space 72). Notably, iconography on one of these ceramic urns depicts a “warrior” wearing a human trophy head around his neck (Figure 2.4) (Ochatoma and Cabrera, 2002:242).⁵ In order to dangle a trophy head around one’s neck, a perforation for a carrying cord would have been necessary, much like those from Nasca (see Silverman and Proulx, 2002; Verano, 1995). A motif on another ceramic urn displays a disembodied head and hand (Figure 2.5), a design that will be revisited in the description and interpretation of the trophy heads from Conchopata (see Chapter 8).



Figure 2.4. Ceramic urn fragment from the ritual D-shaped structure (EA72), depicting a warrior wearing a trophy head. Image courtesy of José Ochatoma and Martha Cabrera.

⁵ Ochatoma and Cabrera interpret the humans depicted on the ceramic urns as males, so I refer to them similarly (2002).

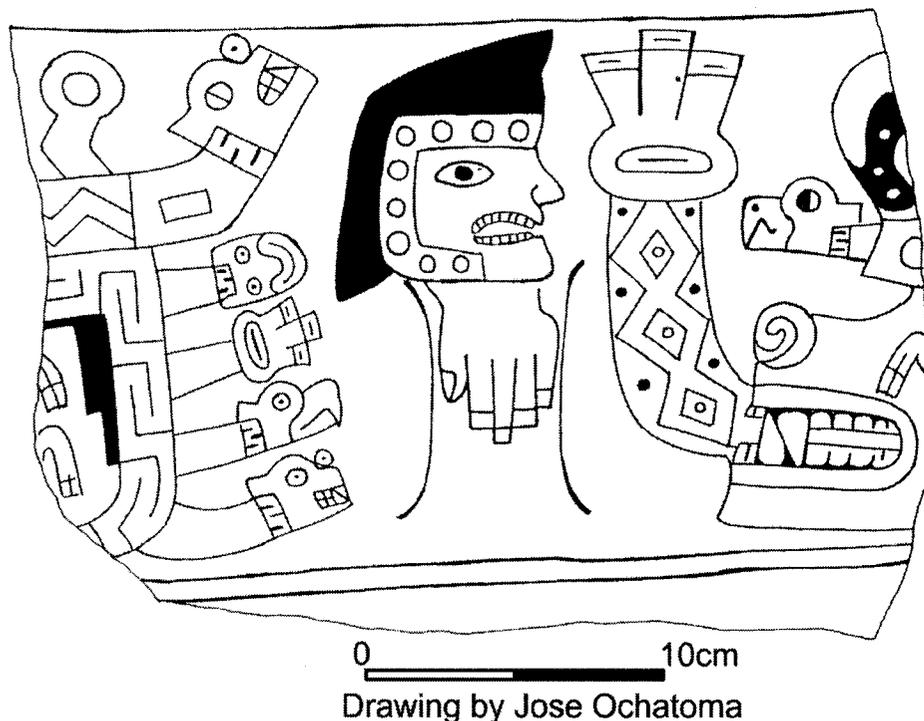


Figure 2.5. Ceramic urn fragment from the ritual D-shaped structure (EA72), depicting a disembodied head and hand. Image courtesy of José Ochatoma and Martha Cabrera.

As the previous discussion indicates, Conchopata certainly functioned as a ceremonial center, but other activities occurred at this site, leading archaeologists to propose different, but not necessarily mutually exclusive interpretations regarding the nature of settlement at Conchopata. Pozzi-Escot (1991) has suggested that it was a “community of potters,” and recent studies by Cook and Benco (2002) partially undergird the interpretation that Conchopata housed potters; however, they also suggest that pottery production may have had dual organizational schemes. That is, based on the ubiquity of pottery production tools and open firing areas throughout the site, some ceramic production may have been linked to individual households, while ceramic fineware production in firing kilns may have been administered by elites (Cook and Benco, 2002). Leoni (2001) has argued that the latter production system was more likely because the firing kilns were near structures that have

been interpreted as palaces (Isbell, 2001), so these areas may have housed attached pottery specialists producing for resident elites. Nevertheless, Cook and Benco (2002) have argued that Conchopata pottery production did not obey the rules of any single, popular production model, and new frameworks for understanding this aspect of politico-economic organization are needed (also see Janusek, 1999). Taken together, these studies indicate that the massive production of pottery and its elaborately ritual destruction were common practices at Conchopata.

Isbell (Isbell, 2001; Isbell and Cook, 2002) has suggested that Conchopata was a palace compound that housed a high-level male elite or even a “royal” male. However, this has been difficult to test because the area identified as the royal tomb (Architectural Space 110) (Isbell, 2001) was severely looted and relatively few diagnostic human bones or high status goods have been recovered from this area. Instead, Tung and Cook (2004) have suggested that the data point to the presence of large, intermediate elite households and extended families where greater prestige was afforded to senior females in mortuary contexts. They also suggest that Conchopata was occupied primarily by intermediate elites who engaged in ancestor veneration practices, ritual ceremonies, and a standardized mortuary treatment that was shared by those at the capital.

Given the complexity and multi-component occupation at the site, it is important to summarize the radiocarbon dates, particularly for those areas from which human remains are derived (Table 2.2). Kettelman (2002) recently presented an overview of radiocarbon dates from Conchopata, demonstrating that it was occupied during Huarpa (pre-Wari) times (AD 425 – 550) through the Middle Horizon (AD 550 – 1000), and possibly into the first part of the Late Intermediate Period (AD 1100). A radiocarbon date (Sample # Beta-133539) from

an intact burial interred with a Huarpa vessel in Architectural Space 100 (northwestern portion of the site) confirms use of the site at AD 425 – 601 (calibrated 2 sigma) (Kettelman, 2002). Thus, this substantiates that burials from this area or those with Huarpa vessels should be assigned to the Huarpa (pre-Wari) temporal component.

Human remains from the D-shaped ritual structure (Architectural Space 72) post-date Huarpa occupations. Kettelman (2002) suggests that the D-shaped building was used at the same time or subsequent to the use of Architectural Space 33, which yields the following radiometric dates: AD 691 – 983 (2 sigma) (Sample # Beta-133541) and AD 685 – 975 (2 sigma) (Sample Number Beta-133542). Essentially, the D-shaped ritual building was used in the first half of the Middle Horizon Period. There are no radiocarbon dates for the circular ritual structure that yielded human trophy heads (discussed in Chapter 8), but its form appears to prefigure the D-shaped structure, suggesting that it was constructed and used earlier. The mortuary sectors at Conchopata post-date AD 800 (Kettelman, 2002);⁶ thus, the majority of human remains date to the second half of the Middle Horizon. However, two samples that this author had processed for radiometric dating exhibit earlier dates for the tomb in Architectural Space 105, which is squarely located within the main mortuary area. The tomb within Architectural Space 105 was intact and its contents were relatively well preserved. A wood board that had been a burial litter for a young male at the bottom of the rock-cut tomb yielded a date of AD 688 – 879 (calibrated 2 sigma) (Sample Number AA45796). A human rib fragment from the adult female buried at the opening of the tomb yielded a radiocarbon date of AD 345 – 616 (calibrated 2 sigma) (Sample Number AA45795). However, this latter date appears to be unreliable, because according to the law

⁶ Kettelman refers to these mortuary areas as Architectural Group 3 and Group 4 (2002).

of superposition, it is unlikely that the top of the tomb would provide a date 250 years earlier than the base of the tomb.⁷ This aberrant date probably resulted because a human bone was used for dating rather than some other organic component.⁸

Table 2.2. Radiocarbon dates for areas at Conchopata that yielded human skeletal remains.

Skeletal Samples	Regional Chronology	Local Phase	Dates*
Huarpa Burials	Second half of the Early Intermediate Period	Huarpa	AD 425 - 600
Trophy Heads from EA143	First half of the Middle Horizon Period	Wari	Predates AD 685 - 900
Trophy Heads from EA72	First half of the Middle Horizon Period	Wari	AD 685 - 900
Wari Burials	Middle Horizon Period	Wari	AD 690 - 1000

*The years presented in this table are based on the calibrated radiometric dates (2 sigma), but they are rounded off for clarity. Refer to above text and Ketteman (2002) for a detailed discussion of Conchopata radiocarbon dates.

2.8.2 *Beringa*

Beringa is located in the middle Majes valley (part of the Colca-Majes-Camaná drainage) in the District of Aplao, Province of Castilla, within the Department of Arequipa in southern Peru (Figure 2.6). The middle portion of the valley is situated at 700 m.a.s.l. and receives a negligible amount of rainfall each year. Therefore, all agricultural fields must be irrigated by the Majes River that derives its plentiful water supply from rainfall and snow-

⁷ It is also possible that the top burial actually dates to the Huarpa temporal component and was saved as an ancestral mummy until interment several centuries later. However, this is unlikely: see footnote below.

⁸ Research with burial samples from the Moquegua valley by Owen (2002) has shown that human bone consistently provides dates that are from zero to nearly 350 years older (mean is slightly over 100 years; standard deviation is approximately 110 years) than other non-human organic materials, principally camelid-wool textiles from the same context; this may be related to the (marine) diet of the individual sampled.

melt from the Andean peaks to the east. This middle valley area is known as the *yungas* zone, a sub-tropical region.

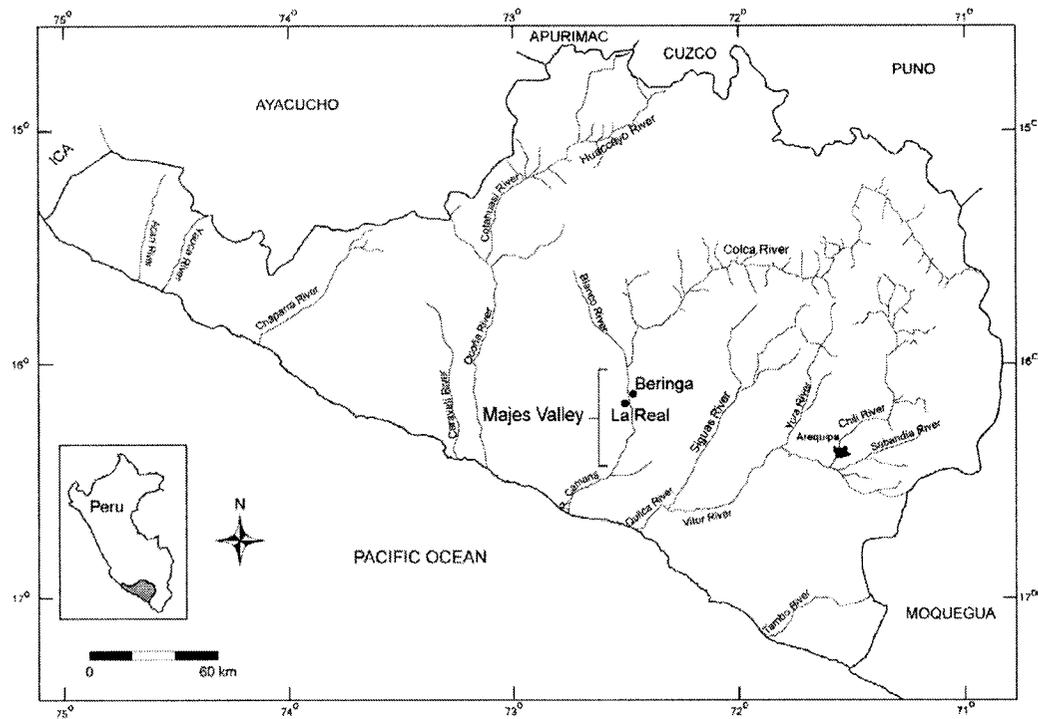


Figure 2.6. Map of the Department of Arequipa.

The site of Beringa is located 70 aerial kilometers from the Pacific coast and is located atop a long alluvial terrace approximately 50 meters above the Majes River, along the left river margin (Figures 2.7 and 2.8). The valley is sided by steep cliffs that rise approximately 800 to 1000 meters above the valley floor, and *quebradas* (ravines) are common around the site, creating treacherous terrain as one descends from the settlement to the river and agricultural fields below (Figure 2.9). The arid Majes-Ocoña and Majes-Siguas pampas are located to the west and east of the Majes valley, respectively, essentially sandwiching in the Majes valley with desert pampas.

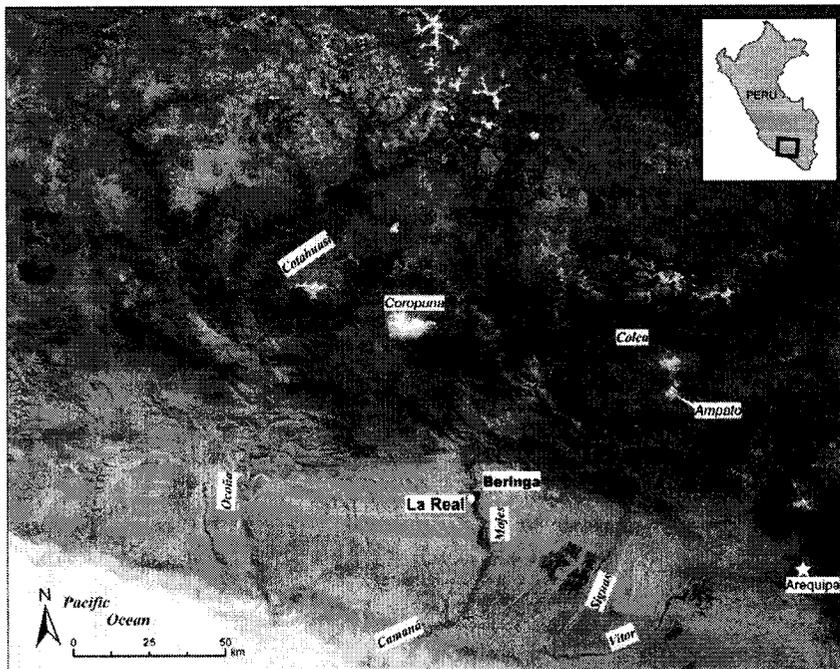


Figure 2.7. Satellite image of the Majes valley. Note the agricultural patch on the arid Majes-Siguas pampa to the east of Majes valley; this is possible due to modern irrigation systems, but would have been impossible in the past.

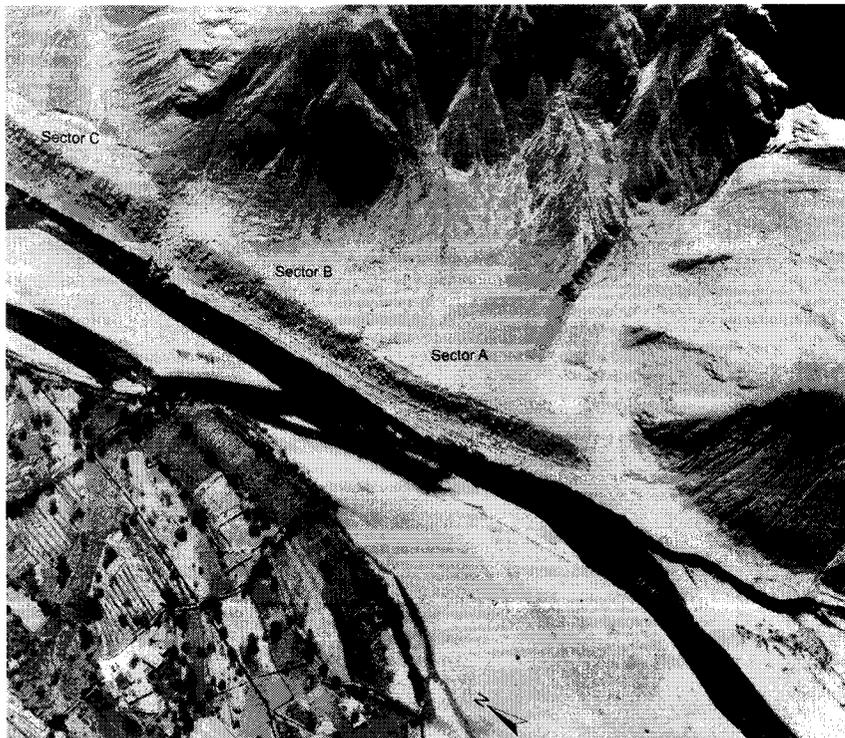


Figure 2.8. Aerial photograph of Beringa. Note the three sectors of the site. (Photograph by Servicio Aerofotográfico Nacional, taken on July 7, 1950)

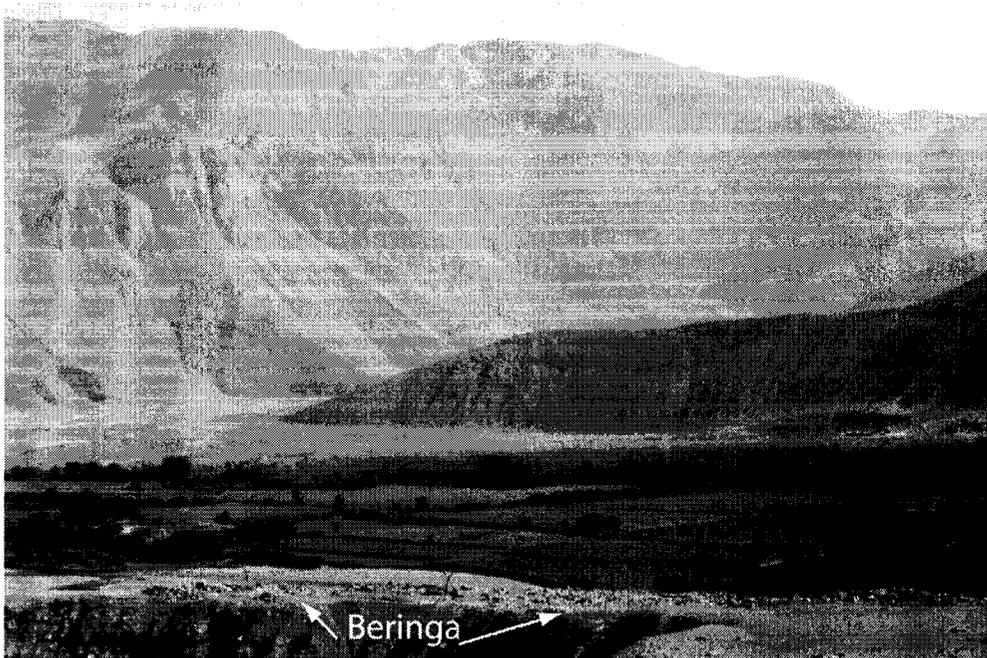


Figure 2.9. Site of Beringa in the foreground with agricultural fields and the Majes valley in the background.

Based on an earlier survey by Peruvian archaeologists, Beringa was identified as a domestic and mortuary site, occupied sometime during the Middle Horizon (AD 550 – 1000) and Late Intermediate Period (AD 1000 – 1450) (Garcia Márquez and Bustamante Montoro, 1990; Ratti de Luchi Lomellini and Zegarra Arenas, 1987). Garcia and Bustamante (1990) briefly describe terraces and small rectangular buildings that yielded Chuquibamaba ceramics (a local Late Intermediate Period ceramic style) that were associated with architecture located on the western edge, along a lower level mesa below the main plateau that is visible in Figure 2.9, above.⁹ The authors also describe the quadrangular domestic structures, collective tombs, and predominance of Q'osqopa ceramics (a Wari-influenced, but poorly defined

⁹ Garcia and Bustamante refer to this area as Sector A. This area was not given a designation in my study, nor was any part of this area mapped or collected because some of it had since been washed into the Majes River.

ceramic style) located on top of the main plateau, shown in Figure 2.9, above.¹⁰ The description of tombs and Q'osqopa ceramics (indicating a Middle Horizon, Wari influenced occupation with mortuary contexts) was a motivation for excavating and analyzing Beringa skeletal remains to elucidate the health status and lifeways of a community in the hinterland of the Wari empire.

As part of this dissertation research project, excavations at Beringa were directed by this author from May to July, 2001; a summary of those excavation results are presented below (also see Tung and Cook, n.d.). Beringa includes three main areas denoted as Sectors A, B, and C (see Figures 2.8 and 2.10). Sector A includes dozens of domestic spaces, a few ritual spaces, tombs, and an open plaza; this area is 3.21 hectares (Figure 2.11). Sectors B and C are domestic areas, and they are 1.46 ha and .33 ha, respectively. All human burials were derived from Sector A, an area that had been badly looted. As a result of the looting, hundreds of human skeletal remains were scattered on the surface (Figure 2.12), so those areas were superficially collected in order to obtain human remains and associated artifacts before they further decomposed.

¹⁰ Garcia and Bustamante refer to this area as Sector B, but my study refers to it as Sector A.

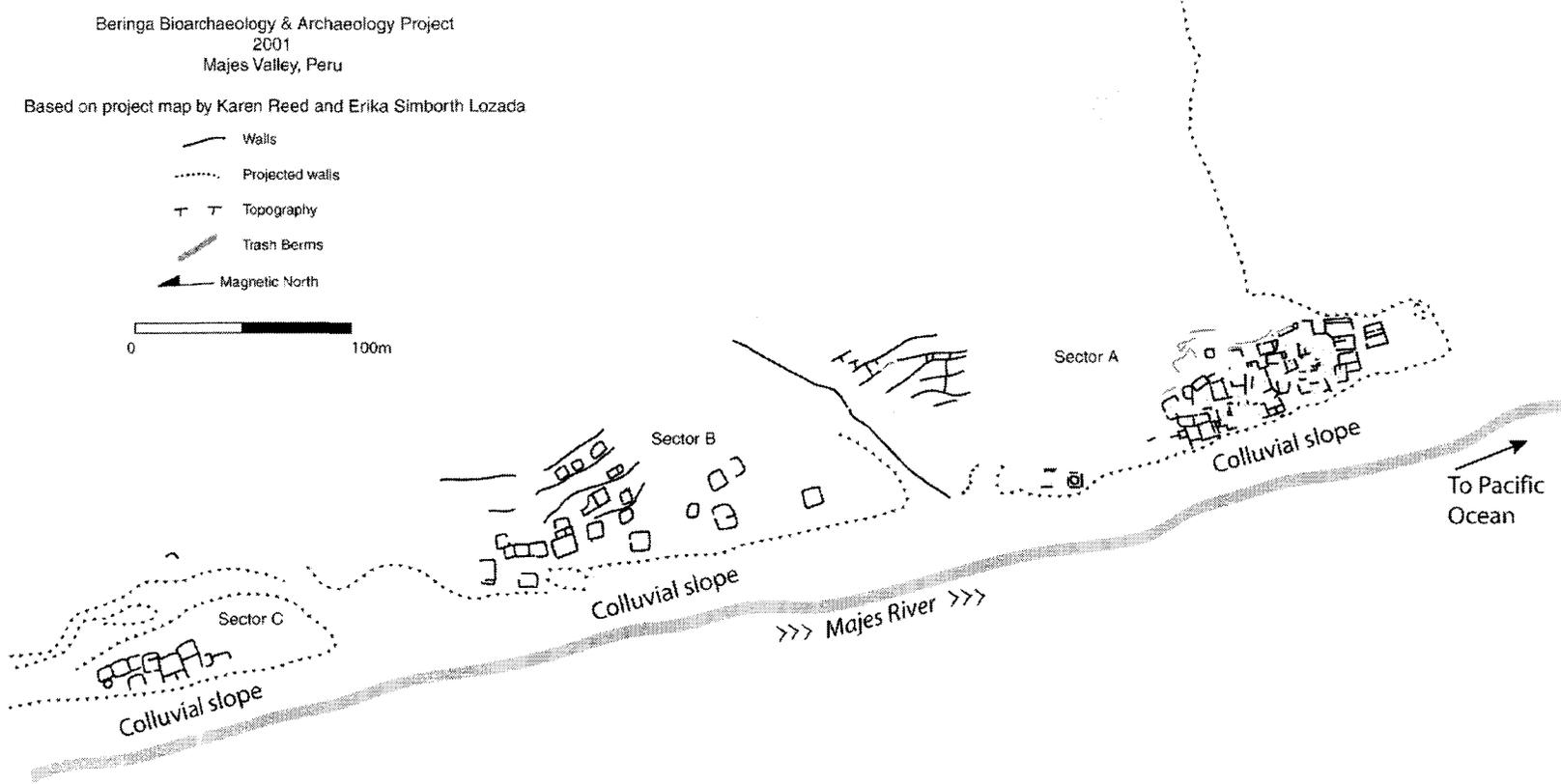


Figure 2.10. Map of Beringa showing Sectors A, B, and C. Excavations were conducted in Sector A.

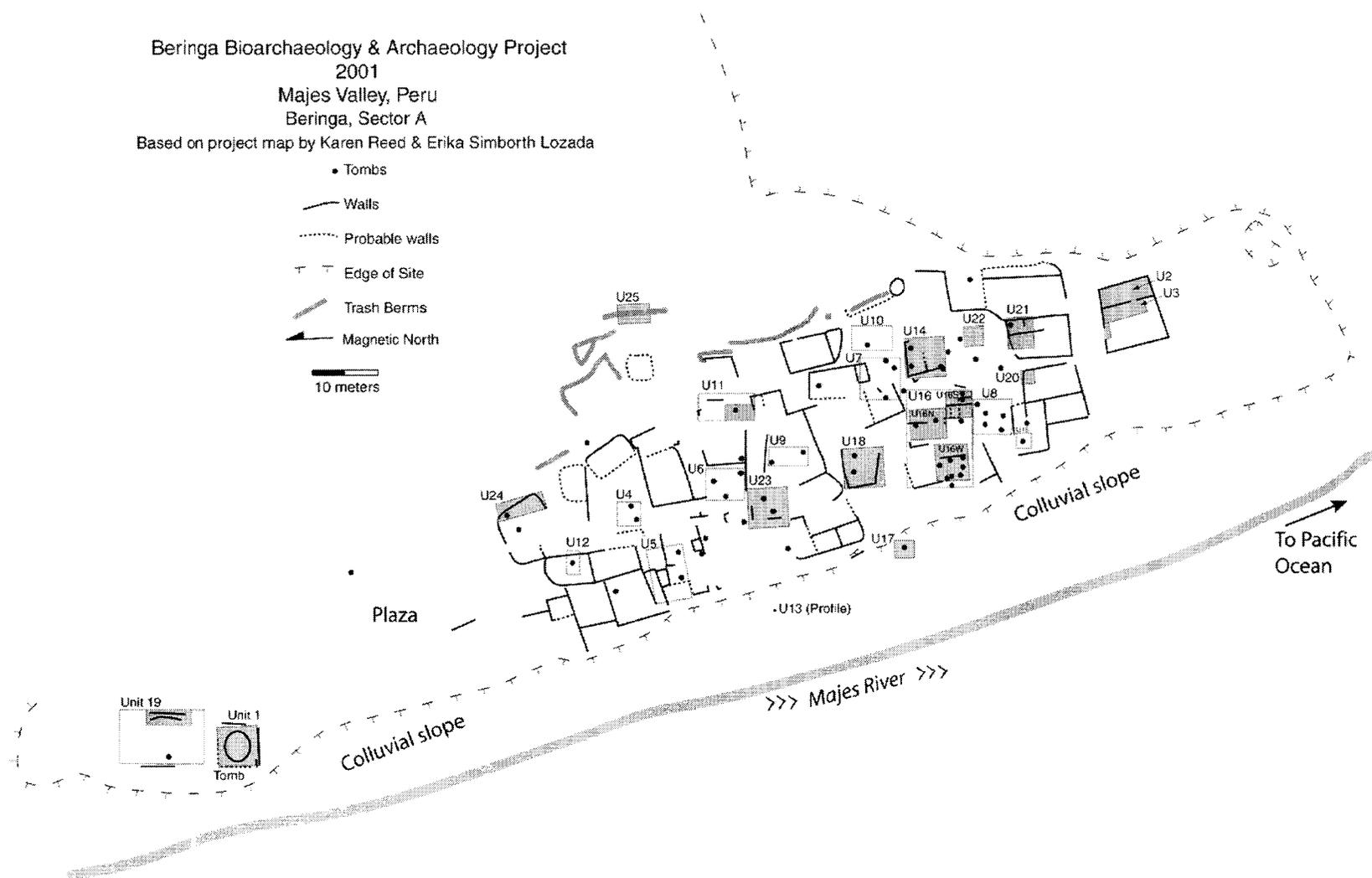


Figure 2.11. Map of Sector A . Boxed areas with a unit number (e.g., U1, U2) were surface collected, and highlighted areas were



Figure 2.12. Looting at the site of Beringa resulted in hundreds of human skeletal remains scattered across the surface of the site, a sight that is not uncommon at many Andean archaeological sites. This photo shows commingled human bones on the surface of Tomb 1; deeper levels contained in situ mummy bundles.

Archaeological materials recovered from Beringa clearly demonstrate Wari influence at this village site (Tung, n.d.). Wari tie-dye textiles and Wari ceramics were recovered from several units, indicating that several subgroups in the community had access to exotic Wari goods (Figures 2.13 and 2.14).

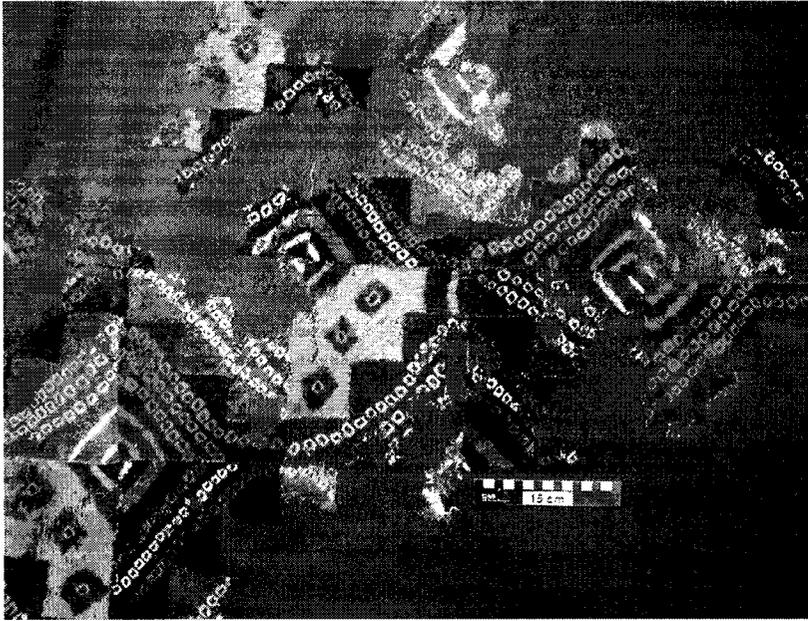


Figure 2.13. Wari textile in the tie-dye design. (Textile conserved by Samantha Lawrence.)

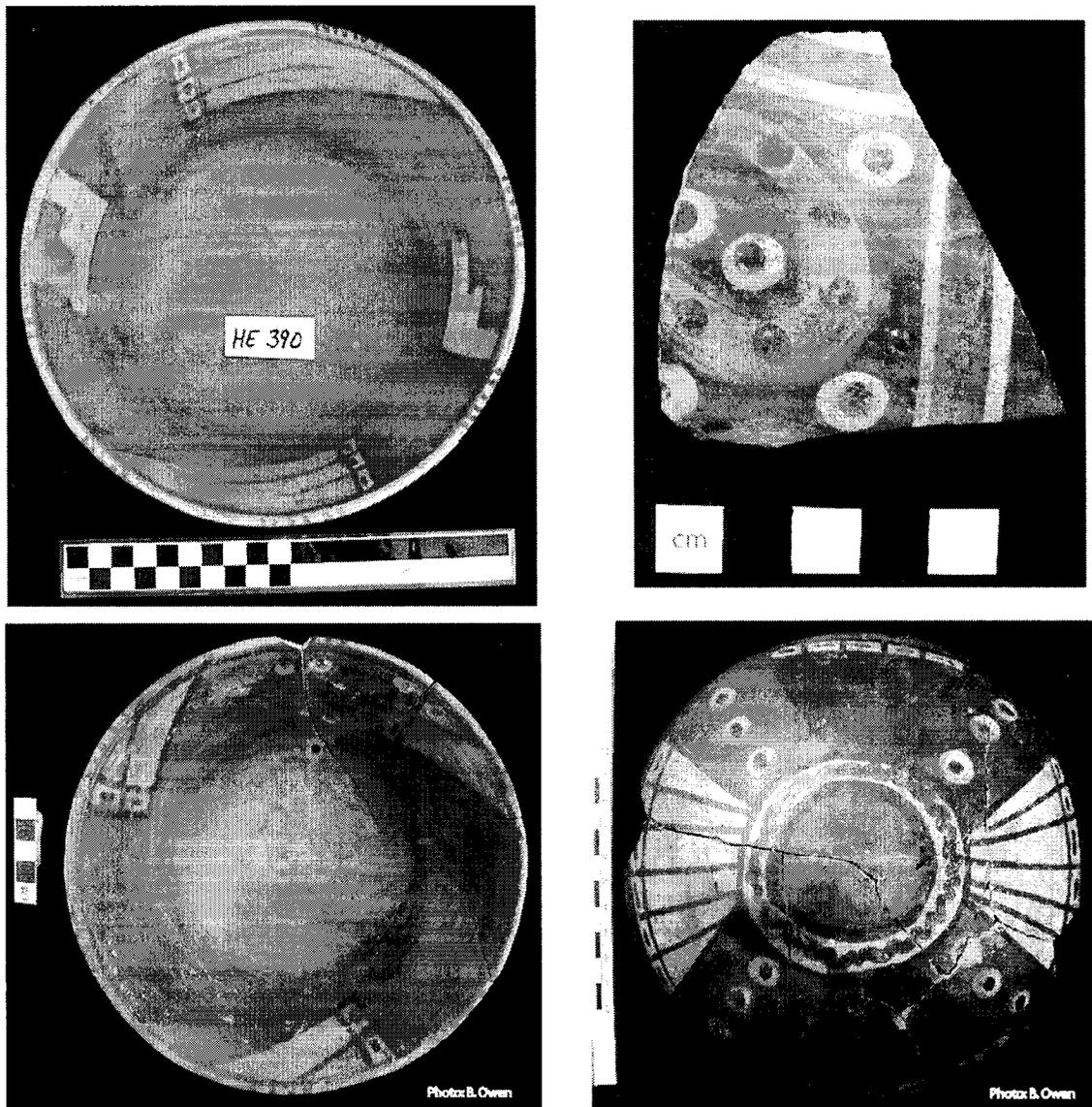


Figure 2.14. An example of Wari ceramics recovered from Beringa. (The ceramics in the two bottom photos were reconstructed and photographed by Bruce Owen.)

In addition to Wari artifacts and local goods, a few items stand out as potential weapons, suggesting that violent conflict may have been a common occurrence for the Beringa community. The weapons shown below could have easily caused skeletal trauma. For example, a machete-like wood club was recovered from a disturbed context and was likely used as a weapon (Figure 2.15), and a wood mace with a doughnut stone, along with

other wood sticks/clubs could have been used to inflict bodily injury (Figure 2.16). The latter items were found in situ with a young male (age 16-19 years-old), along with two *hondas* (slings) used for hurling stones. (See Figure 2.17, which is the same kind of sling, but from another context).

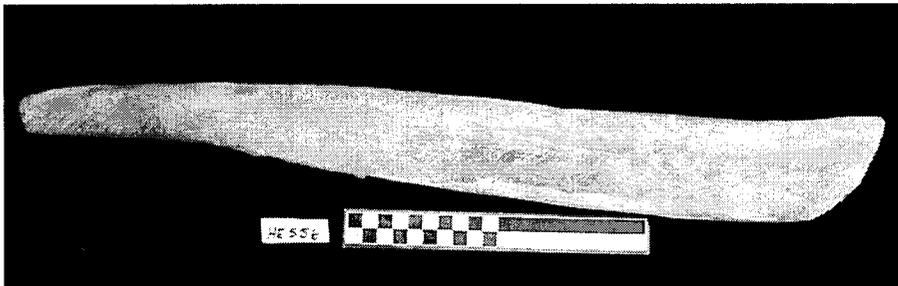


Figure 2.15. Machete-like wood club recovered from a disturbed context.



Figure 2.16. Wood sticks/clubs and a wood mace with doughnut stone still attached. These artifacts were recovered in situ, propped upright along the right side of a young male (16-19 years-old).



Figure 2.17. Sling used for throwing stones. Refer to Figure 3.1 to see men using this type of sling to hurl stones in modern *tinkus* (ritual battles).

Beringa was occupied by a community of textile weavers, fishers, and agriculturalists (Tung, n.d.). Textile production implements were ubiquitous at the site, and fishing implements and fish bones were present in several contexts. Plant remains were plentiful in nearly all units, yielding a total of 89 kilograms. Of that total, 58 kilograms were categorized as potential food resources, including maize (*Zea mays*), molle (a type of berry often used for *chicha*) (*Schinus molle*), peanuts (*Arachis hypogea*), pacay (*Inga feuillei*), yucca (*Manihot esculenta*), lucuma (*Pouteria lucuma*), camote (*Ipomoea batatas*), coca (*Erythroxylum coca*), and several species of squash (*Cucurbita sp.*) and beans (*Phaseolus sp.*). A basic inventory of these plant remains indicates that, based on weight, maize constitutes 25 percent of the sample, molle makes up another 25 percent, squashes represent 21 percent, peanuts and pacay total 10 percent, and all other botanical remains make up the remaining nine percent (Tung, n.d.). If this is representative of the menu at Beringa, then maize and molle were

certainly staples in the Beringa diet, both of which could have been consumed in the form of *chicha* (maize beer or berry beer).

Zooarchaeological analyses of the faunal remains from Beringa indicate that half of the Beringa menu derived from the Majes River and the Pacific Ocean: 10% river shrimp (*Cryphiops caementarius*), 8% marine/river fish (Class *Osteichthyes*), and 32% marine shell (Class *Bivalvia* and Class *Gastropoda*) from the Peruvian Pacific coast (Gladwell, 2002). The other half came from terrestrial animals, such as llama and guinea pig (Gladwell, 2002). Based on the faunal and botanical remains, it appears that the Beringa inhabitants enjoyed a diverse diet, even if much of their diet included the iron-inhibiting food source, maize.

There are five tomb types at Beringa, including one oversized, circular stone-lined tomb that measures 4.5 meters in diameter (Figure 2.12, above) and four smaller types. The latter group varies based on diameter, the presence or absence of stone-linings, and the number of interments (for a detailed description of tomb types see Tung, n.d.). Although there were differences in tomb construction, all individuals were buried in a seated position with knees to the chest, and all were wrapped in a layer or layers of textiles (Figures 2.18 and 2.19). Some mummy bundles were stuffed with raw cotton, including the seeds.

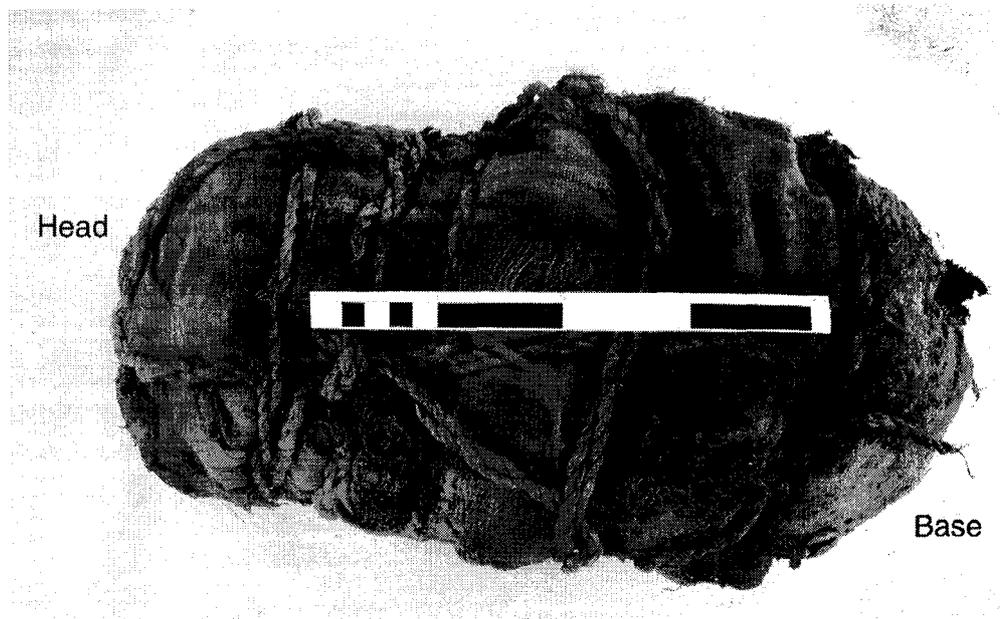


Figure 2.18. Infant mummy bundle (Burial 75) from Beringa.



Figure 2.19. Radiograph of child mummy bundle (Burial 64) excavated from a burial pit at Beringa. All mummy bundles, both juveniles and adults, were interred flexed and seated.

Radiocarbon dates collected from in situ contexts confirm that Beringa was occupied in the Middle Horizon and the Late Intermediate Period. Based on six AMS radiocarbon measurements, Beringa was occupied from approximately AD 600 – 850 (the first half of the Middle Horizon) and again from about AD 1040 – 1250 (the early Late Intermediate Period) (Table 2.3). Beringa could have been occupied in the latter part of the Middle Horizon as

well, but currently, no radiocarbon dates indicate this. The dates are summarized in Table 2.2, and each sample is described in Appendix I.¹¹

Table 2.3. Radiocarbon measurements from Sector A, Beringa.

Site Sample	Lab Code	Unit & Locus	Material	¹⁴ C Age (Years BP)	1 sigma range (AD)	2 sigma range (AD)
015	AA45791	U14L1050	wood	1406 +- 53	600 - 674	540 - 762
013	AA45790	U14L1095	wood	1353 +- 32	651 - 688	622 - 767
007	AA45789	U21L1075	carbon	1330 +- 31	659 - 711	651 - 771
021	AA45793	U01L1001	textile	1243 +- 33	692 - 858	689 - 879
023	AA45794	U11L1011	textile	930 +- 32	1037 - 1158	1024 - 1187
020	AA45792	U16L1025	vegetal cord	840 +- 42	1163 - 1256	1044 - 1278

This dissertation is focused on assessing the health status and lifeways of Middle Horizon populations; therefore, only skeletal remains that could be dated to that time period are discussed. Human remains were assigned to the Middle Horizon based on radiocarbon dates and diagnostic remains. The units and loci that correspond to the Middle Horizon are listed in Table 2.4. (See Figure 2.11 for the location of the units.)

¹¹ All dates were calculated using the radiocarbon calibration program Calib version 4.3 (Stuiver and Reimer, 1993), and calibrated dates reported here are based on the probability distribution method.

Table 2.4. Units and Loci (or Burials) that correspond to the Middle Horizon Period.

Unit	Locus
1	All
4	All
5	All
8	L. 1034 only
11	Burial 92 only
12	All
14	All
17	All
18	All
21	All
22	All
23	L. 1033, 1039 only
24	All
16W (deep loci)	L. 1085, 1086, 1103, 1147, 1152 only
19	L. 1030 only
16N (deep loci)	L. 1134, 1145, 1122, 1140, 1141, 1144 only

2.8.3 *La Real*

La Real is a mortuary site located about eight kilometers downstream from the site of Beringa, on the right (west) side of the river margin. The site is located within the modern town of La Real and was discovered when workers for the local municipality began to clear the area to construct a soccer field. As a result, archaeologists Pablo de la Vera, Marco López, and Willy Yopez, among others, performed a salvage excavation from January to March, 1995 under the auspices of the National Institute of Culture and the local municipality. The site is now covered by concrete.

La Real has been interpreted as a ceremonial and mortuary site (de la Vera Cruz Chávez and Yépez Alvarez, 1995; Garcia Márquez and Bustamante Montoro, 1990). It included two main sectors, a rectangular semi-subterranean structure and a cave, both of which included thousands of skeletal elements and high-status goods. There were no associated domestic structures, and there appeared to be no domestic sites in the immediate

vicinity (i.e., no clearly associated settlements). Instead, the individuals interred here may derive from several Middle Horizon sites in the middle Majes valley. As a result, it is not expected that the La Real skeletal population will reflect a “normal” settlement population. That is, La Real is expected to show unequal numbers of male and females and an under-representation of juveniles. Essentially, the demographic composition at La Real should reflect an exclusive group of individuals who were selected for burial at this high-status site.

The semi-subterranean structure at La Real was constructed of a double coursing of stone, measuring 10m x 9m, including an internal dividing wall with a doorway.

Excavations within this structure recovered thousands of disturbed human and animal remains, many of which were burned. The burning was done at low temperature, as evidenced by the black color and absence of vitrification. Artifacts and ecofacts included textiles, ceramics, and wood and metal objects. A few textiles were decorated with colorful feathers, and some metal objects were embossed. Other artifacts included a figurine depicting a human holding a disembodied head (presumably a trophy head, like those that have been recovered from the site) (de la Vera Cruz Chávez and Yépez Alvarez, 1995). A wooden snuff tablet also was recovered from La Real, but its provenience is unknown (Garcia Márquez and Bustamante Montoro, 1990). These artifacts appear to be items associated with ceremonial activities and probably belonged to high-status individuals.

The cave was a few meters from the semi-subterranean structure, and although its opening was small, the internal portion was approximately two meters high in some areas. The cave yielded similar items as the structure, but more human remains, many of which were burned. Several individuals were placed in *fardos* (reed bags used for wrapping

mummy bundles), but due to looting, the preponderance of human skeletal remains and mummies were commingled.

Chapter 3 The Bioarchaeology of Imperialism: Theoretical Background

3.1 Introduction

Imperialism and conquest can profoundly change the health and lifeways of subject populations. Bioarchaeological studies have demonstrated that European conquest and occupation affected significant changes in demographic composition, nutritional status, disease frequencies, and levels of trauma (Larsen, 2001b; Larsen and Milner, 1994; Verano and Ubelaker, 1992). However, comparatively little is known regarding the way that earlier forms of indigenous prehispanic imperialism affected the physiological status of subject populations. Instead, most information regarding prehispanic imperialism derives from other classes of archaeological data, such as changes in settlement patterning or portable material culture. This dissertation contributes a complementary perspective on the impact of prehispanic conquest by examining human skeletal remains to reconstruct morbidity patterns and community lifeways.

The first section of this chapter presents a bioarchaeological perspective on imperialism and conquest, based primarily on previous bioarchaeological studies of Spanish colonialism in the Americas and its impact on native populations. This is followed by a listing of some of the specific effects of imperialism on the health and lifeways of subject populations: effects which will be explicitly examined in this dissertation.¹² The second

¹² The bioarchaeological methods for identifying specific effects are detailed in Chapter 4.

section includes an expanded discussion of these effects and the specific hypotheses to be tested.

3.2 A Bioarchaeological Perspective on Imperialism and Conquest

Colonialism can be broadly conceived to include archaic forms of imperialism, and can thus inform studies of the latter. Thus, much of the framework for this research agenda stems from previous bioarchaeological studies on the impact of Spanish colonialism in the Americas (Larsen, 1994; Larsen, 2001b; Ubelaker and Newson, 2002; Walker and Johnson, 1992). While prehispanic forms of imperialism may not mirror precisely those of Spanish colonialism, similar effects are expected because imperial powers generally have the authority to effect change on their subject peoples through new policies and demands, some of which may differ from population to population. Thus, empires—both historic and prehistoric—have the potential to impact the livelihood and social organization of communities within their domain.

Bioarchaeological studies on the effects of European colonialism on native populations in the Americas have shown that the colonial encounter affected the lives and livelihood of native populations in significant ways. As demonstrated in previous studies, conquest periods are often associated with changes in population composition, shifts in diet and nutritional status, disease frequencies, and levels of trauma (discussed below) (Larsen, 2001b; Larsen and Harn, 1994; Larsen and Milner, 1994; Verano and Ubelaker, 1992). Such changes have been examined in a variety of regions in the Americas, particularly in places such as the American southeast (see contributors in the volumes by Larsen, 2001b; Larsen and Milner, 1994), the American southwest (Stodder and Martin, 1992), south-central coastal California (Walker and Johnson, 1992), central America (Jacobi, 1997), and Ecuador

(Ubelaker et al., 1999). Taken together, these earlier investigations provide insight into the ways in which imperialism can effect change in conquered populations.

Some of the ways that imperial expansion can impact the health and lifestyle of subject communities are listed below. Each of these themes, and the previous studies that inform them, is developed and discussed in more detail in the subsequent section.

1) Imperial policies can relocate populations or segments of populations, thereby creating distinct population profiles among various communities within the empire. Empires can also differentially affect morbidity and mortality among population subgroups, again contributing to dissimilar demographic compositions. Bioarchaeology can detect these differences by determining the sex and age-at-death of skeletons to reconstruct demographic profiles (Milner et al., 2000); these can then be compared to elucidate the differential impact of imperialism on population composition (Owsley, 1992; Stodder and Martin, 1992; Ubelaker et al., 1999)

2) Imperialism can affect nutritional health and disease loads of subject peoples by controlling access to the means of agricultural production or food resources, or by levying heavy tribute demands on conquered communities. The empire can also aggregate populations into crowded settings, leading to conditions that are conducive to the spread of pathogens (Cohen, 1989; Larsen, 1997; Mensforth et al., 1978; Reinhardt, 1992; Steckel et al., 2002; Ubelaker, 1992). Nutritional and health indices can be assessed by documenting skeletal lesions; thus, changes or population differences in health can be detected and compared (Huss-Ashmore et al., 1982; Larsen, 1997; Sobolik, 1994; Stuart-Macadam and Kent, 1992).

3) Imperialism and conquest can create or exacerbate violent conflict, leading to injury or death for particular segments of the population. In other cases, empires may assert authority and quell tensions and violent conflicts. Through analysis of skeletal trauma, injury morbidity and mortality related to violence and other physically risky activities can be reconstructed (Galloway et al., 1999; Lambert, 1994; Larsen, 1997; Lovell, 1997; Smith, 2003; Standen and Arriaza, 2000; Walker, 1989; Walker, 2001; Wilkinson and M, 1993; Willey and Emerson, 1993) (also see contributors in volume by Martin and Frayer, 1997); therefore, the relationship between violence and imperialism can be evaluated.

4) Imperialism may alter ritual practices that involve human mutilation and sacrifice, particularly as a means to indoctrinate and subjugate new populations (Dillehay, 1995). Therefore, analysis of ritualized skeletal parts can aid in understanding how the body was processed, utilized, and perceived in ancient rituals among distinct communities.

5) During periods of imperial expansion, individuals may migrate to the imperial center as a result of new economic opportunities, post-marital residence rules, or forced relocation. Thus, documenting population movement elucidates how people were affected by and responded to new imperial rule. Population migration can be investigated through analysis of the strontium content in a person's enamel and bone because it reflects the geologic origin of their diet, and by extension, the region where they lived (discussed below and in Chapter 4) (Grupe et al., 1997; Müller et al., 2003; Price et al., 1994; Price et al., 2002).

3.3 Reconstructing Human Health from Skeletal Remains

In this dissertation, osteological data are used to document and contrast specific aspects of health among Wari era populations, including differences in mortality profiles, frequencies in skeletal lesions indicative of childhood disease, and the variation in injury morbidity within and between populations. In addition, these data are used to document the presence of body mutilation and sacrifice in Wari rituals, as gleaned through the analysis of trophy heads. Also, the strontium content of enamel and bone is used to document population migration and the geographical origin of trophy head victims. The five subsequent sections demonstrate in detail how imperialism can affect each of those aspects of community life.

3.3.1 *Imperial Effects on Population Composition*

Imperial policies can affect the population composition of subject communities in a variety of ways. The imperial power may enforce a policy of “population relocation and aggregation” (Larsen, 2001a:23), similar to that imposed on native populations during the time of *congregación* (or *reducción*) in early colonial Spanish Florida (Larsen, 2001a; Worth, 2001) and early colonial Peru (Gade and Escobar, 1982; Málaga Medina, 1974; Wernke, 2003). Also, an empire may temporarily relocate individuals for labor projects, particularly young, unmarried males, as was done in the Spanish colonial *repartimiento* system throughout the Americas (Premo, 2000; Worth, 2001:18).¹³ Of course, prehispanic imperialism is not expected to parallel exactly that of the Spanish empire, but studies of the Inka empire from the Andes (AD 1450 – 1532) show that they too relocated whole and parts

¹³ As Premo (2000) has documented, although population relocation projects may have begun as temporary, many migrants never returned home, thus altering the original demographic composition of the origin community.

of populations to prevent or quell rebellions and force certain subgroups to participate in state labor projects or military campaigns (D'Altroy, 1992; Wachtel, 1982). Perhaps the earlier Wari empire (AD 550 – 1000) also relocated individuals and communities to meet state goals, thus affecting the population composition of its subject communities.

Imperialism also can impact population profiles by prejudicially affecting mortality rates among a particular subgroup in one community or by contributing to increased mortality among an entire population. Excessive demands on males to participate in risky activities, either for state labor projects or warfare, for example, can lead to increased male mortality and a decrease in the mean age-at-death among males. On the other hand, imperial policies can contribute to better health among community members by limiting dangerous activities or provisioning them with adequate resources or the means for resource production (Costin and Earle, 1989; D'Altroy, 1992). Additionally, sex-based differential access to resources can lead to poorer nutritional status among one sex relative to the other, and because inadequate nutrition is linked to increased morbidity and mortality (Armelagos, 1994; Huss-Ashmore et al., 1982; Larsen, 1997), differences in age-at-death profiles between males and females can develop.

These imperial effects on the demographic composition of subject communities can be evaluated via bioarchaeological analysis. By determining the sex and age-at-death of skeletons, the demographic profile of a once-living population can be reconstructed with some degree of accuracy (also see contributions in volume by Hoppa and Vaupel, 2002; Jackes, 1992; Milner, 1991; Milner et al., 2000; Ubelaker, 1983) (but see Bocquet-Appel and Masset, 1982).¹⁴ As a result, population profiles of subject communities can be compared to

¹⁴ However, to achieve a reliable demographic reconstruction of the once-living population, it must be shown that there are no extrinsic factors, such as differential preservation of skeletal material (Gordon and Buikstra,

each other or a particular population composition can be compared to expected distributions, because ancient demographic patterns should not deviate greatly from what is observed in modern human populations, particularly among contemporary non-industrialized communities (Milner et al., 2000). Additionally, demographic compositions can be reconstructed to document changes through time. For example, Ubelaker and Ripley demonstrated that among a historic ossuary population from a church in Quito, Ecuador, adult longevity increased for males and females from the prehistoric to historic period, and female age-at-death was, on average, higher than that of males (Ubelaker et al., 1999:31). Additionally, a detailed paleodemographic study of pre-Wari and Wari period skeletons from Nasca (south-central, coastal Peru) showed that mean age-at-death declined from one period to the next, leading Drusini to conclude that Wari period populations in Nasca were under more physiological stress than their predecessors (Drusini, 2001:167).¹⁵

Finally, it is crucial to define the terms “population” and “community” as used in this dissertation because these can be differentially conceived in distinct settings and among different academic disciplines. The skeletal remains derived from one archaeological site represent one “population,” although it must be remembered that the skeletal series may not accurately represent the once-living population from which it was drawn (Paine and Boldsen, 2002; Sattenspiel and Harpending, 1983). While the term “community” can be a referent for

1981; Walker et al., 1988), affecting the composition of the skeletal series upon which the demographic reconstruction is based.

¹⁵ However, Drusini (2001:170) assumes that the Wari era peoples living in Nasca were not locals, but individuals who migrated there from the Wari heartland, an assumption that he admits must be tested with additional study.

several distinct concepts (Anderson, 1991), “community” is synonymous with “population” in the context of this dissertation.¹⁶

3.3.3.1 Hypotheses about Population Composition among the Heartland and Hinterland

In this dissertation, it is hypothesized that the population profiles of the three Wari populations will differ because each community may have been organized in distinct ways. At Conchopata, the militaristic themes in iconography suggest that militarism played a role in imperial expansion (discussed below) (Lumbreras, 1974; Ochatoma and Cabrera, 2002); thus, it is expected that there will be fewer males than females because the former may have been away from the settlement engaged in raids or warfare for the state. The site of Beringa in the Majes valley is expected to show a normal population profile because it is a village settlement with numerous households; thus, there should be a symmetrical distribution of males and females and a mortality distribution with about half of the population under the age of 12 (Howell and Kintigh, 1996) (Paine and Harpending, 1996). At La Real, also in the Majes valley, it is hypothesized that there will be a non-normal demographic composition because it is a ceremonial and mortuary site with no associated settlement. Therefore it is likely that only a select group of individuals, particularly elite adults from various nearby settlements, would have been interred at this high-status, ceremonial site.

3.3.2 Imperial Effects on Childhood Nutrition and Health

Imperial policies may lead to poor nutritional and health status among subject peoples by, for example, intensifying agricultural production of a particular crop and reducing the

¹⁶ The term “community” in the Andes can also refer to individuals who belong to a community organized beyond the level of the settlement. For example, the Andean concept of *ayllu*, or kin group, denotes community membership at the supra-settlement level; thus, individuals from several sites may belong to the same *ayllu*, or kin-group community. However, based on the data available, there are no means to identify community membership at the supra-site level, so archaeological site-affiliation is used as the defining criterion for community membership.

variety of their subsistence base, as has been documented in the Spanish mission system (Worth, 2001:17). A homogenized diet, particularly one replete with carbohydrates such as maize, common in the Andes (Hastorf, 1993; Hastorf and Johannessen, 1994), may negatively affect health status by failing to provide adequate nutrition for growth and development (Armstrong, 1994; Larsen, 1997), which in particular, can lead to iron deficiency anemia (Stuart-Macadam and Kent, 1992). For example, during the Spanish mission period, the diet of native populations in Georgia and Florida shifted to include less protein from marine resources and more carbohydrates from maize, resulting in poorer nutritional status (Larsen and Harn, 1994; Larsen et al., 2001:68).

In contrast, periods of conquest may be associated with improved nutritional and health status by expanding agricultural production and resource acquisition, by creating storage facilities that ameliorate food shortages during lean months, or through state-sponsored feasting events (Costin and Earle, 1989; D'Altroy, 1992; D'Altroy and Hastorf, 2001; Earle, 1997; Neves and Costa, 1998). The Inka empire (AD 1450 – 1532) appears to have effected some of these changes when they conquered the Upper Mantaro region of the Andes because household consumption patterns indicate increased access and consumption by local peoples of preferred foods, such as maize and meat (Costin and Earle, 1989). However, this kind of dietary shift, though positive in terms of social perceptions about valued foods, could have had negative effects on the nutritional status of individuals if more maize than meat was consumed. Because maize contains phytates, a substance that inhibits iron absorption by the body, excessive maize consumption can lead to deficient levels of iron

if other iron-rich foods are not consumed (Baynes and Bothwell, 1990).¹⁷ In turn, low iron levels can lead to anemia, a symptom that leaves observable marks on juvenile crania (discussed below) (Blom et al., 2004; Garn, 1992; Larsen and Sering, 2000; Schultz et al., 2001; Stuart-Macadam, 1985; Stuart-Macadam, 1987; Ubelaker, 1992; Walker, 1985; Walker, 1986). In such cases, osteological analysis can provide a complementary view of certain aspects of the health impact experienced by populations during a period of imperialism and conquest.

Health status can be affected in other ways. Imperial policies that contribute to population aggregation and unsanitary conditions may lead to an environment conducive to the spread of pathogens and infectious disease (Cohen, 1989; Larsen, 1997; Mensforth et al., 1978; Reinhard, 1992; Steckel et al., 2002; Ubelaker, 1992). In a comprehensive study comparing the overall health status of precolumbian skeletal series representing mobile groups, dispersed communities, and urban populations, the latter showed the poorest skeletal health status, leading Steckel and colleagues (2002) to suggest that living in populated areas contributed to deleterious health effects. Similarly, in a specific example from the Ecuadorian Andes, Ubelaker argues that “poor sanitation associated with increased sedentism and population density” contributed to a high prevalence of iron deficiency anemia among ancient coastal communities, as evidenced via *cribra orbitalia* and *porotic hyperostosis* (Ubelaker, 1992:211).

Environmental context appears to have contributed to differences in disease rates in the Andes. As with the coastal versus highland differences in Ecuador noted by Ubelaker

¹⁷ Although excessive maize consumption may play some role in iron deficiency anemia, it has probably been overstated; instead, parasitism and infectious disease probably plays a greater role (Reinhard, 1992:251; Ubelaker, 1992) (see additional discussions on this topic below and in Chapter 4).

(1992), other researchers had noticed that coastal Andean populations tended to show higher rates of anemia relative to those from the highlands (Hrdlicka, 1914; Verano, 1992).

Anemia rates also were high among three coastal Late Intermediate Period (locally defined as AD 900 – 1350) populations from Moquegua valley in southern Peru, where more than half of the juveniles exhibited cribra orbitalia and porotic hyperostosis (Burgess, 1999). Burgess (1999:91) attributes these high rates of iron deficiency anemia to a mix of factors, including diet, parasites, and disease load. Clearly, environmental context and imperial policies that generate shifts in settlement patterns affect community health status, including the prevalence of childhood iron deficiency anemia, a condition that is osteologically identifiable.¹⁸

3.3.3.2 Hypotheses on Childhood Health among the Heartland and Hinterland

Despite the fact that individuals at Conchopata were living in an urban setting, it is hypothesized that those individuals will show lower frequencies of cribra orbitalia and porotic hyperostosis—lesions indicative of childhood iron deficiency anemia—relative to their counterparts in the hinterland because they probably had greater access to a variety of nutritional resources by virtue of their high status. Also, they were likely exposed to lower parasitic loads because the ceremonial and ritual nature of the site probably ensured better sanitary conditions. In contrast, the site of Beringa was surrounded by trash berms (see Figure 2.11, Map of Beringa) and its inhabitants consumed resources from the Majes River that could have been contaminated, thus leading to diarrheal infection and loss of iron (see Walker, 1985). Moreover, maize, an iron inhibitor, was common at Beringa and could have contributed to an iron-poor diet (Tung, n.d.). It is unknown what the settlements were like for the individuals buried at La Real, but it is probable that they lived at sites similar to

¹⁸ See Chapter 4 for a detailed description of how skeletal analysis can document iron deficiency anemia and background information regarding the etiology and the body's response to anemia.

Beringa and were exposed to water-borne parasites from the Majes River; therefore, Beringa and La Real are expected to be similarly affected by anemia. Additionally, the results from this study are expected to mirror earlier studies in the Andes where there are higher frequencies of anemia on the coast relative to the highlands (Hrdlicka, 1914; Ubelaker, 1992; Verano, 1992).

3.3.3 The Role of Violence in Imperialism and Conquest

Imperialism may negatively affect subject populations by creating a social environment conducive to high incidences of violence and skeletal injury, possibly generated by warfare or other forms of inter-personal or inter-group conflict. Several scholars have attributed the rise and expansion of states to warfare (Carneiro, 1970; Fried, 1961; Hassig, 1988),¹⁹ while others suggest that, although warfare was not the prime mover in state development and expansion, it still contributed in significant ways (Webster, 1975). In the northern Andes, it has been argued that warfare contributed to increasing socio-political complexity and state development (Dagget, 1987), conclusions that are primarily based on settlement pattern data, defensible site locations, and defensive architecture. Within the Inka empire, military power as a means for imperial expansion has been documented both ethnohistorically and archaeologically (Bauer, 1992; D'Altroy, 1992; Earle, 1997). However, while these important studies have demonstrated the connection between increasing social control and the threat or actual use of force, there is little or no osteological data on the frequency of trauma to evaluate these claims (but see Verano, 2003). Thus, in these and other contexts, bioarchaeological analysis can make significant contributions to understanding the role and effect of warfare in imperial expansion.

¹⁹ The warfare model of state development and expansion further posits that it develops from contestation over access to productive land and resources, particularly in environmentally circumscribed zones (Carneiro, 1970).

Similarly, the development and expansion of the Wari empire may have included aspects of militarism, combined with religio-ideological indoctrination (Isbell and McEwan, 1991a; Menzel, 1964; Menzel, 1977; Schreiber, 1992), ultimately backed by “an administratively and militarily strong Huari” (Isbell and McEwan, 1991a:7). Lumbreras (1974) also noted the role of Wari militarism as a means of expansion and suggested that the Wari conquerors exerted domination by force and squelched foreign lifeways, thereby leading to a despotic regime headed by a strong, centrally controlled Wari administration. In order to assess these claims of militarism and conflict in Wari state expansion, archaeological and biological datasets should be evaluated. For example, data on settlement patterns, defensible site locations, and defensive architecture can elucidate how and to what extent particular communities were concerned with issues of defense. However, as Larsen observes (1997: 119), these characteristics do not indicate whether conflict in fact took place. Osteological data on trauma frequencies, in contrast, directly illustrate whether a community experienced violent conflict, and data on the age and sex of those with trauma give insight on the nature and social context of the violence.

In many contexts, warfare and conflict are linked to expanding states, but violent conflicts need not be confined to the conqueror and conquered; levels of violence may rise between indigenous groups as a result of imperial presence (see contributors in volume by Ferguson and Whitehead, 1992). In archaeological contexts, such distinctions are difficult to discern. Nevertheless, the studies in the volume by Ferguson and Whitehead (1992) send a cautionary message; the presence of skeletal trauma among subject populations does not necessarily imply that it was perpetrated by agents of the imperial power.

Documenting skeletal trauma not only informs issues of warfare and raiding, whether within or between regions, but also elucidates community perceptions about violence in its various manifestations. Other categories of violence can include domestic violence, corporal punishment, conflict resolution, and ritual battles, all of which can lead to serious bodily injury (Chagnon, 1968a; Chagnon, 1968b; Chagnon and Bugos, 1979; Conklin, 2001; Counts et al., 1992; Counts et al., 1999; Lambert, 1994; Larsen, 1997; Martin, 1997; Smith, 2003; Verano, 1995; Verano, 2001; Walker, 1989; Walker, 2001; Wilkinson and M, 1993). To discern these different types of violent encounters, frequency and locational distribution of wounds, as well as lethal versus non-lethal wounds should be documented; moreover, male and female skeletal wound frequencies and patterns should be compared, as this provides insight regarding the social contexts in which the violence occurred (Lambert, 1994; Larsen, 1997; Martin, 1997; Smith, 2003; Verano, 1995; Verano, 2001; Walker, 1989; Walker, 2001; Wilkinson and M, 1993). The importance of documenting these traits are illustrated in a study by Lambert (1994:119) in which she notes that peri-mortem cranial fractures on prehistoric individuals from southern California were distinct in “severity and intent from the sub-lethal [cranial] wounds;” the peri-mortem wounds were larger and concentrated on the side and posterior of the cranium, while sub-lethal wounds were smaller and located on the anterior. Moreover, based on the association of projectile point injuries and peri-mortem head trauma, Lambert (1994:119) suggests that “when a lethal blow was administered, the lethality of the blow was intentional rather than accidental.” In the case of the non-lethal head wounds, their patterned location on the frontal bones of males suggests that they were received in standardized face-to-face combat, similar to non-lethal conflict resolutions practiced by the Jalé of New Guinea (Koch, 1974) or the Yanomamo of Venezuela

(Chagnon, 1992) (Lambert, 1994; also see Walker, 1989). Lambert's (1994) study eloquently demonstrates how data on wound frequency, wound type (i.e., non-lethal versus lethal), and the locational distribution of wounds (i.e., where the wounds are located on the body) can be marshaled to reconstruct levels of violence, intentionality, and the social context in which violent encounters occurred.

Empires have legal codes that proscribe some behaviors and define social practice, and transgressions may be met with punitive actions, including corporal punishment. According to historical accounts, the Inka state, which flourished four centuries after the decline of the Wari, used corporal punishment to prosecute transgressions against an individual or the community (Cobo, 1892 [1653]:III, xxi, xxvii, 238, 240-241; Moore, 1958; Murúa, 1946 [1590]:III, xx, 70, 211, 213; Valera, 1945 [1585]:58). Physical punishment included hanging, whipping with rope, and lethal and non-lethal stonings. The latter would have occasionally generated bone fractures, particularly on the cranium, and would, therefore, be visible in the skeletal record. Punishable offenses that warranted stonings included, hunting without permission (Cobo, 1892 [1653]:III, xxi, xxvii, 241), a poorly executed labor project (Murúa, 1946 [1590]:III, xx, 70), disobeying a native nobleman (*curaca*) (Cobo, 1892 [1653]:III, xxi, xxvii, 240), rape of a virgin (Valera, 1945 [1585]:58), and stealing food from a non-Inka (Cobo, 1892 [1653]:III, xxi, xxvii, 240). *Curucas* could also be punished by blows with a stone if they ordered an imperial subject to death without obtaining proper authority (Murúa, 1946 [1590]:III, xx, 213, 238). The punishment could also vary depending on one's sex and familial status. If a man fled his hometown, he could be stoned to death, while a childless woman could be hanged for the same offense, but a woman with children received some other unspecified punishment (Moore, 1958; Murúa,

1946 [1590]:III, xx, 211). Perhaps the Inka laws and associated forms of corporal punishment developed from judicial practices formulated by the Wari empire a few centuries before. If so, then patterned cranial wounds on Wari era skeletal remains may reflect corporal punishment.

Ethnographic studies in the Andes have documented a form of ritual battle known as *tinku* (*tinkuy*) in the Peruvian and Bolivian Andes or *juego de la pucara* (game of the fortress) in Ecuador (Allen, 1988; Bolin, 1998; Brachetti, 2001; Chacon et al., 2004; Gifford et al., 1976; Hartmann, 1972; Orlove, 1994; Sallnow, 1987; Schuller and Petermann, 1992; Schultz, 1988). Two communities converge to engage in violent and sometimes deadly battles where one of the goals is to shed the blood of the opponent as an offering to earth for a bountiful harvest; the ritual battles are scheduled to correspond with festivals or the maize harvest (Allen, 1988; Bolin, 1998; Gifford et al., 1976; Hartmann, 1972; Orlove, 1994).

While physical fights and stonings are certainly key components of *tinku*, it is not perceived to be entirely hostile by the participants because this ritualized joining together of opposites is meant to maintain balance and harmony (Allen, 1988; Bolin, 1998; Gifford et al., 1976; Hartmann, 1972; Orlove, 1994). As one of Bolin's informants from Chillhuani (in the Peruvian highlands) states, "...it [the *tinku*] is not done in the mood of hostility. Instead it causes solidarity. It brings fertility for all" (Bolin, 1998:95). Nevertheless, the fighting can be brutal, even deadly, and while the ultimate goal is harmony, the proximate goal that brings this about is bloodshed and prisoner-taking. Based on his observations of *tinku* in Ch'iaraje (southern Peruvian Andes), Orlove notes that "the goal of the fighting was to take prisoners.... [T]here had been several such prisoners who had been taken to the lands of the other side, stripped, beaten and killed. [T]he prisoners corpses [were] sometimes

decapitated” (Orlove, 1994:135). Killings are often perpetrated in response to killings from the previous year; thus, there appears to have been an element of revenge in this cyclical event (Orlove, 1994).

Tinku typically involves men who square off in face-to-face fighting or who hurl stones at each other with a sling (Allen, 1988; Bolin, 1998; Chacon et al., 2004; Gifford et al., 1976; Hartmann, 1972; Orlove, 1994) (and see Plates 64 and 65 in Schuller and Petermann, 1992); this type of weapon was recovered from the two hinterland sites in the Majes valley (see Figure 2.17 for an example of a sling recovered from the site of Beringa). Women occasionally participate in the battles and they are sometimes taken as prisoners, but this is rare relative to the level of involvement among men (Allen, 1988; Bolin, 1998; Schuller and Petermann, 1992). The fighting is vicious and the injuries are serious, resulting in severe head trauma (see Plate 66 in Schuller and Petermann, 1992), which is visible osteologically. While some of the ethnographic literature emphasizes killings during *tinku*, most head injuries were non-lethal, and individuals lived to tell the tale of *tinku* (Allen, 1988; Bolin, 1998; Chacon et al., 2004; Hartmann, 1972; Orlove, 1994; Schuller and Petermann, 1992; Schultz, 1988). Perhaps ritual battles akin to *tinku* occurred prior to Spanish conquest. If so, then these modern ethnographic studies, coupled with biological and archaeological data, may give clues to ancient behaviors.²⁰

²⁰ Granted, there is no way to confirm that *tinku* occurred in prehispanic times, and this discussion is certainly not meant to imply that Andean culture has been static and unchanging from prehispanic to modern times. To the contrary, there were many changes in indigenous lifeways with the advent of Spanish colonialism, but the native cultural practices of today may provide insight to native cultural practices of the past.

3.3.3.1 Hypotheses on Violence and Trauma among the Heartland and the Hinterland

It is hypothesized that trauma frequencies related to warfare and raiding will be lower among the Conchopata population relative to those from the hinterland because Conchopata was inhabited by high status individuals who were likely to be integral to the function of the Wari state rather than victims of it. However, if the Wari empire used warfare as a means for expansion, then it is expected that male cranial trauma will be relatively high.²¹

The percentage of cranial trauma among populations in the hinterland is expected to be greater than that in the heartland because Wari imperial forces may have intruded into this region and generated conflict, or they may have broken down and recreated new political alliances, causing unrest and intra-valley conflict. Additionally, these hypotheses are based on data presented by Kellner (2002) who notes that cranial trauma slightly increased among Nasca males from the pre-Wari to Wari period (Kellner, 2002).

Differences in cranial trauma between the two hinterland skeletal series are also expected. Given that Beringa is a village site of agriculturalists and fishers (Tung, n.d.) and La Real is a ceremonial site, it is hypothesized that the village community will show distinct patterns of cranial trauma relative to the high status individuals buried at La Real.

Other kinds of skeletal trauma unrelated to violent conflict are expected, and they should differ between the heartland and hinterland. The majority of individuals from Conchopata are high status (Isbell and Cook, 2002); therefore, it is unlikely that they would have engaged in physically dangerous activities resulting in skeletal fractures. In contrast, the individuals in the hinterland were likely exposed to greater physical risks, particularly

²¹ Cranial trauma is a reliable indicator of violent conflict; see Chapter 4.

given the rough terrain of the Majes valley; the ravines (*quebradas*) were surely areas where individuals could have suffered skeletal fractures in accidental falls.

3.3.4 *Rituals of Violence: Trophy Heads in the Ancient Andes*

Imperial expansion can introduce new ritual practices, both in the heartland and the hinterland of an empire's domain, particularly as a means to dominate and incorporate new populations (see contributors in volume by Benson and Cook, 2001; Burger and Burger, 1980; Isbell and Cook, 1987; Moser, 1974; Proulx, 1989). Many studies have documented that human bodies were mutilated and sacrificed in prehispanic Andean rituals (see contributors in volume by Benson and Cook, 2001; Browne et al., 1993; Proulx, 1989; Proulx, 2001; Reinhard, 1996; Silverman and Proulx, 2002; Verano, 1995), so analysis of the skeletal remains provides an ideal means to document how the body was processed and perhaps sacrificed. Moreover, because rituals involving human sacrifice and the mutilation of human body parts reflect violence and terror (Cordy-Collins, 2001; Massey and Steele, 1997; Milner et al., 1991; Proulx, 1989; Silverman and Proulx, 2002; Verano, 2001), analysis of skeletal parts from ritual contexts provide insight regarding these connections, and as to how the Wari empire may have marshaled these concepts and fears to its advantage. As Dillehay notes, "...intermittent mutilation and/or human sacrifice may demonstrate the power and wealth of new ruling groups and the lengths to which they would go to maintain power" (Dillehay, 1995:14).

The Nasca society (AD 1 – 700) from south-central coastal Peru engaged in headhunting, and these heads were transformed into trophies by drilling a hole through the center of the frontal bone for a carrying cord and enlarging the foramen magnum to extract the brain (Browne et al., 1993; Proulx, 1971; Silverman and Proulx, 2002) (Verano, 1995;

Verano, 2001). Trophy head taking is presumed to have developed from small-scale sacred rituals, which later became affiliated with warfare, battles, and raids (Proulx, 1989; Roark, 1965; Silverman and Proulx, 2002). However, there is debate regarding the source of the trophy head victims: do they represent the heads of revered ancestors, as suggested by Guillén (cited in Silverman 1993: 224)? Were they victims of warfare, raiding, or ritual battles? The heads could have been spoils of war or procured in other kinds of violent activities. Given the presence of several female and child trophy heads, Tello (1918) rejected the notion that heads were taken in warfare and suggested they were related to religious and thaumaturgical ceremonies, but as Silverman and Proulx note (2002:233), the trophy heads could have been taken in raids. Ritual battles, such as *tinku* described above, also could have been the method for obtaining heads, with the ultimate goal of processing and using them in rituals (Browne et al., 1993; Silverman, 1993:221-225). In contrast, Proulx (1971; 1989) maintains that they were obtained in warfare or raids—not ritual battles—subsequently to which, the victims were decapitated and transformed into trophy heads for a variety of ritual functions.

Based on recent studies of Nasca trophy heads, the presence of female and child trophy heads has been confirmed, especially for early Nasca times, but for all Nasca time periods they were predominantly from young men (Kellner, 2002; Verano, 1995; Williams et al., 2001).²² Thus, the presence of female and child trophy heads from Nasca suggests procurement contexts other than formal warfare;²³ the majority were probably procured in raiding or ritual battles. Although male heads may have been preferred, as evidenced by

²² The results of these trophy head studies are discussed in more detail in Chapter 9 when they are compared to results from this investigation.

²³ It is possible that Nasca females engaged in warfare and other types of battles, but to date, there is little evidence to support that assertion.

their greater quantity, any member of the attacked community could have been abducted and decapitated. This is not at odds with what has been ethnographically documented among head-hunting societies, such as the Jivaro of southern Ecuador (Harner, 1972).

Conversely, young women and children may have represented ritual sacrifices, as has been documented for later Inka times (Reinhard, 1996; Verano, 1995). That is, certain trophy heads may represent rituals of human sacrifice that were unconnected to violent battles and raids. However, the Nasca trophy head iconography indicates that this is unlikely (Roark, 1965) (and see discussion on Nasca trophy heads by Silverman and Proulx, 2002).

In sum, previous archaeological and ethnographic studies indicate that trophy heads were obtained in raids and ritual battles, ultimately for use in sacred rituals. The context, preparation, and meaning of Wari trophy heads may resemble the Nasca in limited or multiple ways.

3.3.4.1 Hypotheses Regarding the style and use of Wari Trophy Heads

It is hypothesized that the Middle Horizon Period trophy heads from Conchopata will resemble those from Nasca in broad form (i.e., decapitated heads for carrying and display), but it is expected that they will differ in some aspects of the modification, as the newly developing Wari empire attempted to distinguish itself as a novel power. Also, given that the majority of Nasca trophy heads are males, it is expected that the preponderance of Conchopata trophy heads will be males. Finally, given the proximity between Nasca and Majes, it is hypothesized that the Middle Horizon trophy heads from the Majes valley will resemble those from Nasca.

3.3.5 *Population Migration and the Geographical Origin of Wari Trophy Heads*

During the development of an imperial power, previously dispersed populations may be forcibly relocated to new urban centers (D'Altroy, 1992; Larsen, 2001a:23; Worth, 2001). Similarly, individuals may migrate to new locations during periods of conflict, as part of post-marital residence rules, for new economic opportunities, or other reasons (Longacre, 1964; Plog, 1983; Price et al., 1994; Price et al., 2000). As demonstrated by recent research, strontium isotope analysis provides a reliable method to evaluate residential mobility and geological origins among ancient peoples (see studies by Bentley, 2002; Grupe et al., 1997; Knudson et al., 2004; Müller et al., 2003; Price et al., 1994).²⁴

At the ancient city of Teotihuacan in Mexico (AD 1 – 650), strontium isotope analysis of enamel and bone from individuals buried at this large, urban center show that some members of the community were migrants from a variety of geological zones; this was indicated by their strontium signatures that clearly differed from the local region (Price et al., 2000).²⁵ This is in contrast to individuals from the generally contemporaneous center of Monte Albán, south of Teotihuacan, where strontium isotope ratios of tooth and bone pairs show that most individuals were life-long local residents (Price et al., 2000).

3.3.5.1 *Hypotheses Regarding Population Migration among the Conchopata Population*

Based on the similar style of grave goods associated with Conchopata burials (Tung and Cook, n.d.), it is hypothesized that individuals interred there are from the local geological zone. This will be tested via examination of the strontium isotope ratios of enamel and bone

²⁴ Strontium isotope analysis is discussed in more detail in Chapter 4.

²⁵ Ongoing research by Price and colleagues is focused on identifying the places from which they came by obtaining the strontium isotope ratios for a variety of geological areas in Mesoamerica (Price et al., 2000)

pairs from individuals buried in the mortuary area (see Figure 2.1) and contrasted to known strontium isotope ratios for the local region based on local fauna and geology. Specifically, if individuals consumed foods from Ayacucho, then their strontium isotope ratio should range from 0.7054 to 0.7067.²⁶

Using strontium isotope analysis, hypotheses regarding the origin of the Conchopata trophy head victims will also be tested. Given that trophy heads are likely to indicate victims of violent circumstances, probably procured from rival communities, it is hypothesized that at least one of the trophy heads will show a non-local strontium isotope ratio (i.e., distinct from 0.7054 to 0.7067). The primary goal of this part of the strontium study is simply to determine if trophy head victims were local or foreign, not to determine their actual geographical origin. However, due to groundbreaking research by other scholars, the strontium values for additional Andean regions (e.g., southern Peru and the Titicaca Basin) have been well documented (see Knudson et al., 2004), so tentative suggestions may be posited regarding the possible geological zones from which foreigners in Ayacucho derived. For example, Knudson and colleagues (2004) have established that the strontium value for organisms consuming food from the Paleozoic rock formations in the Titicaca Basin range from 0.7090 to 0.7104, a value which is highly distinct from the Ayacucho Basin, and that the strontium values from southern Peru (i.e., the Moquegua valley) should range from 0.7059 to 0.7067, which is indistinguishable from that of the Ayacucho area. Thus, if any individuals or trophy heads show strontium values greater than 0.7090, then it may be suggested that they came from the Titicaca basin or some similar geological zone. Strontium

²⁶ The origins of these values are discussed in detail in Chapter 4.

values ranging from 0.7054 to 0.7067 will be interpreted as local Ayacucho, and not Moquegua, unless additional data comes to light suggesting otherwise.

3.4 Summary

As described in the introduction, there are three broad hypotheses to be tested in this dissertation regarding the impact of Wari imperialism. Under the rubric of these general suppositions, the hypotheses discussed in the preceding five sections are individually tested because they provide the necessary lines of evidence to reconstruct the larger picture supporting one of the general hypotheses listed below.

- 1) Wari imperialism contributed to turmoil and conflict in the heartland and hinterland, partially due to the reorganization of political coalitions, tribute demands, and a policy of imperial domination via military means and terror. In short, Wari imperialism contributed to high rates of trauma and morbidity and generated adverse effects on the quality of life for people within their domain.
- 2) Wari imperialism created peace, stability, and properly managed resources, such that heartland and hinterland communities experienced low levels of violence and enjoyed adequate access to the means of food production, storage, and exchange. In sum, Wari imperial rule contributed to low rates of trauma and morbidity and generated positive effects on community lifeways.

- 3) Wari imperialism differentially affected populations and individuals. Owing to variable imperial policies in the heartland versus the hinterland and distinct relationships to the imperial power, different communities experienced dissimilar trauma and morbidity rates.

In sum, those general hypotheses that characterize the impact of Wari imperialism will be evaluated based on the bioarchaeological results presented in Chapters 5 through 9. Those various lines of data will be synthesized in Chapter 10.

Chapter 4: Materials and Methods

4.1 Introduction

This project entailed two major methodological phases: 1) archaeological excavations to recover human skeletal remains and their associated goods; and 2) bioarchaeological analysis of the human remains. Archaeological excavations were conducted at three sites—Conchopata, Beringa, and La Real. Because each site was excavated with somewhat distinct excavation methodologies, field methods for each site are described in detail in Appendix II.

This chapter presents the skeletal sample size of the three series and the methods for collecting the osteological data. These data were collected using the standards for data collection by Buikstra, Ubelaker, and colleagues (Buikstra and Ubelaker, 1994) (discussed below), and the data collection standards were uniformly employed among all three skeletal samples.

4.2 Materials

There are a minimum of 689 individuals from the three sites, and among these, 604 are securely dated to the pre-Wari and Wari periods (Table 4.1). At the site of Conchopata, there are at least 300 individuals: 27 from the pre-Wari (Huarpa) phase and 273 from the subsequent Wari phase (Middle Horizon). Among the 273 Wari period individuals, 242 are individuals from the mortuary sector, and 31 are trophy heads from ritual buildings. There are at least 237 individuals from Beringa, and of these, 152 can be securely dated to the

Middle Horizon (time of Wari rule). The site of La Real includes at least 152 individuals, 7 of which are trophy heads.²⁷

Table 4.1. Skeletal samples from the three sites evaluated in this study.

Site	MNI for pre-Wari (Huarpa) period	MNI for Wari period	Wari period trophy heads [^]	MNI for Wari/post-Wari periods*	Totals
Conchopata	27	242	31	0	300
Beringa	0	151	1	85	237
La Real	0	145	7	0	152
Totals	27	538	39	85	689

[^]Trophy heads are not counted with the individuals from the mortuary areas; they comprise a separate group at each site.

*Skeletal remains from Beringa that could not be specifically assigned to one time period are initially included in Chapter 5 in the demographic profile for the entire site of Beringa, but excluded from additional skeletal analyses in subsequent chapters.

4.3 Bone Coding and Mending

Documenting provenience for each skeletal element is essential for reconstructing certain aspects of mortuary practices and determining if specific bones belonged to the same individual. This is particularly important when skeletal remains are commingled, like they are in ossuaries (Hutchinson, 2002) and looted cemeteries. Given that the majority of human remains recovered from the three sites in this study came from looted contexts, each skeletal element was assigned a unique code based on the minimal unit of provenience: for the Conchopata and Beringa skeletal remains, it was the Locus Number and for La Real bones it was the Lot Number.²⁸

²⁷ Two of the 7 trophy heads are stored at the Majes valley museum, and although their provenience can not be precisely determined, they clearly derive from the middle Majes valley.

²⁸ The locus number was the primary identifying code for a skeletal element, which was followed by a second numerical code. For example, if Locus 1975 included 21 skeletal elements that could not be securely assigned to the same individual, then the Bone Codes were as follows: 1975.001, 1975.002, 1975.003.... 1975.0021. All bones from each locus were numbered in this manner, so every bone has a unique code. When bones from the

Each bone was individually labeled: first, a thin layer of acetate (clear nail polish) was applied to a tiny area of the bone and permanent black ink (i.e., a Sharpie pen) was used to write the code on top of the acetate. Acetate was the preferred substance because it was easily removed with acetone.

As human bones were inventoried and assigned bone codes, post-mortem breaks were mended with 100% acryloid B-72. Much laboratory time was spent mending bones in order to increase the reliability of calculating the MNI. The acryloid B-72 copolymer was selected for gluing bones together for several reasons: 1) it is a strong and durable substance that can withstand heat and cold better than other glues (i.e., the glue won't melt or bend in hot temperature, nor will it crack in cooler temperatures); 2) it is a clear, non-yellowing copolymer that is less glossy than PVA; 3) it is resistant to water; 4) it dries at a rate conducive for fitting bones together; and 5) it is reversible with acetone, which is a substance that dries quickly, unlike water.

4.4 Reconstructing Demographic Profiles with Skeletal Populations

Estimating the age and sex of ancient skeletal series is critical for understanding past mortuary practices, the distribution of paleopathological lesions, and the demographic characteristics of ancient populations (Hutchinson, 2002:55-61; Milner et al., 2000). In turn, this information can provide much insight regarding the impact of imperialism. However,

same individual from one locus were encountered, a third integer was added to the bone code. That is, bones from one person were assigned the same locus and second numerical code, but the third integer was unique to distinguish between them. For example, an ulna, radius, and humerus from a single individual from Locus 1200, was coded as 1200.001.00 (ulna), 1200.001.01 (radius), and 1200.001.02 (humerus). In this way, bones from the same individual were easily identified in the database because the first two numbers were the same, yet the third numeral provided a unique code. The bones from La Real were coded in the same way, but instead of a locus number the lot number assigned by field archaeologists formed the first portion of the bone code.

demographic reconstructions based on skeletal remains are not always straightforward because the demographic composition of a once-living population may not be accurately represented in the skeletal series from which it was drawn (Paine and Boldsen, 2002; Sattenspiel and Harpending, 1983). That is to say, the skeletal population may not mirror the once-living population because skeletal remains “have been subjected to a highly selective process that involves several stages: Living → Dead → Buried → Preserved → Found → Saved” (Milner et al., 2000:473). Throughout each stage, many factors can affect the eventual composition of the skeletal series upon which the population profile is constructed (for a detailed discussion of the factors affecting each stage of the process see Milner et al., 2000). The “Dead → Buried” stage will be affected by mortuary practices of the ancient society. For example, infants may not be interred with adults in the formal cemetery, as was practiced in parts of the ancient eastern Mediterranean (Angel, 1947; Moyer, 1989) and parts of prehispanic Peru. In Nasca (south-central Peru), non-adults were often buried in domestic contexts rather than officially demarcated cemeteries (Carmichael, 1988). These kinds of mortuary practices often lead to an under-representation of infants in the mortuary sample (Milner et al., 2000). The “Buried → Preserved” stage (Milner et al., 2000) can be affected by differential preservation of skeletal remains because delicate infant bones and fragile elderly female bones may degrade at a faster rate than sturdy adult bones, depending on soil pH (i.e., acidic soils can destroy delicate osseous material) and other aspects of the burial environment (Gordon and Buikstra, 1981; Walker et al., 1988). Finally, the “Preserved → Found → Saved” stages (Milner et al., 2000) can be affected by factors such as the archaeologist’s decision of where to excavate. Additionally, archaeologists, museum curators, and even state bureaucrats have a hand in deciding which materials are saved for

further study, so their decisions affect (and bias) the final skeletal series examined by the osteologist.

Despite these potential pitfalls, calculating population profiles is a critical component in the analysis of archaeological skeletal samples (Milner et al., 2000). This type of analysis, known as paleodemography, can include the following determinations: the age distribution, the sex profile, probability of dying, survivorship, and life expectancy (Hoppa and Vaupel, 2002; Milner et al., 2000). Reliable age determinations and a standard margin of error in aging the skeletal sample are prerequisites for accurately calculating a detailed demographic profile of a once-living population, and they are particularly necessary to establish the probability of dying, survivorship, and life expectancy among a skeletal population (Bocquet-Appel and Masset, 1982; Jackes, 1992; Wood et al., 2002). However, if a skeletal series is poorly preserved and commingled, specific chronological ages may be difficult to assign (Hutchinson, 2002) and individuals may have to be assigned to an age cohort, such as infant, child, adolescent, young adult, middle adult, and old adult (described below). In this study, owing to the commingled nature of the majority of remains, skeletons and skeletal parts are assigned to age cohorts and only rarely are they assigned a specific age-in-years. As a result, detailed demographic analyses that elucidate the probability of dying, survivorship, and life expectancy could not be calculated.

4.4.1 Calculating the Minimum Number of Individuals (MNI)

The basic method for determining the minimum number of individuals (MNI) for commingled human remains includes counting each bone type and determining which bone shows the greatest sum. For example, if there are 85 right tibiae and 90 right femora, then the MNI is 90. Of course, MNI calculation must continue by counting the number of

individuals within general age categories: infants, children, and adults. For example, if 60 of the femora are from adults and 30 are from infants, but the right tibia tally shows there are actually 35 infants, then 5 infants must be added to the MNI total. That is, based on the right tibia, 35 infants are present in the sample, but the right femur only reflected the presence of 30 infants. Thus, the femur count resulted in an under-representation of infants in the mortuary sample, so the 5 infants must be added to the MNI. In this case the MNI total would equal 95: 60 adults and 35 infants. This same tallying process is done for the other age groups that do not overlap (also see Hutchinson, 2002:57-58).

The method just described was used for calculating MNI's within discrete areas at each of the three sites. However, because looting was so severe at the site of La Real, all skeletal remains from each Lot Number were combined together, and the MNI was calculated for the entire site. If the MNI had been calculated for each Lot Number and added together, then it would have resulted in an inflated MNI.

At Beringa, because many bones were mixed between various loci, but contained within discrete excavation units, the MNI was calculated for each unit and then added together to obtain the population MNI. There was one exception to this method: three units that were superficially collected could not be added to the total MNI because the isolated bones recovered from those units probably derived from skeletons in other units. Excluding them prevented an overestimation of the MNI.

Conchopata was treated somewhat differently because some Architectural Spaces (*Espacio Arquitectónico*, EA) included loci with discrete, intact burials, while other Architectural Spaces included loci with commingled bones. Thus, when solely intact burials were present in a locus, an MNI was established for that locus only. This value was then

summed with MNI tallies from other discrete loci within the Architectural Space. This provided an MNI for the entire Architectural Space (which can contain one or more loci). In other cases, particularly in looted buildings, numerous skeletons were dispersed among several loci, so an MNI could not be calculated for each locus and then added together because this would have overestimated the minimum number of individuals. Instead, all loci within a looted Architectural Space were combined and the MNI was calculated for the entire Architectural Space. Finally, the separate MNI's from each Architectural Space were summed to obtain the MNI for the entire Conchopata burial sample. The specific MNI calculations for each site are presented in the results chapters and the MNI for each Architectural Space at Conchopata are presented in Appendix III.

4.4.2 Age Determination

Age at death was determined by examining dental formation and eruption (Buikstra and Ubelaker, 1994; Ubelaker, 1978), dental wear (Lovejoy, 1985; Walker et al., 1991), epiphyseal unions (Buikstra and Ubelaker, 1994), cranial suture closure (Buikstra and Ubelaker, 1994), and changes in the pubic symphysis (Brooks and Suchey, 1990) and auricular surface (Meindl and Lovejoy, 1989). These traits were used to assign individuals and isolated skeletal elements to one of eight age categories as developed by Buikstra and Ubelaker (1994). Below is a listing of the age groups, their data entry code, and age in years.

- F = Fetus (*in utero* – birth)
- I = Infant (birth-3 years)
- C = Child (4-14 years)
- Ad = Adolescent (15-19 years)²⁹

²⁹ Although Buikstra and Ubelaker (1994) define “Adolescent” as 12-19 years-old, I begin this age category at the age when most individuals exhibit post-pubescent morphological sex differences (15-19 years-old).

YA = Young adult (20-34 years)

MA = Middle adult (35-49 years)

OA = Old adult (50+ years)

A = Adult (20+ years)

The last category is a general grouping for individuals and bones that clearly were not juveniles, but could not be more specifically aged in adult terms. When a skeleton was relatively complete and reliable diagnostic aging traits were present, a numerical age was assigned. However, this was rare due to the disturbed and commingled nature of the samples. The methods used to assign ages are described below.

All dentition in the maxillae and mandibulae was examined to document dental formation and eruption in order to estimate the age-at-death. Dental formation and eruption were documented to estimate age-at-death. Although the chronology of deciduous dental eruption was based on non-Native American groups, “mostly United States Whites” (Ubelaker, 1989), the dental development chart was adjusted by Ubelaker to reflect the differences in deciduous tooth formation between the two groups. That is, because deciduous teeth may erupt slightly earlier in Native American children than in “American whites” (Ubelaker, 1978), the ages were adjusted to more accurately depict dental formation times. Thus, the dental eruption standard created by Ubelaker (Ubelaker, 1989) provides the best characterization of tooth formation for prehistoric populations from the Andes of Peru. Moreover, because many other researchers working in the Americas use this standard, the data presented here will be comparable to other studies.

Dental wear was used in conjunction with dental development and other skeletal age indicators to estimate the age-at-death for each individual. The more dentine exposed, the

higher the dental wear score, and by extension, the greater the age of the person (Walker et al., 1991). The dental wear score systems devised by Smith (Smith, 1984) and Scott (Scott, 1979:214) were used to score the wear on anterior and posterior teeth, respectively. The latter system is more specific because the occlusal surface is divided into quadrants, and each quadrant is scored individually from “1” to “10.” The four scores are then summed to obtain the final wear score for the molar. Thus, the final wear score can range from 4 to 40: 4 indicates that wear facets on all quadrants were invisible or very small, and a score of 40 indicates that dentine exposure was complete on all quadrants.

Age-at-death was also estimated by examining the extent of epiphyseal closure, a particularly useful criterion for establishing the age of non-adults (Buikstra and Ubelaker, 1994). Individual bones must fuse during growth, and because the timing of these unions and ossifications is known within a few years, they are useful for skeletal age estimations.

Ossification scores were recorded as either “0” (open; no union), “1” (partial union), or “2” (complete union); complete union indicates a more advanced age. Although epiphyseal unions were primarily used to age juveniles, two late fusing parts of the skeleton were particularly useful for distinguishing between younger and older adults: the clavicular epiphysis and basioccipital synchondrosis. While a few other skeletal elements fuse relatively late in development, these two fuse the latest—between 18 to 25 years—so they can be used to differentiate younger adults from older adults.

Observation of cranial suture closure was another means for determining the age at death of skeletal individuals. Although there is much variability in the rate of cranial suture closure (Masset, 1989), it is still useful when used with other aging criteria (Meindl and Lovejoy, 1985). Moreover, when only portions of the cranium are present, the extent of

suture closure can aid in estimating a general age category to which an individual belongs (e.g., young adult, middle adult, old adult). Seventeen cranial suture scores were recorded for complete crania (10 ectocranial sutures, 4 palatine sutures, and 3 endocranial sutures) (Buikstra and Ubelaker, 1994). The scoring method was established by Meindl and Lovejoy (1985) and the scores range from 0 to 3: “0” (open; no suture closure at the site), “1” (minimal closure), “2” (significant closure), and “3” (complete obliteration of the suture). Because cranial sutures gradually become obliterated with age, a higher score generally indicates greater age when void of pathological conditions that may increase the rate of cranial suture closure (Buikstra and Ubelaker, 1994). Specifically, suture scores from two areas of the cranium are summed: 1) the vault sites, and 2) the lateral-anterior sites. The vault includes seven suture site scores and when summed total from 0 to 21. The lateral-anterior sites include five suture areas and when tallied total from 0 to 15. These composite scores are then matched to a suture score ranging from “S1” to “S7.” Finally, the “S score” is matched to an age range (Buikstra and Ubelaker, 1994).

The bony changes on the pubic symphysis of the pelvis are one of the more reliable indicators for estimating age-at-death (Buikstra and Ubelaker, 1994). The age related changes of the pubic symphysis are well documented, so observing its morphological condition contributes to estimating the age of the individual (Brooks and Suchey, 1990; Suchey and Katz, 1986; Todd, 1921a; Todd, 1921b). The morphology of the auricular surface of the pelvis provides another means to estimate age-at-death because the changes to the surface and texture of the bone are age related (Meindl and Lovejoy, 1989). Although this method is more difficult to score relative to the pubic symphysis, it is often better preserved than the latter (Buikstra and Ubelaker, 1994; Meindl and Lovejoy, 1989).

4.4.3 Sex Determination

The sex of an individual was primarily determined through examination of pelvis morphology and secondarily through cranial characteristics. Based on these traits, an individual was assigned to one of five sex categories:

- F = Female
- F? = Probable female
- M = Male
- M? = Probable male
- ? = Unknown

The adult pelvis is the most sexually dimorphic bone in the human body, thus it is the ideal element to distinguish adult males from adult females (Buikstra and Ubelaker, 1994; White, 1991). (Immature remains do not display sexually dimorphic characteristics, and there are currently no widely accepted techniques for establishing the sex of juveniles (Saunders and Katzenberg, 1992).) Phenice's technique (Phenice, 1969) for determining sex focuses on three observations of the pubis bone: 1) ventral arc presence on the medial-ventral surface indicates female and absence of this trait indicates male; 2) subpubic concavity presence is female and absence is male; 3) a sharp ischiopubic ramus ridge on the medial aspect is female, and a broad, flat surface on the medial aspect is male. In addition to these three observations, I add a fourth observation for determining sex: in dorsal view, a female pubis bone is square-shaped and the male pubis bone is rectangular-shaped. This observation is particularly useful when the medial surface of the pubis is missing and ventral arc presence or absence is unobservable.

The shape and size of the greater sciatic notch is also used to determine the sex of individuals. Given that this notch is generally broader in females than in males (Buikstra and Ubelaker, 1994) this trait can sometimes be used to sex an individual, particularly if the pubis is missing. The size and shape of the notch is assigned a score from “1” to “5.” A score of “1” represents typical adult female morphology in that the notch is wide, while “5” represents a narrow notch more characteristic of adult males. A score of “2” is considered a probable female and a “4” is a probable male. A “3” is too ambiguous to determine sex, so it is coded as unknown. This characteristic is considered with other sex determination traits whenever possible, so if a sciatic notch score of “4” accompanied a pubis that was clearly morphologically female, the final sex is recorded as female.

The morphology of the skull provides another suite of traits to examine in order to determine the sex of an individual. In general, adult males have larger, more robust cranial features than adult females, but these traits can vary and some males will display gracile features while some females may appear robust. Therefore, sex determination based on the skull was secondary to the pelvis. Five morphological traits on the skull were examined and assigned a score ranging from “1” to “5;” a score of “1” was considered gracile and more characteristic of adult females, while “5” was robust and generally typical of adult males. The observations of the skull are based on criteria by Ascádi and Nemeskéri (Ascadi and Nemeskeri, 1970), and include the following: 1) the nuchal crest and its level of rugosity; 2) the mastoid process and its volume relative to surrounding cranial features; 3) the supraorbital margin and the thickness of its edge; 4) prominence of the glabella and the extent of its projection; and 5) the size and projection of the mental eminence on the mandible (Buikstra and Ubelaker, 1994). If all five traits receive scores of “5,” then the

individual is sexed as a male, and if all are “1,” then it is sexed as a female. When scores are mixed, but on the higher end of the scale, the individual is usually recorded as a probable male, and when they are mixed, but in the lower score range, the cranium is typically sexed as a probable female.

4.5 Cribra Orbitalia and Porotic Hyperostosis as Indicators of Childhood Anemia

Skeletal samples from nearly all geographical locations and time periods have exhibited cranial lesions that make the surface of the skull appear porous, prompting many researchers to inquire about the pathological condition that generates these bony changes. The lesions appear on the orbital roof and cranial vault and are known as cribra orbitalia and porotic hyperostosis, respectively. Based on numerous studies of skeletal samples, it appears that the cranial lesions are the result of anemia that develop in response to insufficient levels of iron in the body (Blom et al., 2004; Burgess, 1999; Garn, 1992; Kent, 1992; Larsen, 1997; Larsen and Sering, 2000; Stuart-Macadam, 1985; Stuart-Macadam, 1987; Ubelaker, 1992; Walker, 1985; Walker, 1986); however, other disorders in the blood-forming system and kidneys (i.e., renal disorders), as well as exposure to certain toxins may lead to anemia (Garn, 1992:33). Additionally, illnesses such as osteitis, scurvy, tumors, or rickets have been posited as culprits for the pathological cranial changes (Schultz et al., 2001; Schultz and Merbs, 1995). Nevertheless, the majority of evidence, particularly from the prehistoric Andes points to anemia, not the latter diseases, as the primary cause for these pathological changes on the skull (Benfer, 1990; Blom et al., 2004; Burgess, 1999; Garn, 1992; Larsen, 1997:39-40; Ubelaker, 1992; Verano, 1992).

4.5.1 What is Anemia?

When the body experiences a deficiency of iron, anemia develops. That is, anemia is a symptom of iron deficiency and is not a disease itself (Garn, 1992:34). Hemoglobin, the iron-containing component in red blood cells, delivers iron to the body, so when hemoglobin (and red blood cells) decrease (e.g., via blood loss), iron levels drop, leading to anemia (Garn, 1992), which is a morbid, abnormal physiological condition. Iron is necessary for body growth, maintenance, and “standard” mental functioning, so when iron deficiency anemia develops, it leads to “pallor, lassitude, and decreased learning ability at all ages and decreased growth and delayed sexual maturation” (Garn, 1992:33). These effects have an impact not only on developmental health, but have lasting effects on adult stature (bone size and possibly bone strength) and population growth rates (i.e., if sexual maturation is delayed, so are reproduction rates).

There are myriad types of anemias, but in short, anemia can be placed into two general categories: 1) genetic anemias (i.e., abnormal hemoglobin resulting from a genetic condition); and 2) acquired anemias (Larsen and Sering, 2000). Genetic conditions, such as thalassemia or sickle cell, both of which can lead to anemia are particularly common in the Mediterranean and parts of Africa where malaria is endemic (Angel, 1966; Wadsworth, 1992). Because these genetic conditions are thought to be an effective adaptive response to protect the body against malaria, frequencies of thalassemia and sickle cell disease are common in populations where malaria is widespread. Thus, with high rates of malaria, there are usually elevated rates of anemia. However, there is no evidence to suggest that these genetic conditions were present in the prehispanic Andes, for it was not until European contact that New World populations were exposed to the malaria-causing pathogen (Rucknagel, 1966). Instead, acquired iron deficiency anemia among ancient populations

from the Andes probably resulted from environmental and social conditions (e.g., low-iron diet or parasitism) (discussed below). Thus, among skeletal collections from precolumbian Peru, the porous cranial lesions were likely the result of acquired iron deficiency anemia, not genetic anemias or some other diseases.

4.5.2 Potential Causes of Acquired Iron Deficiency Anemia

While low iron levels lead to the anemic response, the etiology of deficient iron in the body is still debated (see contributors in volume by Stuart-Macadam and Kent, 1992). One explanation posits anemia of chronic disease. In this case, the body decreases the amount of circulating iron—hypoferremia—as a defense against pathogens (Kent, 1992; Stuart-Macadam, 1992; Weinberg, 1984). As the argument follows, because many pathogens require iron and must steal it from their host, the host decreases iron availability as a means to starve the pathogen. Thus, according to this view, this is an evolutionary adaptation that has developed to cope with extreme pathogen loads (Kent, 1992; Stuart-Macadam and Kent, 1992; Weinberg, 1984); however, there appears to be limited data to support this hypothesis (Goodman, 1994).

Other hypotheses state that iron deficiency anemia results from one or all of the following: insufficient iron intake, too much iron loss, or low iron absorption (Blom et al., 2004; Dallman et al., 1984; Goodman, 1994; Lallo et al., 1977; Larsen, 1997; Larsen and Sering, 2000; Mensforth et al., 1978; Reinhardt, 1992; Stuart-Macadam, 1985; Ubelaker, 1992; Ubelaker and Newson, 2002; Walker, 1985; Walker, 1986). The first suggests insufficient iron in the diet—dietary iron deficiency anemia—as the cause for low levels of iron in the blood; if a person's diet does not include adequate quantities of iron, then anemia will result (Kent, 1992). The second states that iron loss is a significant problem contributing

to iron deficiency anemia (Garn, 1992; Walker, 1985). For example, parasites can rob a host of iron, and parasitic and bacterial infections can lead to internal bleeding and diarrheal disease, and thus, iron loss (Garn, 1992; Walker, 1985). In this case, although one may consume adequate quantities of iron, gastrointestinal infections may cause the body to quickly discharge resources before the body absorbs them. Third, deficit levels of iron can result if a diet includes foods that inhibit iron absorption. Phytates in cereals such as maize, a staple in the Andes, interfere with iron uptake by the body. Thus, even if iron consumption is sufficient, ingesting foods high in phytates may limit iron availability to the body (Baynes and Bothwell, 1990). However, the way maize is prepared and consumed may alter its effect on iron absorption. When consumed in its fermented form, such as *chicha* (maize beer) in the Andes (Moore, 1989) or sour corn soup in the American southeast (Christian, 1931) (Riggs, Pers. Comm., 2003), the lactic acid in the fermented cereals (Steinkraus, 1996) may promote iron absorption (Baynes and Bothwell, 1990). Thus, in the context of the Andes, one major food source—maize—may either inhibit or promote iron absorption, depending on its dietary form when ingested. In sum, it is likely that all three factors—low iron consumption, iron loss via parasitism, and low iron absorption—work in tandem to contribute to iron deficiency anemia (Goodman et al., 1984; Huss-Ashmore et al., 1982; Stuart-Macadam, 1985; Stuart-Macadam, 1987; Walker, 1986).

4.5.3 *The Body's Response to Iron Deficiency Anemia*

Once anemia develops as a result of deficient iron levels, the body attempts to ameliorate the iron shortfall by increasing red blood cell production. For this to occur, the bone marrow (blood forming tissue) in the interior of the bone expands, a process known as marrow hyperplasia. The expanding bone marrow pushes outward, replacing the smooth,

dense outer surface of the bone with the interior, porous diploic bone (Larsen, 1997). This particular process occurs in infants and children who suffer from iron deficiency because youths have more blood-producing tissues than adults (i.e., larger marrow cavities that can expand) (Larsen, 1997). Thus, anemic infants and children often exhibit the osseous changes (porosity), but anemic adults do not because there is no excessive expansion of the marrow cavity, and thus, no excessive expansion of the diploë (Lallo et al., 1977; Mensforth et al., 1978). As a result, porotic lesions on adult crania do not indicate they suffered from anemia at the time of death; rather, the lesions suggest they suffered anemia in childhood and survived to adulthood (Mensforth et al., 1978:45).

4.5.4 Methods for Observing Cribra Orbitalia and Porotic Hyperostosis

The methods employed to determine the prevalence of iron deficiency anemia among the three skeletal populations included observations for porotic hyperostosis and cribra orbitalia on all well-preserved crania. If porous lesions were observed on the cranial vault or orbital roof, then they were recorded as porotic hyperostosis and cribra orbitalia, respectively. If only the calvarium (cranial vault) was present, then only observations for porotic hyperostosis were made on the parietal and occipital bones; porotic hyperostosis on the anterior portion of the frontal bone is not presented in this study. Similarly, if only the frontal bone was present (i.e., at least one orbit), then observations for cribra orbitalia were made.

Scoring for indicators of anemia included more than documenting presence, absence, or unobservable. Based on the Buikstra and Ubelaker standards (1994), the degree of expression was recorded, ranging from 1) “barely discernible;” 2) “true porosity;” 3) “coalescing pores;” and 4) “coalescing pores with increased thickness” (Buikstra and

Ubelaker, 1994:115, 120-121). The location of the lesions on the cranium was also noted. Finally, lesions were documented as either “active at time of death,” “healed,” or “mixed reaction.” Sharp edges of the pathological foramina indicate that lesions were active at time of death, while remodeled bone indicates that the lesions had healed.

All complete eye sockets, parietal bones, and occipital bones were observed for cribra orbitalia and porotic hyperostosis. If the surface of the bone was missing or too badly degraded to reliably determine presence or absence, it was scored as a “9,” meaning unobservable. Obviously, cases that were unobservable were not considered in the calculations to determine the percentage of the population with these pathological lesions. Given that porotic hyperostosis and cribra orbitalia are skeletal indicators of iron-deficiency anemia, the frequencies were then evaluated to determine its prevalence and compare frequencies between the three archaeological communities and previous studies.

4.6 Trauma: Identifying Injury and Violence in the Skeletal Record

The analysis of ancient human skeletal remains are a crucial component in the assessment of violence among past human societies because the trauma data obtained from skeletons can be used to infer important aspects of human behavior and social organization (Lambert, 1994; Larsen, 1997; Ortner, 2003; Verano, 1995; Verano, 2001; Walker, 2001; Webb, 1995) (and see contributors in volume by Martin and Frayer, 1997). Injury to the body sometimes affects the skeleton by causing bone fractures and dislocations that often leave a permanent mark on the bone, both in healed and un-healed states (Galloway, 1999b). As a result, the frequency of skeletal trauma among a population can be ascertained, and populations can be compared to evaluate differences in trauma rates, providing insight on the

relationship between injury morbidity and environmental and social influences (Larsen, 1997:110).

However, before bones and behavior can be linked, bone breaks (i.e., skeletal fractures) should be examined to determine if it occurred before, during, or after the time of death: pre- peri- or post-mortem trauma, respectively) (Galloway, 1999b; Lambert, 1994; Larsen, 1997; also see contributors in volume by Martin and Frayer, 1997; Ortner, 2003; Smith, 2003; Verano, 1995; Verano, 2001; Walker, 1989; Walker, 2001). For example, bones can be scratched or broken while in their burial environment or at the hands of excavators, producing post-mortem marks that mimic skeletal trauma (Larsen, 1997:109; Milner et al., 1994). However, these breaks are not always easy to identify, particularly when compared to peri-mortem trauma because neither show any evidence for healing (Galloway et al., 1999; Larsen, 1997; Lovell, 1997:145). Nevertheless, given the known differences between peri-mortem and post-mortem trauma, careful examination of the skeletal remains can help to avoid a misidentification that might lead to erroneous conclusions about the prevalence of accidental or violent trauma (Galloway et al., 1999; Larsen, 1997:109; Lovell, 1997:145; Milner et al., 1994). Post-mortem fractures have straight edges and no hinging (i.e., no attached bone fragments) due to the “clean snap” or break of dry bone, and the color along the post-mortem break line differs from surrounding bone because it has not been exposed to the same taphonomic conditions (e.g., soil or sun) for the same duration as the rest of the bone (Buikstra and Ubelaker, 1994; Galloway et al., 1999; Lovell, 1997; Ortner, 2003). A peri-mortem break, in contrast, will show hinged and angled edges because the bone is “fresh” or moist with organic components, and peri-mortem cranial injuries will exhibit radiating fracture lines around the location of the blunt force

trauma (Courville, 1962; Galloway et al., 1999; Lovell, 1997; Ortner, 2003). Peri-mortem wounds show no evidence for healing because the individual dies before the body can initiate the healing process (Lovell, 1997).

In contrast to peri- and post-mortem breaks, pre-mortem trauma exhibits evidence for healing, and if it is well-healed, then the injury can be interpreted as non-fatal (Lovell, 1997). Healed fractures are distinguished from other pathological lesions based on the deposition of new bone and the bony callus on long bones or the smooth, well-defined margins of cranial depression fractures (Lambert, 1994; Lambert, 1997; Lovell, 1997; Walker, 1989).

Distinguishing between pre-, peri-, and post-mortem skeletal trauma is crucial to determining if a wound was lethal or non-lethal, thus providing significant insight regarding the nature of accidental injury and possibly human intention (Walker, 2001). (The specifics for observing and coding bone fractures are described below.)

To continue the interpretative steps from bones to behavior, skeletal injuries should be identified as accidental or intentional whenever possible, since most trauma can be categorized as one of the two (Larsen, 1997:110). Identifying trauma patterns by skeletal element is a key step in this process (Larsen, 1997). Cranial wounds are a reliable index of violence among ancient populations, and the patterning of wound locations add a crucial component to understanding the nature of violence (Lambert, 1994; Lovell, 1997; Milner et al., 1991; Walker, 1989; Walker, 1997; Walker, 2001; Webb, 1995). Wounds concentrated on the frontal bone, for example, indicate that the injuries were not randomly incurred by accidental falls, but probably stem from face-to-face interpersonal conflicts (Lambert, 1994; Lambert, 1997; Walker, 1989; Walker, 1997; Wilkinson and M, 1993), and if wounds are concentrated on the left side of the frontal (or left anterior parietal), then it can be inferred

that most were received by a right-handed attacker (Lambert, 1994; Webb, 1995). Moreover, if head wounds are common and similarly distributed among a particular sex or age cohort, then they probably suggest interpersonal violence and not accidental injury (Lambert, 1994; Walker, 1997; Wilkinson and M, 1993).

Arm injuries can result from either violent encounters or accidents, but certain types of arm injuries are more likely to result from the former. Parry fractures on the shaft of the ulna are one example, resulting when an individual raises the arm above the head to protect the head from an oncoming blow (Lambert, 1994; Ortner and Putschar, 1981). However, Lovell (1997) cautions against identifying all parry fracture as an attempt to ward off a hit to the skull because parry fractures can also result from steep falls where the ulna receives the brunt of the impact. Nevertheless, when forearm parry fractures coincide with cranial fractures, they are more likely to be indicative of violent interactions, not accidental injuries (Lambert, 1994; Smith, 2003:245; Walker, 2001). Conversely, a Colles' fracture on the distal end of the radius (i.e, wrist) suggests that the wound resulted from an accident when the person flung out his/her hand to brace a fall (Ortner and Putschar, 1981); this kind of accidental injury is often associated with a fractured styloid process of the ulna (Lovell, 1997). Of course, it is possible that a violent action such as shoving could lead to a Colles' fracture, but there is no means to differentiate an accidental fall from an intentional shove. Thus, certain kinds of arm fractures can be attributed to a violent action or accidental incident with only some degree of certainty

Rib and hand fractures may be related to violent interactions, as fractures to the metacarpals often result from "longitudinal compression impact... from boxing" (Lovell, 1997:164) or similar physical engagements involving the fist. Conversely, hand fractures

could result from accidental falls or heavy objects landing on the hand (Galloway, 1999b). Rib fractures could result from face-to-face combat, particularly if solid weapons are used, or a fall from a great height could crush the ribs (Galloway, 1999b). Lower limb and foot fractures are often attributed to accidental falls and rarely associated with violence (Lovell, 1997). Given the varied social settings in which particular injuries can occur, the suite of osteological and archaeological data should be considered together before determining if postcranial injuries resulted from intentional acts of violence or accidents.

4.6.1 Skeletal Observations for Trauma

Owing to the complex nature of a bone fracture, several characteristics must be recorded to document fully the injury. There are several types of bone fractures, owing primarily to the excessive force acting upon the bone (Galloway, 1999a). Galloway (Galloway, 1999a) categorizes skeletal fractures into two major groups: incomplete and complete fractures. The former is characterized by preservation of continuity of some portions of the fractured bone (i.e., the bone is not completely broken into two or more pieces), and the latter signifies a break that leads to discontinuity between the bone fragments (Galloway, 1999a).³⁰ In this study, the standards for data collection (Buikstra and Ubelaker, 1994) were used to document the type of long bone fracture. Specifically, incomplete fractures were coded as “greenstick” or “partial” fracture (imagine a twig that is bent and then partially snaps, leaving a portion of the twig still intact) (see Figure 102d in Buikstra and Ubelaker 1999:144) (see Figure 2-3 in Galloway, 1999a:50), and three types of complete fractures were distinguished whenever possible: transverse fracture (e.g., straight horizontal

³⁰ Galloway (1999:48-57) adds subcategories to these major two groups. For example, an incomplete fracture can be characterized as one of seven types and a complete fracture can be identified as one of five types. However, archaeological samples are sometimes difficult to subcategorize due to bone healing, which often obscures the original nature of the bone fracture.

break across a long bone; imagine a clean, straight snap of a twig), comminuted fracture (the bone breaks into many pieces), and spiral fracture (the fracture line is angled) (see Figures 102a-c, Buikstra and Ubelaker 1994:144) (see Figure 2-4 in Galloway, 1999a:53) (see Figures 1 and 2 in Lovell, 1997:142-143). Other fracture types observed in this study included compression fractures or crush fractures, which are common among vertebrae (e.g., collapsed vertebrae) and hand and foot bones, respectively (see Figure 102e in Buikstra and Ubelaker 1994:144) (see Figure 4-6 in Galloway, 1999d:97) (see Lovell, 1997:142). Finally, cranial depression fractures were recorded, including those that affect either the outer bone table only (the ectocranial surface) or the outer and inner bone table (ecto- and endocranial surfaces) (Buikstra and Ubelaker, 1994; Galloway, 1999c; Lovell, 1997). The latter indicates a more severe blow to the head (Galloway, 1999c; Lovell, 1997).

The shape and features of a cranial wound were examined to determine the weapon or source of trauma whenever possible. Cranial wounds were typically described as blunt round, blunt oval, or edged (Buikstra and Ubelaker, 1994; Webb, 1995). As the terms suggest, the two former wound types are circular or oval in shape, suggesting perhaps that a round sling stone or doughnut stone was the weapon of choice (see Figure 2.14 in Chapter 2)(Webb, 1995). An edged wound indicates a sharp stone or metal blade (Ortner, 2003). Radiating fracture lines near the cranial trauma are also noted because these indicate that the injury was peri-mortem and may have contributed to the death of the individual (described above) (see Figure 7.5 in Chapter 7) (Courville, 1962; Ortner, 2003). Given the importance of noting if breaks occurred before, during, or after death, skeletal fractures were coded as such. Also, pre-mortem skeletal wounds were observed to document the extent of healing or

associated infection. Finally, bone fractures that did not re-align and mend properly were coded as non-union fractures.

4.7 Analysis of Trophy Heads and Human Offerings

Prehistoric and colonial period Andean ritual practices often included humans or human body parts as offerings to the supernatural world (see all contributors in volume by Benson and Cook, 2001; Cordy-Collins, 1992; Gose, 1986; Proulx, 1971; Proulx, 1989; Reinhard, 1992; Reinhard, 1996; Verano, 1995), so identifying skeletal remains that may be part of this important Andean tradition is crucial for documenting the historicity of this practice and its geographic distribution. To understand more fully this cultural practice, the peoples who were sacrificed and whose body parts were altered (e.g., trophy heads) must be identified in terms of their age, sex, and place of origin, whenever possible. Additionally, establishing the degree to which these rituals were standardized may provide insight regarding the strong hand of the Wari State. If there is great variability in ritual practices and the processing of human body parts, then perhaps the state had little control over this significant aspect of Wari society. Conversely, standardization may suggest strong Wari control by state institutions and ritual specialists.

Examining the archaeological context is integral for differentiating between ritualized human offerings and funerary burials. The latter is identified by their placement in tombs, the types of which have been well defined at Conchopata (see Isbell and Cook, 2002; Tung and Cook, n.d. for a description of the eight Conchopata tomb types). Although human offerings could have been placed inside tombs, the looted nature of most prevented distinction between commingled skeletal parts and those that could have been offerings.

Nevertheless, all skeletal elements were examined for modifications that might indicate they were used as offerings.

Human remains recovered from non-mortuary contexts were examined to determine if looting had displaced the bones from a funerary space (i.e., tomb). For example, if a looted space void of a tomb contained human skeletal parts and an adjacent room with a tomb contained an incomplete skeleton, in most cases they were combined and recorded as a human burial, not a ritual offering. However, the opposite condition—the absence of a tomb—did not automatically imply a human offering. Architectural features, patterns in skeletal element frequency, age and sex of burials, and peri- and post-mortem bone modifications were considered to determine if human remains were part of an offering complex. For example, if the same body parts with similar modifications appeared in ritual buildings to the exclusion of other skeletal elements, then they were identified as offerings. The human offerings were then excluded from the “normal” mortuary sample and analyzed as a subgroup.

Trophy heads are one such subgroup. These are decapitated skulls with an intentionally drilled hole through the cranium, enabling them to be displayed as “war trophies” (Proulx, 1989; Verano, 1995), ritual objects (Coehlo, 1972), or both (Browne et al., 1993). They are easily identified by their inclusion in ritual D-shaped and circular structures at Conchopata, and at all sites, they are identified by specific modifications to the skull. Definitions regarding what constitutes a trophy head have been based on those recovered from Nasca sites (AD 1 – 600) on the south-central Peruvian coast where the majority of Andean trophy heads are derived (Silverman and Proulx, 2002; Williams et al., 2001). Until now, they have

been minimally defined by the presence of a hole on the frontal bone and an enlarged foramen magnum (Browne et al., 1993; Verano, 1995) (see Figure 8.15).

In contrast, definitions for Wari trophy heads remain to be established, so this author describes them in great detail in Chapter 5 (Conchopata results). Each skull is examined for modifications that paralleled Nasca trophy heads, but other characteristics are documented as well. Skulls thought to be trophy heads are examined for holes, cutmarks, scalping marks, burning, trauma, and a patina indicative of extensive handling. Drilled holes are measured to establish their mean diameter, and if the standard deviation is within 20% of the mean, the trophy head modification process is considered to be highly standardized. The locations of drilled holes are also documented by drawing their location on a blank sketch of a skull and measuring its distance from well-established cranial osteometric points (e.g., distance from bregma and glabella). Additionally, cranial trauma frequencies and locational patterning of wounds are analyzed to compare the trophy head subgroup to the rest of the mortuary population, particularly as a means to determine if trophy heads represent a unique warrior class (i.e., significantly more head wounds than the other individuals). Methods described above for documenting cranial trauma are used in this trophy head sub-sample. Finally, the geological origin (local vs. non-local) of Conchopata trophy heads is elucidated via strontium isotope analysis (see below).

4.8 Strontium Isotope Analysis

Analysis of strontium isotope ratios from human dental enamel and bone, combined with data on strontium isotope ratios for geological zones in the study region can document the geological locale of an individual's childhood and last ten years of life; thus, place of

childhood and residential mobility can be identified in many cases (Grupe et al., 1997; Price et al., 1994; Price et al., 2002; Price et al., 2000). “Strontium isotope ratios [expressed as $^{87}\text{Sr}/^{86}\text{Sr}$] are signatures for local geologies” (Price et al., 2000:903), and food grown in the local area will exhibit the same strontium isotope ratio as the geology, and individuals consuming those local foods will also exhibit the same ratio (Grupe et al., 1997; Price et al., 1994; Price et al., 2002; Price et al., 2000). Thus, the strontium signature obtained from an individual’s enamel and bone reflects the geological zone of his/her diet during childhood and adulthood, respectively (Price et al., 1994; Price et al., 2002).

There are four strontium isotopes that can be found in the earth’s geological formations: ^{84}Sr , ^{86}Sr , ^{88}Sr , and ^{87}Sr ,³¹ and as these isotopes spread from the rocks to the soil and groundwater, they are absorbed by plants and animals (Price, 1989). The *total amount of strontium* absorbed by organisms varies (Burton and Wright, 1995), but because there is no isotopic fractionation, the *strontium ratio* does not change during biological processes (Faure, 1986; Grupe et al., 1997; Price et al., 1994:320). That is to say, the *proportion* of each strontium isotope absorbed by an organism does not differ because the four strontium isotopes have relatively small mass differences (i.e., the strontium isotopes are essentially the same size) (Faure, 1986). In short, while strontium content may differ between organisms, the strontium isotope ratio is the same because the four strontium isotopes are absorbed in equal proportions. Therefore, the strontium isotope ratio found in an individual’s tooth or bone matches that of the food that he/she consumed. As a result, this method is ideal for establishing the geological zone from which an individual’s diet was derived, and by extension, the zone in which an individual lived.

³¹ Only the latter is radiogenic, meaning that, in this case, it altered from rubidium (^{87}Rb) to radiogenic strontium (^{87}Sr) by spontaneously emitting electrons as its nucleus disintegrated (Faure and Powell, 1972).

Childhood residence can be established because as dental enamel forms during childhood, the enamel permanently incorporates minerals from the person's diet, and if local food is consumed, the enamel will reflect the mineral composition of the local geology (Grupe et al., 1997). After the tooth has formed, it no longer absorbs dietary strontium (Hillson, 1996; Price et al., 2002), so strontium content of tooth enamel is ideal for documenting where an individual resided during developmental years. However, because different populations may have different dental developmental rates, it is important to identify the tooth type and dental formation rate for the population under study. This study often used the second molar (unless otherwise indicated) because it was most commonly preserved, and based on dental eruption rates for "American Indians" (Ubelaker, 1989), this enamel typically forms between age four to ten years. Thus, the strontium signature from that tooth will reflect the geological origin of their food (and presumably where the child resided) during that particular age bracket.³²

Similarly, the strontium content of human bone reflects the local geology if local foods are consumed. However, in contrast to enamel that absorbs strontium during development, the strontium content of human bone reflects the last seven to ten years of an individual's life because that is the approximate time needed for osteoclast and osteoblast activity (i.e., the breakdown and build-up of bone) to remodel the bone tissues (Lowenstam and Weiner, 1989). Therefore, if strontium isotope ratios differ between the enamel and bone of a person, then it can be suggested that the individual migrated out of his/her place of childhood (or at least consumed foods grown in another geological locale).

³² Theoretically, more specific ages can be established depending on the tooth section used in analysis. However, this was not done in this study.

For this study, strontium isotope ratios from Conchopata bones and teeth were compared to the local Ayacucho strontium signature as established by the geology and modern fauna (guinea pigs) from Ayacucho.³³ Because the central Andean highlands are composed of late Cenozoic igneous rock, they should show a strontium isotope ratio around 0.7055 – 0.7068 (Hawkesworth et al., 1982), and the values obtained from the local fauna should fall within that range. Indeed, the strontium isotope ratios from three Ayacucho guinea pigs are: 0.7058 ± 0.0008 ; 0.7063 ± 0.0007 ; and 0.7118 ± 0.0008 (Knudson 2003, Pers. Comm). Given that the expected values of late Cenozoic rock formations, which comprise most of the Ayacucho Basin, range from 0.7055 to 0.7068 (Hawkesworth et al., 1982; Migard et al., 1984), the strontium isotope ratios from two of the guinea pigs are expected, but the ratio from the third is considered aberrant (i.e., 0.7118).³⁴ Therefore, the expected strontium isotope ratio for individuals consuming foods from Ayacucho should show values in line with the first two guinea pig strontium values, or specifically, the strontium value for an organism from Ayacucho should equal $0.7060 \pm$ two standard deviations (0.7054 – 0.7067) (Table 4.2). If an enamel sample shows a strontium isotope ratio of 0.7054 – 0.7067, then the individual consumed foods from the Ayacucho region (or one with similar geology) during his/her childhood; by extension, the person likely resided in that geological location. Similarly, if strontium values from bone match the local Ayacucho range, then the individual consumed foods from the Ayacucho area during the last seven to 10 years of his/her life and likely lived there as well. If the observed strontium isotope values fall outside the expected

³³ Price (2002) suggests using small animals from the study region because they are less likely to roam across long distances and consume foods from a variety of geological zones.

³⁴ There are some Paleozoic geological formations in the Ayacucho region that could potentially lead to higher strontium values if foods were grown in or water was consumed from those areas (Hawkesworth et al., 1982; Migard et al., 1984); this will be taken into account in the interpretation of the strontium isotope data.

range, then the individual is considered “non-local” or “foreign.” The strontium isotope ratio for the Titicaca Basin in the southern, highland Andes, which is the imperial center of the Tiwanaku empire that is contemporaneous with Wari, has also been established (Knudson et al., 2004). Thus, strontium values from Ayacucho specimens can also be compared to the strontium value for that southern region (Table 4.2).

Table 4.2. Known strontium isotope ratios for two Andean regions.

Expected Strontium Isotope Ratio for Individuals from Ayacucho (Central Andes)	Expected Strontium Isotope Ratio for Individuals from the Titicaca Basin (southern Andean highlands)
0.7054 - 0.7067*	0.7090 - 0.7104^

*Based on strontium values from Ayacucho guinea pigs (Knudson, 2003, Pers. Comm.) and strontium signatures for late Cenozoic geological formations (Hawkesworth et al., 1982), which comprise much of Ayacucho (Migard et al., 1984).

^Based on strontium values from Titicaca guinea pigs (Knudson et al., 2004).

All enamel and bone samples were prepared by Kelly Knudson at the Laboratory for Archaeological Chemistry (LARCH) at the University of Wisconsin, Madison. Thereafter, Paul Fullagar and Kelly Knudson collected the strontium data via thermal ionization mass spectrometry at Fullagar’s Isotope Geochemistry Laboratory at the University of North Carolina, Chapel Hill (UNC-CH). The UNC-CH Isotope Geochemistry Laboratory uses a VG Sector 54 thermal ionization mass spectrometer (TIMS) in quintuple-collector dynamic mode (Fullagar, pers. comm. 2003). Internal accuracy for strontium carbonate is usually 0.0006 – 0.0009% standard error (Fullagar, pers. comm. 2003). Thus, this small margin of error has little impact on the strontium ratio results from Conchopata, presented in Chapter 9. Specifics of the laboratory methods are detailed elsewhere by Grupe and colleagues (Grupe et al., 1997).

4.9 Statistical Methods

All statistical tests were performed with SPSS 11.0 and SAS 8.1, depending on the particular test being performed. Specifically, SPSS 11.0 was used to run Fisher's exact test and Pearson's chi-square test to evaluate the correspondence between distributions of two or more populations (Shennan, 1997) and to determine if a null hypothesis could be rejected.³⁵ The former test was used when comparing two sets of variables and the latter was used when comparing more than two sets of variables.³⁶ In all cases, the null hypothesis states that there is no relationship between the variables being assessed. The significance level (α) for rejecting a null hypothesis is 0.05. Therefore, if the p-value generated from the Fisher's exact test or Pearson's chi-square test is less than 0.05 (α), then the null hypothesis is rejected, and the alternative hypothesis is accepted.

The statistical package, SAS 8.1, was used when comparing outcomes for variables with more than two possible results. For example, the location of a head wound could be on one of five different cranial regions: 1) anterior; 2) posterior; 3) superior; 4) left lateral side; and 5) right lateral side. First, to establish if the distribution of observed head wounds significantly differed from a symmetrical distribution (i.e., equal number of wounds on each location), the observed was contrasted to the expected even distribution. If it was shown to significantly differ, then the next step entailed contrasting one area (that with the highest wound count) to the average of the other four areas to determine if one part of the head showed significantly more wounds. The contrast was done in the context of a log linear

³⁵ Because the chi-square test requires that expected cell counts be greater than five, Fisher's exact test is better suited for small sample sizes, a characteristic of archaeological samples. Moreover, given that Fisher's exact test is more accurate for determining if the relationship between proportions is significantly different (Agresti, 1990), this is used in place of a Pearson's chi-square test whenever possible.

³⁶ Because Fisher's exact test is computationally intensive to run, the computer could not run this kind of tests when more than two sets of variables were being compared.

model, such that the natural log of the count for the region with the greatest number of wounds was contrasted to the log of the geometric mean of the observed counts on the other four regions of the head.³⁷ This statistical test was performed only on the La Real skeletal sample, as that was the only site with human remains showing high counts of distinctly located cranial wounds.

4.10 Summary

Bioarchaeological methods provide the means to reconstruct the lifeways and health status of individuals and communities. Data on age at death and sex are collected to reconstruct population profiles to inform our understanding of social organization in the heartland and hinterland of the Wari Empire. The skeletal observations for cranial marrow hyperplasia facilitate a general re-creation of childhood health among children and retrospectively among adults.

Healed and un-healed skeletal trauma is documented, and the source of the injury is categorized as accidental or intentional whenever possible. Based on these data, frequencies of intentional traumas are calculated and compared between age and sex groups and communities.

In addition to examining the biological health status of each community, ceremonial practices that included the sacrifice and/or ritual use of human body parts are also identified. Specifically, trophy heads are carefully examined to determine their age, sex, and health status in order to address questions regarding their role in Wari society. The Wari trophy

³⁷ The log of the geometric mean was established by calculating the log of each count, summing them, and dividing that value by the number of variables. This is expressed as the following:

$$\log \text{ of the geometric mean} = \frac{\sum \log(x_i)}{n}$$

head style also is documented and compared to trophy heads from other Andean regions. Thus, this Wari ritual practice is placed within an Andean context, giving the practice historical depth and geographical breadth.

Strontium isotope analysis is used to establish the origin and residential mobility of Conchopata inhabitants and trophy heads. The strontium isotope ratios are used to determine if Conchopata adults were locals or non-locals, and specifically, to identify whether adult females or males immigrated to Conchopata. Strontium data from trophy heads are used to determine if trophy head victims were from the local Ayacucho region.

Chapter 5 Population Profiles of Communities in the Wari Empire

5.1 Introduction

This chapter presents the demographic composition for each of the three sites examined in this study. First, the minimum number of individuals (MNI) is reported for the entire site of Conchopata; however, because this settlement included two temporal components—pre-Wari and Wari—the demographic distribution for each time period is presented separately. This is followed by the demographic compositions of Beringa and La Real.

5.2 Results: Demographic Distribution at Conchopata

The MNI at Conchopata is 300: 269 individuals and 31 trophy heads.³⁸ This is based on summing the MNI for each discrete architectural space (*Espacio Arquitectónico* or EA). For this study, human skeletal elements from 36 architectural spaces are analyzed: three architectural spaces are Huarpa (pre-Wari) and 33 are Wari. The spatial distribution of skeletal elements was carefully examined to ensure that bone mixing between rooms did not inflate the MNI. For example, Architectural Spaces 39A, 39B, 39C, 39D, and the surface of Architectural Space 88 exhibited evidence for commingling (see Figure 5.1 for locations of architectural spaces). Thus, the MNI for these five spaces was calculated together, rather

³⁸ Sixty-seven of the 300 individuals were inventoried by Marc Lichtenfield and added to the Conchopata Project bioarchaeology database. There are no pathological data for these persons, only age and sex. See Appendix X for the Lichtenfield Conchopata Project data.

than calculating them separately and summing them.³⁹ (See Appendix III for list of architectural spaces and associated MNI.)

The MNI for the Huarpa occupation is 27, and the MNI for the Wari period is 273 (242 individuals and 31 trophy heads).⁴⁰ In continuation, all results are presented for each temporal component. When percentages of each age group are presented, they will always be accompanied by the sample size (N); that is, N = sample size throughout this dissertation.

In most cases, the age-at-death profiles discussed below are based on general age class assignment rather than specific age designations because commingled bones and poor preservation prevented the latter. As a result, formulas for reconstructing life tables, survivorship, and life expectancy are not calculated because the broad age ranges would lead to inaccuracies. Instead, only the age-at-death distributions are reported.

³⁹ Only the surface of EA88 was considered with the EA39 spaces. The deeper strata of EA88 were undisturbed, so their MNI could be calculated separately.

⁴⁰ Conchopata has two occupations: the pre-Wari (Huarpa phase, or early Mendoza phase, AD 400 – 550, which is the latter part of the Early Intermediate Period) and the Wari (Middle Horizon, AD 550 – 1000). I use the terms pre-Wari and Huarpa interchangeably throughout this chapter.

5.2.1 Huarpa (pre-Wari) Age-at-Death Distribution

Twenty-seven individuals derive from three architectural spaces dating to the pre-Wari component. These spaces are interpreted as ceremonial and include Architectural Space 100 (an area containing a circular structure with smashed ceramic offerings), Architectural Space 104 (the Pink Plaza), and “Eb-3” (excavated during the 1977 excavations and located immediately west of the Pink Plaza). Among these 27 individuals, one-third are infants and children (<15 years-old), and two-thirds are adolescents and adults (>15 years-old) (Figure 5.2). A closer look at the age distribution (Figure 5.3) shows that adolescents constitute the greatest portion at 22 percent (6 out of 27), which is notable given that it includes only those between ages 15 to 19 years-old. Infants and old adults make up the next largest proportion at 19 percent each, and children and young adults each constitute 15 percent. Middle-aged adults represent only 11 percent of the burial population. No fetuses were recovered from the Huarpa tombs.

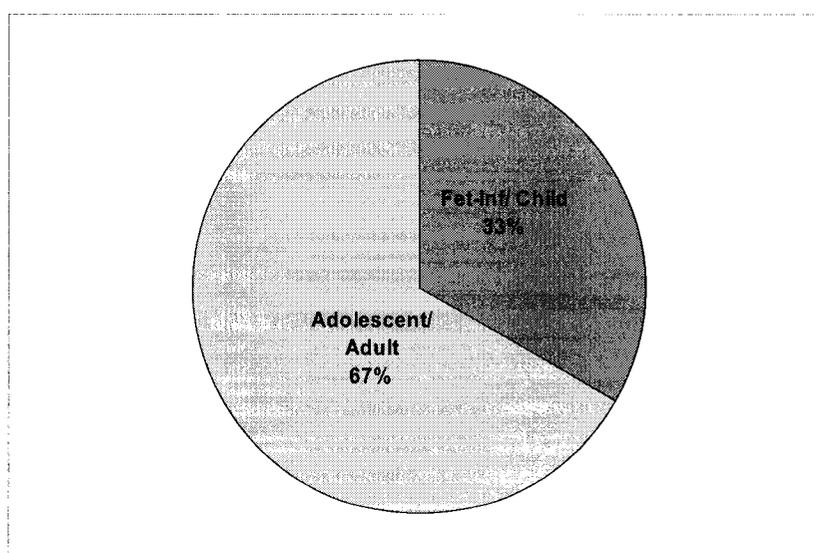


Figure 5.2. General age-at-death distribution for individuals interred during the Huarpa occupation (N=27). (N = sample size)

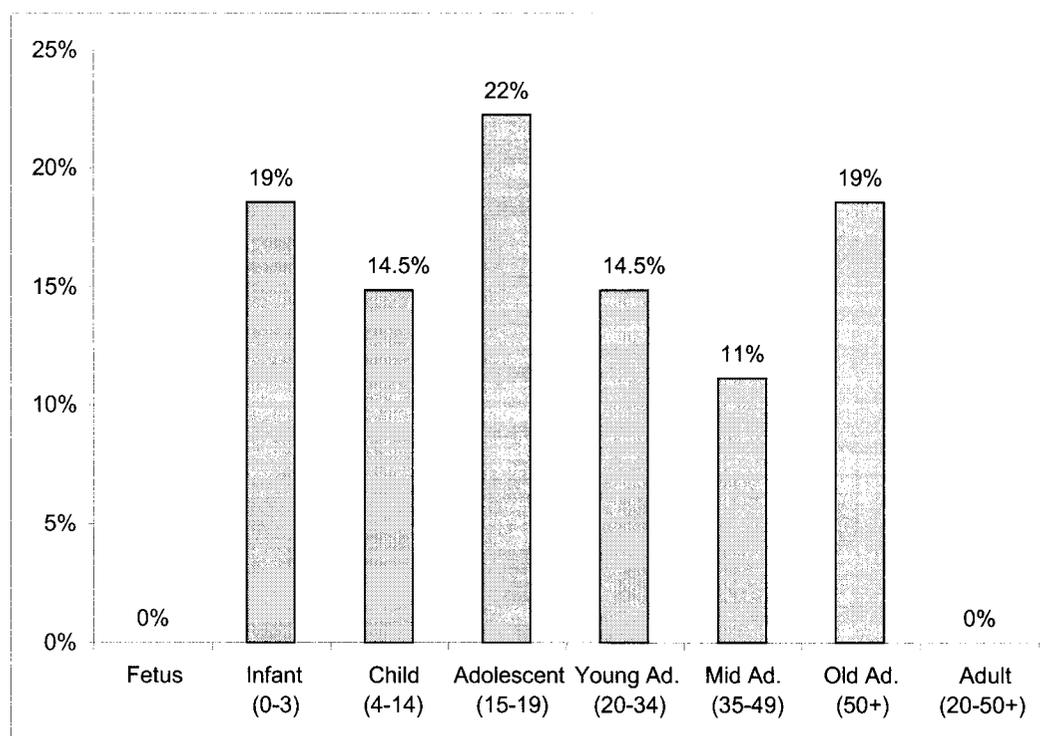


Figure 5.3. Age-at-death distribution for individuals interred during the Huarpa occupation (N=27). Note that the last column is the unspecified adult age group (20-50+). (N = sample size)

5.2.2 *Huarpa Sex Distribution*

During the pre-Wari phase, females far outnumbered males. Among the 16 adults whose sex could be determined, women and men constitute 87.5 percent and 12.5 percent, respectively (N=16) (Figure 5.4). The Huarpa sex profile does not conform to the sex distribution of a normal human population (i.e., a 1:1 ratio of males and females). Instead, the male to female ratio among the 16 adults is 1:7. Moreover, the observed sex distribution is significantly different from a symmetrical distribution. Using Fisher's exact test, the two distributions are compared (observed vs. theoretical symmetrical), and they are statistically significantly different ($p=0.0021$; N=16). Clearly, there are more female burials than would be expected for a normal human population during the Huarpa phase.

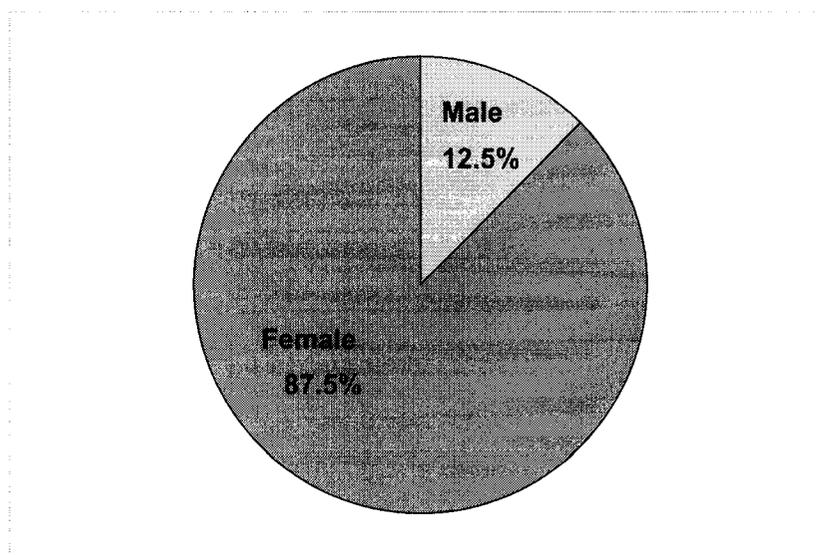


Figure 5.4. Huarpa phase sex distribution of confidently sexed individuals and probable males and females combined (N=16). (N = sample size)

5.2.3 *Wari Period Age-at-Death Distribution*

Among the 273 individuals interred during the Wari occupation, 242 are formal burials, while 31 are trophy heads recovered from ritual structures. The 242 Wari component burials derived from 33 architectural (mortuary) spaces, and the latter group constitutes a unique category that is not examined in conjunction with the rest of the mortuary sample. Thus, data on the Conchopata trophy heads are separated from data on the general mortuary population; the trophy head data are presented in Chapter 8.

The age-at-death distribution for these burials is nearly evenly divided between two general age groups: 1) fetus/infants/children (<15 years-old); and 2) adolescents/adults (>15 years-old). The former group makes up 49 percent of the sample (118/242), while the latter constitutes 51 percent (124/242) (Figure 5.5). A detailed look at the age-at-death distribution shows that infants and children make up 22 and 24 percent of total deaths, respectively. Young adults (20-34 years-old) constitute the next largest portion at 17 percent, followed by middle-aged adults who make up 12 percent. Old adults (50+ years) and adolescents (14-19

years) each represent five percent, and adults who could not be specifically aged make up 12 percent of the burial population. The presence of seven disassociated fetuses (i.e., not in the womb of a female) constitutes the final three percent of the population (Figure 5.6).⁴¹ Notably, the fetus, infant, and child deaths constitute nearly half of the mortuary population.

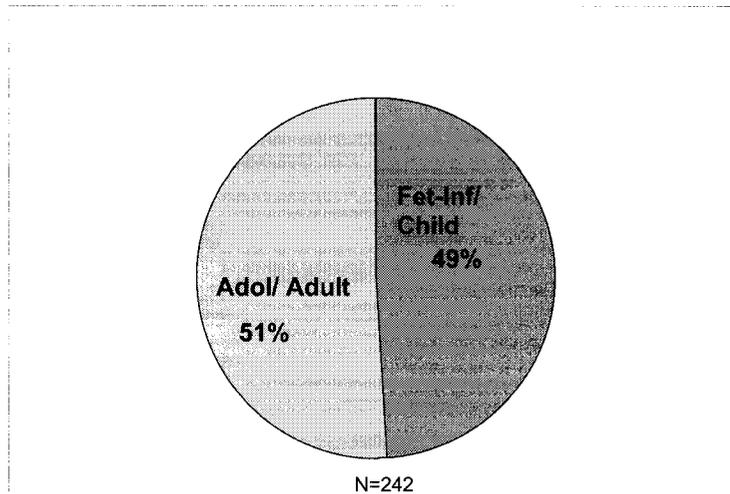


Figure 5.5. General age-at-death distribution at Conchopata during the Wari occupation, showing the two general age categories (N=242). (N = sample size)

⁴¹ The tally of seven fetuses does *not* include the one that was in the womb of the pregnant female in Architectural Space 105 (discussed below).

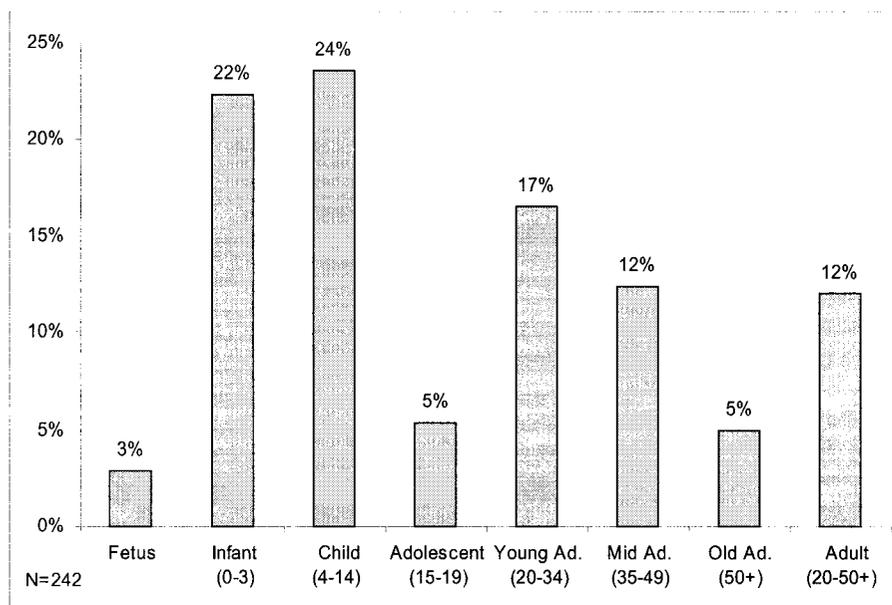


Figure 5.6. Age-at-death distribution during the Wari occupation (N=242). Note that the last column is the unspecified adult age group (20-50+).

5.2.4 *Wari Period Sex Distribution*

The sex profile during the Wari component shows many more females than males. Among the 81 individuals whose sex could be determined, 50 were female (62%) and 31 were male (38%) percent (Figure 5.7). This represents an asymmetrical sex ratio; the male to female ratio is 1:1.65, indicating that for every male, there were nearly two females. The unbalanced sex ratio is also apparent when the observed frequencies are compared to an equal sex distribution where females and males should constitute 50 percent of the population each. Using Fisher's exact test to compare the observed to the expected (i.e., symmetrical distribution), the sex distributions are shown to be statistically significantly different ($p=0.0176$; $N=81$). Thus, there are significantly more women at Conchopata than would be expected in a normal human population, a characteristic shared with the preceding period, though less marked.

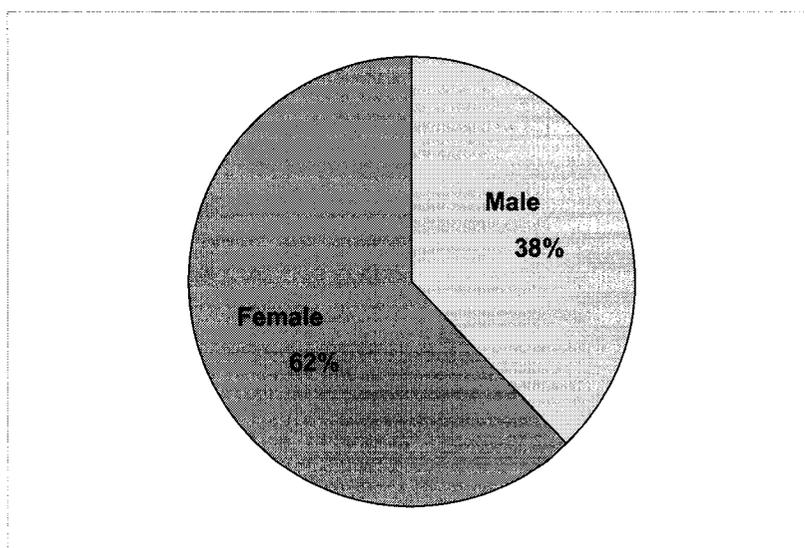


Figure 5.7. Sex distribution of males and females at Conchopata during the Wari temporal component (N=81).

The age-at-death profile for males and females are distinct. More than half of the women at Conchopata died during their reproductive years. Among the 46 females who could be specifically placed into one of four non-youth age categories—adolescent, young adult, middle-aged adult, and old adult—57 percent belong to the first two age categories (26/46=57%). They likely represent women in their child-bearing years (15 – 34 years-old). Notably, nearly one-quarter of the female population is represented by women over the age of 50 years, possibly suggesting high life expectancy among women (Figure 5.8). In contrast, among 27 males who could be aged, only four percent survived beyond 50 years-old. The majority died in middle middle-age (35 – 49 years-old) (14/27=52%). Young adults (20 – 34 years-old) represent the next largest age group at 41 percent. Together, young and middle-aged men constitute more than 90 percent of adult male deaths, leaving adolescent boys and old adult males to constitute three and a half percent each (Figure 5.8).

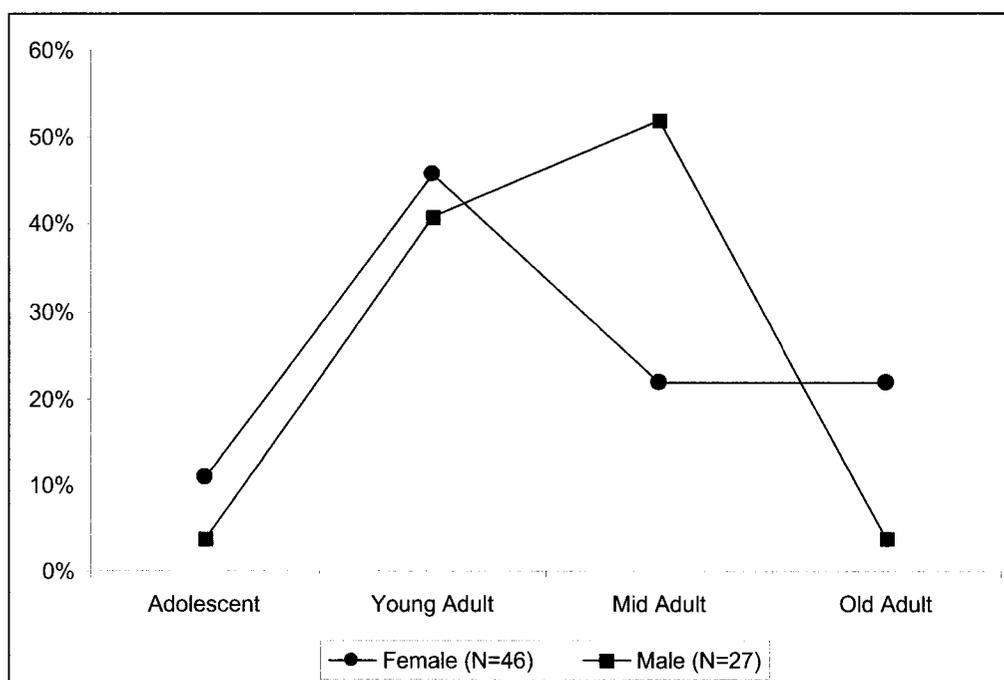


Figure 5.8. Age-at-death distributions of male and females at Conchopata during the Wari period (Females, N=46; Males, N=27).

5.3 Results: Demographic Distribution at Beringa (Majes valley)

The MNI at Beringa for both time periods combined (Middle Horizon and Middle Horizon/Late Intermediate Period) equals 238 individuals: 236 individuals and two trophy heads. The total MNI for the site was calculated by summing the MNI for each excavation unit, with the exception of Unit 1 and Unit 19, which were combined because looters mixed materials between the two spaces. (However, Locus 1030 within Unit 19 was not collapsed with Unit 1 because it was clearly a discrete space with one mummy bundle.) Units 13, 20, and 25 were excluded from the total MNI because bones from those areas could have derived from other spaces. Excluding them prevented an overestimation of the MNI.

5.3.1 Age and Sex Distributions for the Entire Skeletal Sample from Beringa

Among the 236 individuals from *both* temporal periods, 48 percent are infants and children, and 52 percent are over 15 years-old. One-third of the sample is represented by

fetuses and infants: 4 fetuses and 74 infants (none of the fetuses was recovered from a female's pelvis). Children constitute 15 percent and adolescents between 15 and 19 years-old make up nine percent of the skeletal population. Adults comprise the remaining 43 percent: young adults, middle-aged adults, and old adults constitute 21 percent, 13 percent, and four percent, respectively. Adults with no specific age assignment make up the last five percent (Figure 5.9).

The sex distribution is evenly divided between males and females. Among the 78 adults whose skeletal sex was determined, 39 are male and 39 are female.

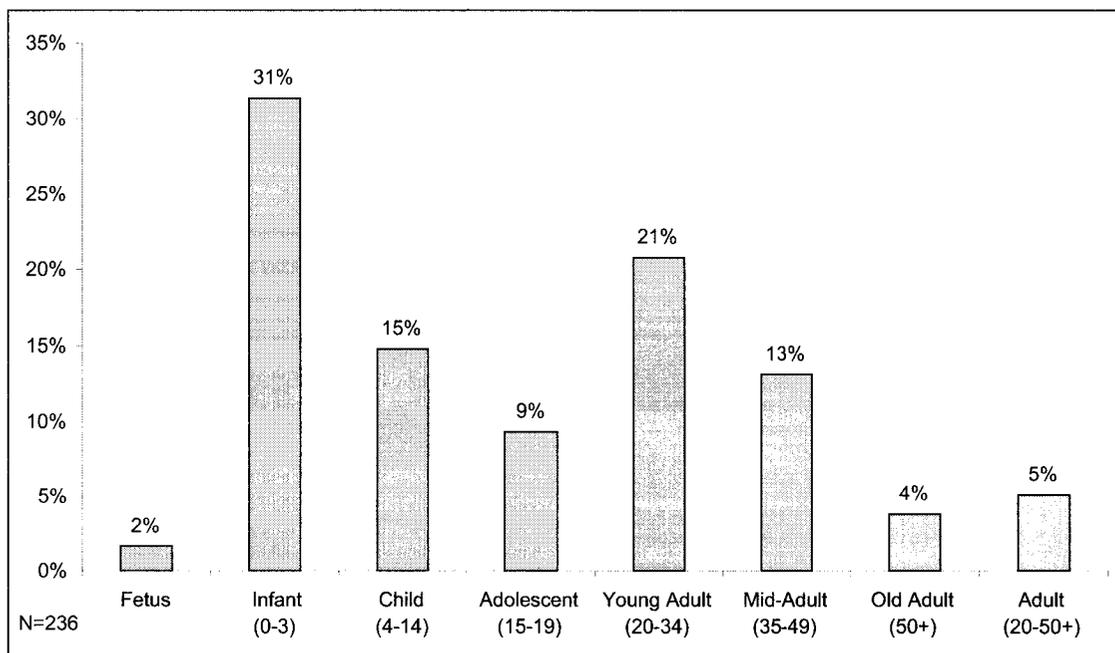


Figure 5.9. Age-at-death distribution of Beringa inhabitants from *both* time periods combined (N=236) (excludes two trophy heads). Note that the last column is the unspecified adult age group (20-50+).

5.3.2 Middle Horizon Period Age-at-Death and Sex Distributions at Beringa

Although there are a total of 236 individuals and two trophy heads, only a portion are derived from the Middle Horizon period, the time of Wari presence in the Majes valley. All following discussion focus only on human remains attributable to that time period. (See Table 2.4 for the list of units and loci that were assigned to the Middle Horizon.)

There are at least 151 individuals associated with the Middle Horizon temporal component, and more than half are under 15 years-old. Specifically, the age-at-death distribution shows that one-third are fetus and infants, and 23 percent are children. Adolescents between 15 to 19 years of age make up nine percent, and young adults constitute 13 percent. Middle-aged adults represent 14 percent, while old adults constitute only five percent of the age-at-death profile. The remaining three percent are adults who can not be specifically aged (Figure 5.10). The sex profile for the Middle Horizon Period exhibits a nearly equal distribution among the 42 sexed adults: 22 are females (48%) and 20 are males (52%) (Figure 5.11).

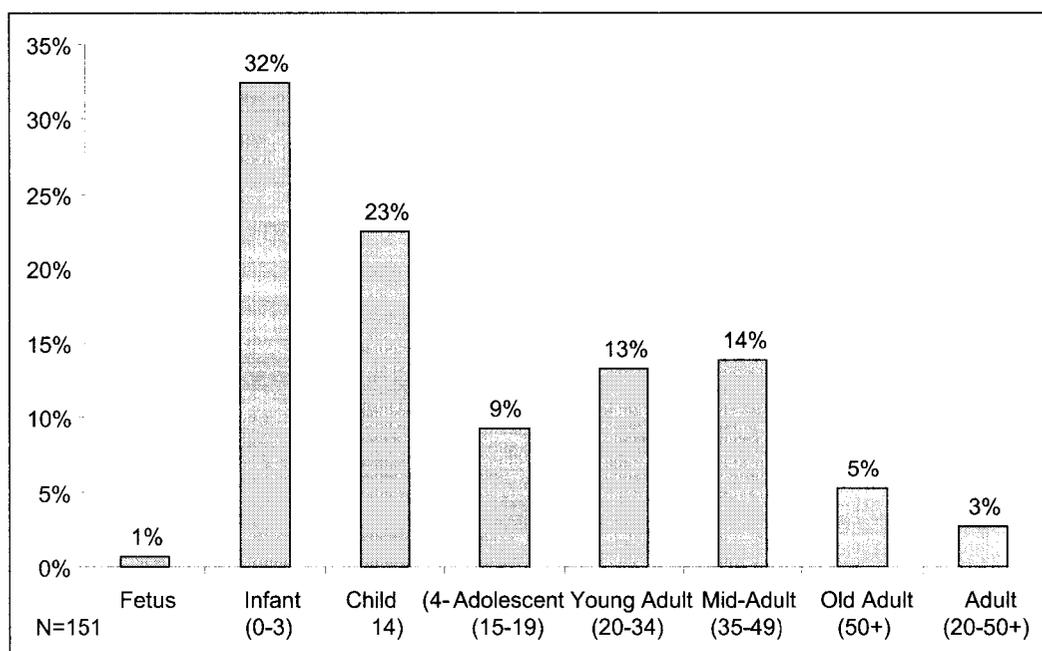


Figure 5.10. Age-at-death distribution for Beringa individuals associated with the Middle Horizon temporal component only (N=151). Note that the last column is the unspecified adult age group (20-50+).

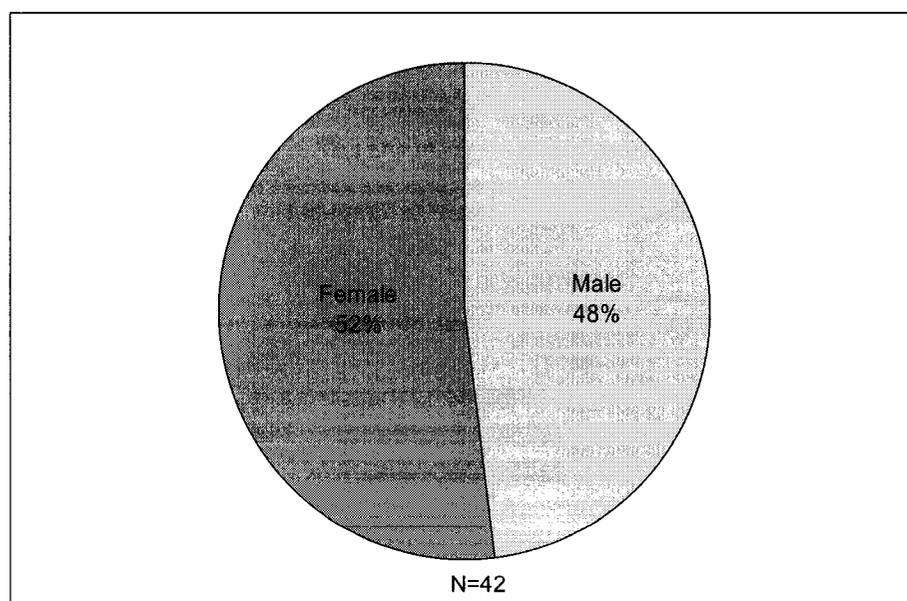


Figure 5.11. Sex distribution for Beringa individuals associated with the Middle Horizon Period temporal component only. (N=42)

5.4 Results: Demographic Distribution at La Real (Majes valley)

At the Middle Horizon ceremonial and mortuary site of La Real, the MNI is 145. This is based upon 109 crania from adults and adolescents over 15 years of age, 19 crania from children, 14 crania from infants, plus three mandibulae from young children whose ages clearly differed from the others (i.e., these mandibulae did not belong to the other crania). The next section divides these age groups into smaller categories.

5.4.1 *Age-at-Death Distribution*

Among the 145 individuals, the greatest percentage derives from individuals over age 15. Three-fourths of the skeletal sample ($109/145 = 75\%$) are represented by adults and older teenagers, and the remaining one-fourth ($36/145$) includes infants and children (<15 years-old) (Figure 5.12).

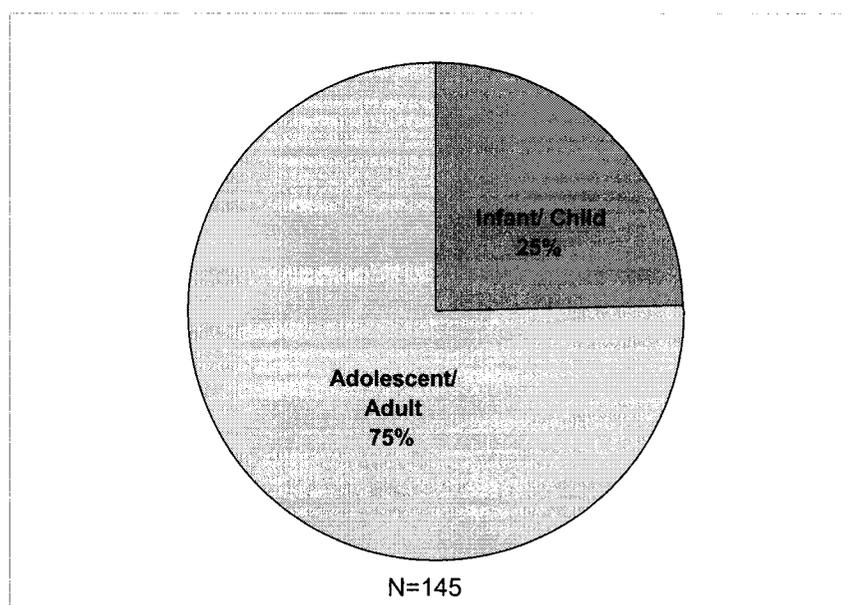


Figure 5.12. The La Real age-at-death distribution, showing the two general age groups (N=145).

Specifically, among the 145 individuals, infants constitute 10 percent (14/145) of the sample, and children (3-14 years) represent 15 percent (22/145) (Figure 7.2). Seven

individuals are adolescents between 15-19 years-old (5%), and 49 are young adults (20-35 years) (34%), while only 12 are middle adults (35-50 years) (8%) and 11 are old adults (50+ years) (8%) (Figure 5.13). The remaining 30 are adults that could not be specifically aged (21%). When the child age group is further divided, 10 of the 22 children are between ages three and seven years, while 12 are eight to 14 years-old. No fetuses are in this skeletal sample.

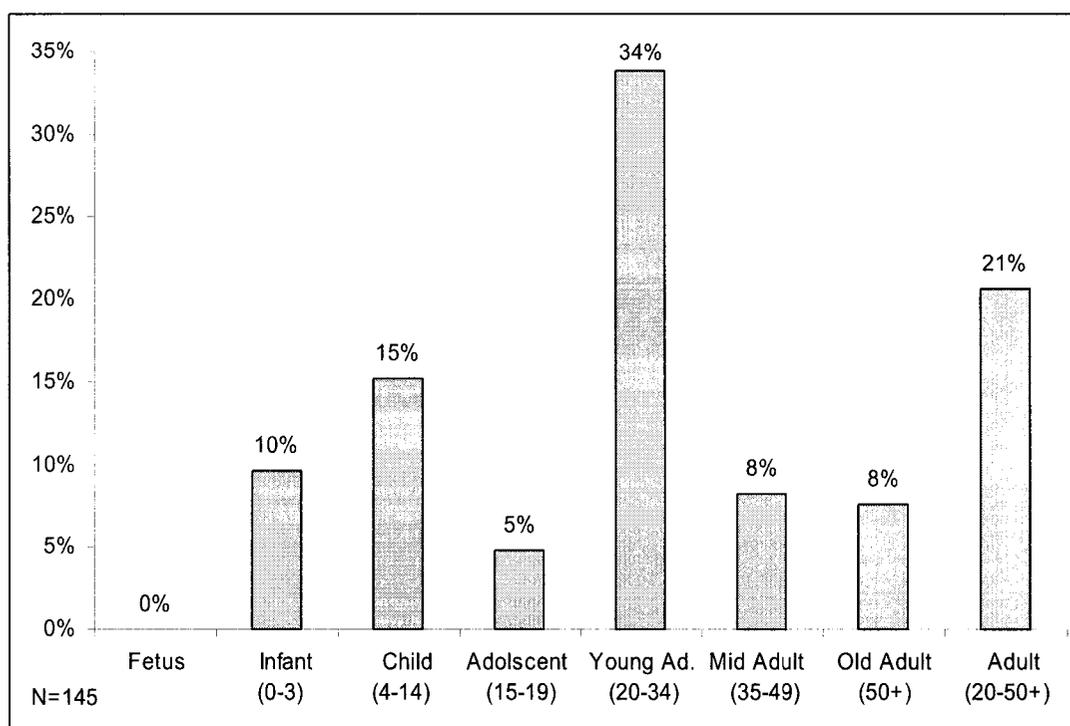


Figure 5.13. The La Real age-at-death distribution for all age categories (N=145). Note that the last column is the unspecified adult age group (20-50+).

5.4.2 Sex Distribution

Analysis of the sex distribution shows a greater proportion of males than females at La Real. Among the 67 individuals whose sex could be determined, 26 were female (39%) and 41 were male (61%) (Figure 5.14). The sex profile at La Real does not exhibit an equal sex distribution. Instead, there are slightly more than one and a half males to every female: a

female to male ratio of 1:1.61. In other words, men are over-represented relative to a normal sex distribution. A Fisher's exact test comparing the observed sex distribution to a symmetrical distribution shows that the differences are statistically significant (Fisher's exact, $p=0.0432$, $N=67$).

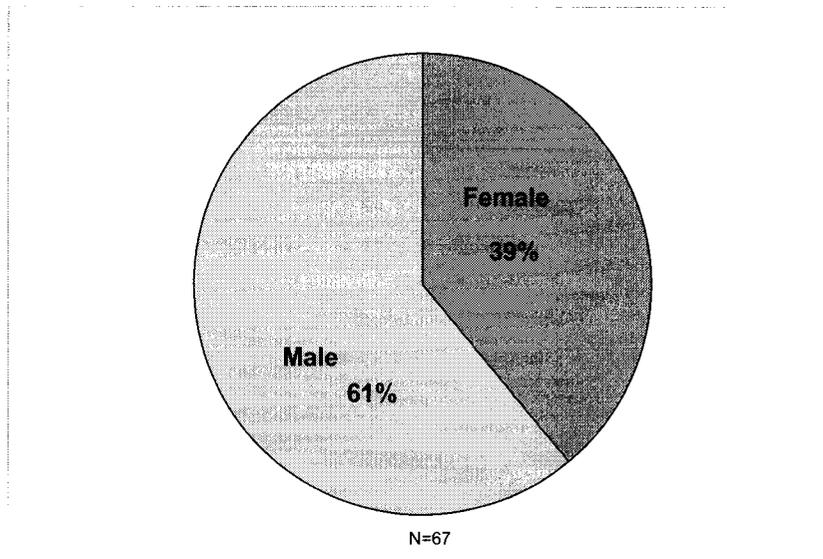


Figure 5.14. Sex distribution of La Real individuals ($N=67$).

5.5 Discussion and Comparisons

5.5.1 Discussion of Conchopata Huarpa (Pre-Wari) and Wari Population Distributions

At the Wari heartland site of Conchopata, the Huarpa temporal component shows a sex distribution in which women are seven times more common than men, and the age-at-death distribution shows that adolescents constitute the greatest percentage of deaths (Figure 5.15). In particular, five of the six adolescents are female; the sixth is of indeterminate sex. Although infants, older adults and one male do appear in the sample, the Huarpa demographic profile is not representative of a normal population where males and females are typically evenly distributed (Howell and Kintigh, 1996; Milner et al., 2000). However, it

is possible that Huarpa males were buried elsewhere at Conchopata and have not yet been recovered. Nevertheless, among the Huarpa mortuary areas encountered thus far, young females certainly outnumber males; perhaps teen-age females were preferentially selected for burial in Eb-3 and Architectural Space 104. These females appear to have been high status based on associated grave goods, such as copper tupus and bone pins used for headdresses (Tung and Cook, n.d.); moreover their burial placement within and near ceremonial areas (i.e., the Pink Plaza) undergirds the notion that they were high status individuals (Isbell and Cook, 2002). Thus, data on the Huarpa demographic profile and archaeological context suggest that high-status adolescent women, as well as infants and old adults constitute the majority of burials at Conchopata during the Huarpa phase.

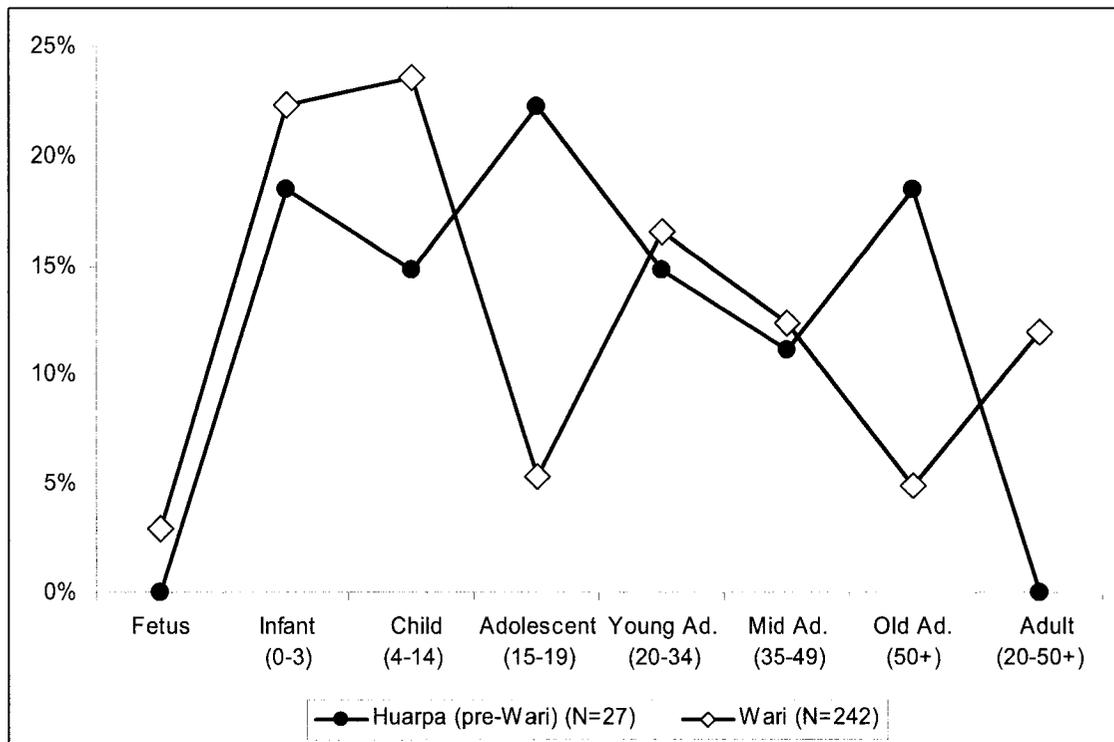


Figure 5.15. The age-at-death distribution for Huarpa and Wari temporal components at Conchopata.

At Conchopata, the Wari demographic profile is distinct from the preceding period (Figure 5.15), particularly in terms of infant and female deaths. There is a larger proportion of infant and child deaths in the Wari period; one-quarter of the deaths were among fetus and infants and nearly a quarter were among children. Thus, the change in age-at-death distributions may reflect differences in fertility rates (Milner et al., 2000:481). Indeed, Sattenspiel and Harpending (1983) and Paine and Harpending (1996) argue that age-at-death profiles are more reflective of fertility than mortality. Therefore, the fewer infant deaths in Huarpa times relative to the subsequent Wari period suggest a slight increase in fertility rates from the Huarpa to Wari temporal components. Moreover, more than half of the women were of reproductive age, which supports the interpretation that fertility rates may have increased through time. If, on the other hand, the Huarpa period demographic profile is reflecting biases in mortuary practices and not the actual demographic distribution, then it can not be suggested that fertility increased in the Wari period.

The Wari period demographic profile also illustrates that the Wari period sex distribution significantly deviates from a symmetrical sex distribution. Women outnumber men nearly two to one overall, and in the oldest age group they outnumber men more than six to one (see Figure 5.8, above). This biased sex distribution is probably not the result of differential preservation because fragile elderly female bones may degrade at faster rate than male skeletal elements (Walker et al., 1988). It is possible that Wari period mortuary practices included different burial areas for males and females and excavations have yet to discover a male mortuary sector, but this seems improbable because many parts of the site have been excavated (Isbell and Cook, 2002; Ochatoma and Cabrera, 2000), and both males and females have been uncovered together in tombs (see Appendix III, which lists the MNI

and age and sex distributions for each architectural space with a tomb). Moreover, there are only two sex-specific tombs: one included three females with two children (EA 150) and the other included three males (EA 44A).⁴²

This author suggests that the reconstructed sex distribution probably reflects the proportion of males and females who once inhabited this site. Thus, the high female-to-male ratio may be an indicator of Conchopata's community organization. Earlier studies by this author (Tung, 2001) presented the biased sex distribution at Conchopata, prompting Isbell (Isbell and Cook, 2002) to suggest that the higher preponderance of females represented polygyny among elites. This is certainly a possibility and stands as a working hypothesis to be tested with additional research. However, although one of the tombs (Architectural Space 105) included five adult females and one male (and another adult who was unsexed), the sole male was only 23-27 years old, which seems too young for a man to have acquired multiple wives. Within polygynous communities, males with numerous co-wives tend to be older. Moreover, the young male and an old female in the tomb both exhibited a vastus notch on the patella, a genetic trait that may be indicative of genetic relatedness (Finnegan, 1978). Therefore, perhaps the male and elderly female were related through biology, not marriage.⁴³ Finally, the unsexed adult prohibits conclusive statements about Conchopata social organization as reflected in this tomb's demographic composition. Overall, while the high female-to-male ratio is suggestive of polygyny, other forms of social organization could explain this unequal sex distribution.

⁴² The bones recovered from Architectural Space 44A were probably originally buried in EA38A. It appears that looters tossed their bones from one space into the neighboring room (See Figure 5.1, map of Conchopata).

⁴³ Granted, it is possible that females married their brothers, similar to what was practiced by the Inka lords several centuries later.

The unbalanced sex profile has been interpreted in other ways (Tung and Cook, n.d.). Given that many of the females were interred in high status tombs with great quantities of luxurious grave goods such as turquoise, *Spondylus* (an exotic seashell from the coast of Ecuador), copper, and gold, (Tung and Cook, n.d.), it may be that Conchopata was home primarily to females of a specialized class who participated in pottery production or feasting events for the Wari state (Cook and Glowacki, 2003). Similarly, these intermediate elite females may have been ritual specialists overseeing or participating in rituals involving the mutilation of human bodies (Tung and Cook, n.d.). It is also possible that the sex profile reflects Wari imperial policies that sent males away for state projects, including such things as administrative tasks or formal military campaigns; practices that were conducted by the subsequent Inka empire (D'Altroy, 2002). The deportation of men from Conchopata is not mutually exclusive with the possibility that females were specialists of some sort for the empire; both men and women at Conchopata could have served integral roles within the Wari state apparatus.

5.5.2 Discussion of Beringa Middle Horizon Population Distribution (Majes valley)

The demographic composition of the Middle Horizon (Wari era) community at Beringa parallels that expected for ancient populations (see Howell and Kintigh, 1996; Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel and Harpending, 1983). The sex distribution was characteristically symmetrical, suggesting that sub-groups based on sex may not have been transplanted or sent away on labor projects: practices conducted by the later Inka State.⁴⁴ Also, the balanced sex profile suggests that one sex did not suffer higher

⁴⁴ Although the Inka state often sent husbands and wives together on military campaigns or state farming projects (D'Altroy, 2002:217, 225), young, single men were often relocated, but not young woman (D'Altroy, 2002:217).

mortality rates than the other. The Beringa population suffered many infant deaths: one-third of the skeletal sample died before the age of three and an additional 15 percent of the population passed away before reaching age 15.⁴⁵ Clearly, the majority of deaths occur in the youngest age groups, and only five percent lived beyond the age of 50 years. Because there is no Early Intermediate Period (pre-Wari) skeletal sample from Beringa, it is unknown if the Middle Horizon infant death rate is an increase or decrease from the preceding period. Nevertheless, the high percentage of fetus and infant deaths (33%) suggests high fertility rates (Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel and Harpending, 1983) at Beringa, particularly in comparison to Conchopata where only 25 percent of the deaths were of fetus and infants. Overall, the demographic profile exhibiting an equal sex distribution and half of the deaths in infant and children matches expected population distributions (Howell and Kintigh, 1996; Paine and Harpending, 1996; Walker et al., 1988), suggesting that Beringa was a village of family groups whose overall population configuration was little altered by Wari imperialism. Furthermore, the archaeological data indicate that Beringa was a village community engaged in domestic activities and limited production of goods and foods for consumption at the site (Tung, n.d.).

5.5.3 Discussion of La Real Population Distribution (Majes valley)

All of the skeletal elements from La Real are associated with the Middle Horizon (Wari period), and the population composition of this series shows fewer infants and children than adults: the former constitute only one-quarter of the burial sample (see Figure 5.12,

⁴⁵ While these data suggest many infant deaths, the greater number of infant and child mummy bundles may have been partially affected by looting activity. Looters targeted adult mummy bundles because those were interred in easy-to-locate tombs and often included more grave goods than infant burials. However, because looters tended to remove grave goods, not bodies, the disturbance and under-representation of adult bones was probably minimal, so the relative age-at-death distribution between youths and adults appears accurate.

above). Also, the sex profile significantly differs from an equal sex distribution; there are slightly more than one and a half males to every female.

A low percentage of infants and children is common among archaeological skeletal samples (Howell, 1976; Paine, 1989; Paine and Harpending, 1996), which could reflect bias in preservation (Gordon and Buikstra, 1981; Walker et al., 1988), low fertility rates (Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel and Harpending, 1983), or mortuary practices that include separate burial areas for infants and adults (Angel, 1947; Carmichael, 1988; Moyer, 1989). Additionally, the under-representation of females could be related to differential preservation (Walker et al., 1988). But given the arid environment of the Majes valley where textiles, soft tissue, and hair were well preserved, it is improbable that the infant and elderly female bones at La Real degraded at a significantly greater rate than sturdy adult bones. Instead, the demographic profile may reflect mortuary practices of the communities who interred their dead at this site. La Real was a high status ceremonial and mortuary site with great quantities of high quality Wari goods (see Chapter 2) (de la Vera Cruz Chávez and Yépez Alvarez, 1995), so it is not surprising that its population distribution does not reflect that of a single settlement population. Rather, the La Real population distribution is indicative of supra-settlement affiliations with this ceremonial and funerary site. Thus, based on the individuals who were interred at La Real, it appears that infants and children were less likely than adults to be selected for interment, and among the adults, males were preferentially selected for burial at this high status locale. As will be discussed below, these males seem to have been part of a “warrior class” who likely participated in ritual battles common throughout parts of the prehispanic and modern Andes.

5.5.4 Comparisons

The age-at-death distributions for the three populations examined in this dissertation are clearly distinct from one another (Figure 5.16), and the differences are statistically significant ($\chi^2=72.369$; $p=0.000$; $df=14$; $N=538$). Conchopata has the greatest proportion of fetuses, but this probably reflects differences in the way each community treated fetus corpses. At Conchopata, several were placed in ceramic vessels capped by ceramic bowls; this special mortuary treatment probably led to greater preservation and retrieval of fetuses at Conchopata relative to the sites in the Wari hinterland. The lowest frequency of infant burials is at La Real, but as explained above, this probably reflects mortuary practices according to which infants were uncommonly buried there. Instead, it appears that young adults were preferentially selected for burial at the ceremonial and mortuary site of La Real. Given that the La Real skeletal series appears to represent a funerary group organized at the supra-settlement level or only a select group of individuals from one settlement, subsequent comparisons focus on the single settlement populations of Conchopata and Beringa only. That is, this author argues that the age-at-death profile of the La Real series likely does not reflect the demographic composition of a once-living population that inhabited a single settlement, whereas the Conchopata and Beringa series do. For the purposes of this discussion, it is useful to focus on the age-at-death distributions that derive from single settlements.

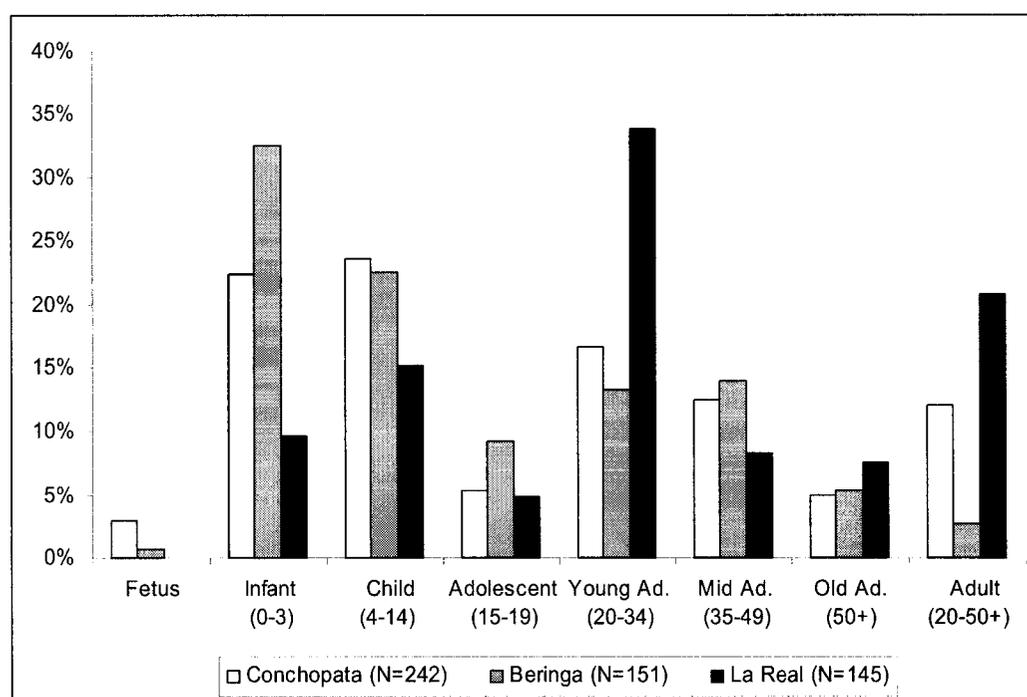


Figure 5.16. Age-at-death distributions for Conchopata, Beringa, and La Real populations (Middle Horizon Period only). Note that the last column is the unspecified adult age group (20-50+).

The number of individuals in each age category differ significantly between Conchopata and Beringa ($\chi^2=18.508$; $p=0.010$; $df=7$; $N=393$). The distinct age-at-death distributions may illustrate important differences between Wari heartland and hinterland communities (Figure 5.17). For example, there may have been differences in fertility rates between the two settlement communities (see Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel and Harpending, 1983). This is particularly apparent when fetus/infant deaths are compared between Conchopata and Beringa; the Beringa population shows more fetus/infant deaths relative to Conchopata, and the difference is nearly statistically significant (Fisher's exact, $p=0.058$; $N=393$). Given that the infant death rate is indicative of a population's fertility rate (see Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel

and Harpending, 1983), it appears that the Beringa community experienced a slightly higher fertility rate than the Conchopata community.

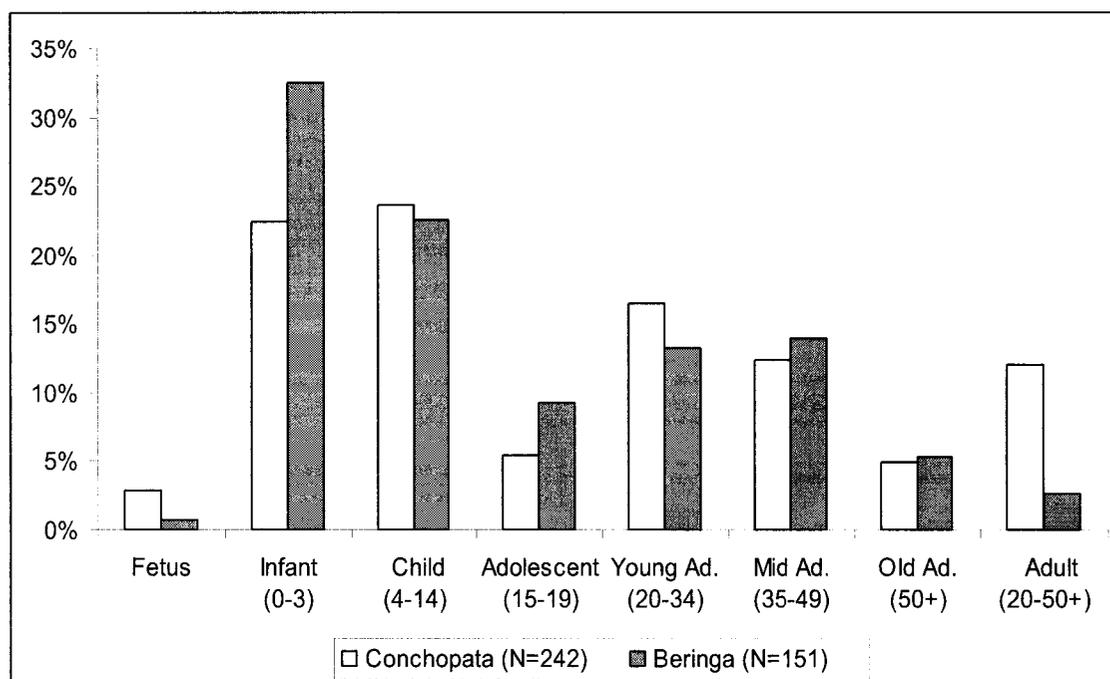


Figure 5.17. Age-at-death distributions for Conchopata and Beringa populations (Middle Horizon only). Note that the last column is the unspecified adult age group (20-50+).

Comparisons between the sex distributions of each series show that Conchopata has a greater proportion of females and La Real has a greater proportion of males; Beringa is unique among the three in that the sex distribution is nearly balanced. The differences in sex distributions between the three sites are statistically significant ($\chi^2=7.728$; $p=0.021$; $df=2$; $N=190$). This indicates that females and males were differentially represented within each community, perhaps suggesting differences in social organization based on sex. As discussed above, the Conchopata population shows significantly more females relative to a symmetrical sex distribution, and this probably relates to the ways in which the community was organized. Perhaps the Conchopata community was organized around polygynous

households or female descent lines with a greater proportion of women inhabiting Conchopata and taking on roles as producers and ritual practitioners for the state.⁴⁶ Additionally, Wari imperial policies may have sent males away on raids or military campaigns, a practice that need not be mutually exclusive from the practice of keeping numerous women at Conchopata to produce materials for rituals and to conduct rituals on the empire's behalf.

Archaeological evidence from Beringa indicates that it was a village community organized around household groups (Tung, n.d.), and the osteological data show that the inhabitants included equal numbers of men and women and all age groups. In contrast, the series from La Real shows significantly more men compared to an equal sex distribution, and as argued above, this is probably because men were preferentially selected for burial at this high status ceremonial and mortuary site. The individuals interred at La Real were likely derived from several settlements or represent only an exclusive portion of individuals from one settlement. Therefore, in order to compare single settlement populations (i.e., Conchopata and Beringa), the La Real series is eliminated from the comparison. The sex distributions among Conchopata and Beringa are not significantly different statistically (Fisher's exact test, $p=0.210$; $N=123$). Nevertheless, when the sex profile at Conchopata (62%-38%) is compared to a symmetrical distribution (50%-50%), it is significantly different, indicating a unique form of social organization at the Wari heartland site. In sum, Beringa shows an equal sex distribution, La Real exhibits significantly more males than females, and Conchopata displays significantly more females than males.

⁴⁶ As Chapter 2 illustrates, a primary activity at Conchopata was the production of beautifully painted pottery, much of which was intentionally destroyed in ritual structures (Cook and Glowacki, 2003; Isbell and Cook, 2002). The Conchopata females were likely involved in their production and ritual consumption.

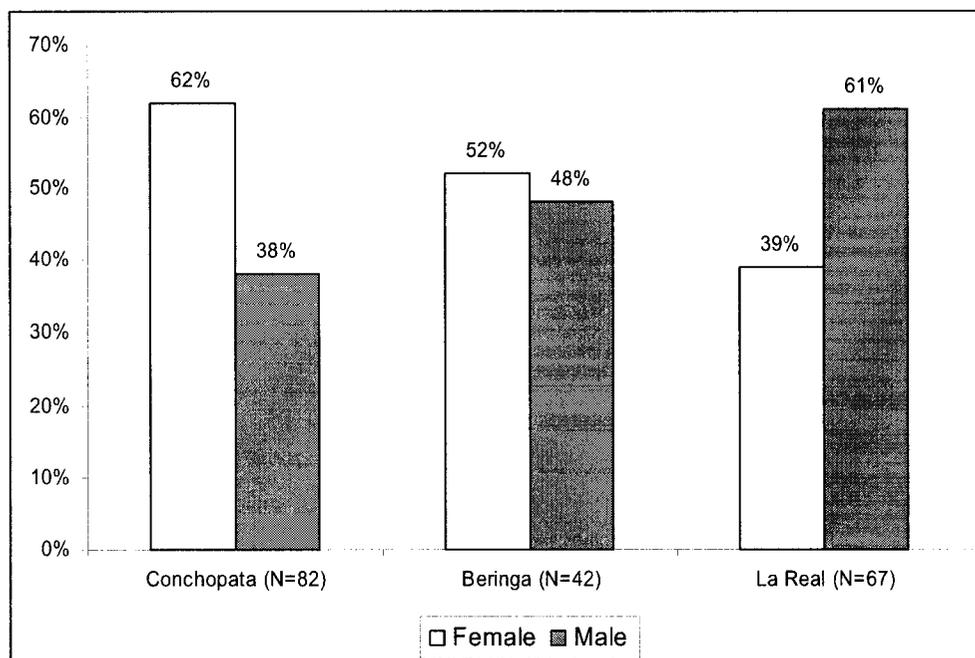


Figure 5.18. Sex distributions for Conchopata, Beringa, and La Real populations.

When all of the sites are compared, each has a distinct age-at-death and sex distribution. As hypothesized in Chapter 3, the Conchopata population shows fewer males than females, which may be a result of two potential scenarios: 1) Conchopata was a polygynous society, home to a royal male and several noblemen with their many wives (see Isbell and Cook, 2002); and 2) Conchopata was one of the imperial centers for high status females (Tung and Cook, n.d.) who may have been organized in sex-specific parallel descent groups (see Zuidema, 1977b), producing ritual goods and subsequently destroying them as sacred offerings in D-shaped and circular ritual structures; additionally, males may have been sent away on raiding or military campaigns for the state. If males were sent away on raids to obtain captives for ritual sacrifice or ritual mutilation, then Conchopata should yield evidence

for these practices. As will be discussed in Chapters 8 and 9, human trophy heads from ritual structures indicate that these practices indeed occurred at Conchopata.

At the site of Beringa, archaeological evidence indicates that it was a village community organized around numerous households (Tung, n.d.); therefore, it has been hypothesized that Beringa would display a normal human population distribution, showing an equal proportion of sexes with about half of the population under the age of 12 (Howell and Kintigh, 1996; Paine and Harpending, 1996). The expected demographic distribution has been observed at Beringa, supporting the hypothesis that Beringa was a village composed of various households, likely family groups.⁴⁷

Finally, it was expected that the La Real population distribution would be distinct from the other communities because La Real was not a settlement, but a high status ceremonial and mortuary site (de la Vera Cruz Chávez and Yépez Alvarez, 1995). The observed demographic composition was distinct from Conchopata and Beringa. There were significantly more males than females relative to a symmetrical sex distribution, and only a quarter of the population was infants and children. (At Beringa, half of the population were infants and children.) The individuals buried at La Real probably reflect an exclusive group selected from one or several nearby settlements. That is, the skeletal population likely reflects a mortuary community organized at the supra-settlement level.

⁴⁷ Ongoing and future research will test the hypothesis that the community at Beringa was organized around family groups. Analysis of the distribution of non-metric traits and ancient DNA studies are underway.

Chapter 6 Childhood Health in the Wari Empire

6.1 Introduction

This chapter presents the frequencies of cribra orbitalia and porotic hyperostosis among infants/children and adults for the three skeletal populations evaluated in this dissertation. The prevalence of these lesions among males and females is also presented. The results are presented for each of the three series in the following order: Conchopata, Beringa, and La Real. Subsequent to all of the results, each is discussed independently and then all are compared to each other in the final section.

6.2 Results: Cribra Orbitalia and Porotic Hyperostosis among Conchopata Sample

6.2.1 Huarpa period (pre-Wari): Cribra Orbitalia and Porotic Hyperostosis among Conchopata Infants/Children and Adults

The Huarpa (pre-Wari) period skeletal sample is small relative to the Wari period sample; nevertheless, these observations provide for later comparisons between pre-Wari and Wari frequencies of cribra orbitalia or porotic hyperostosis. Neither of the two well preserved juvenile crania display cribra orbitalia or porotic hyperostosis. However, among the 10 individuals (>18 years-old) with well preserved frontal bones, two display cribra orbitalia ($2/10 = 20\%$), and one-third of the well-preserved calvaria exhibit porotic hyperostosis ($2/6 = 33\%$) (Figure 6.1).

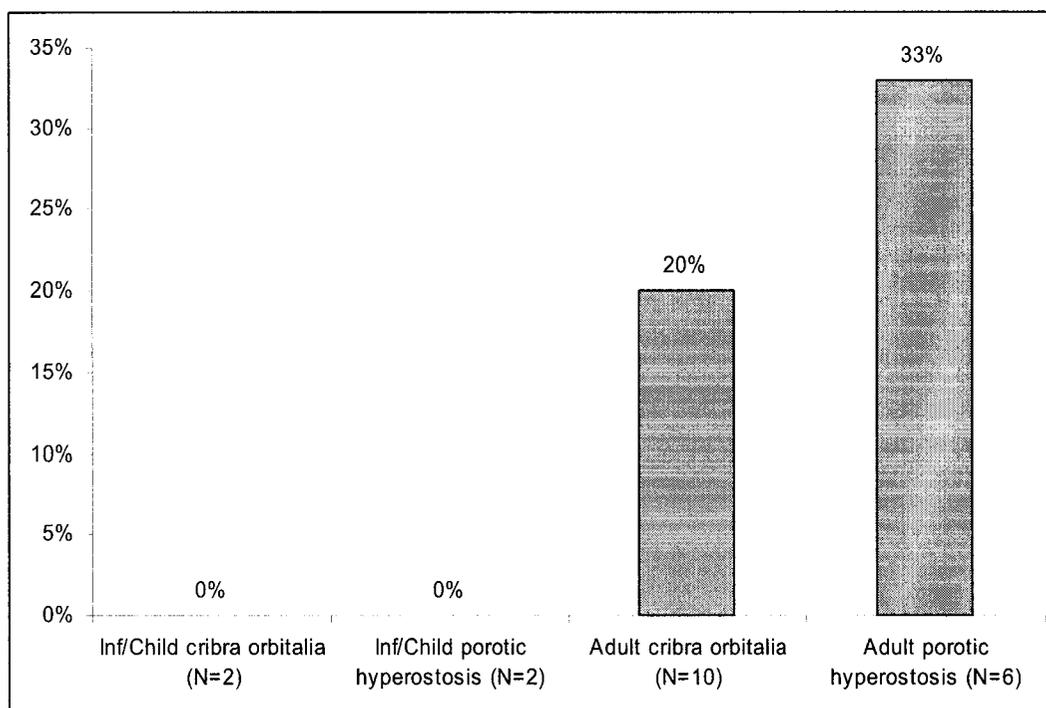


Figure 6.1. Frequencies of cribra orbitalia and porotic hyperostosis among infants/children and adults from Conchopata during the Huarpa (pre-Wari) period. (N=sample size)

Females show higher frequencies than males in both forms of cranial marrow hypoplasia during the Huarpa period, but the differences are not significantly different. Two out of nine women display cribra orbitalia (22%), but the single male was unaffected. The difference in cribra orbitalia frequency between the sexes was not significantly different (Fisher's exact, $p=0.800$; $N=10$). Two out of five females show porotic hyperostosis (40%), but the one male does not. Again, the difference in the frequencies of cranial vault lesions was not significantly different (Fisher's exact, $p=0.667$; $N=6$)

6.2.2 *Wari period: Cribra Orbitalia and Porotic Hyperostosis among Conchopata Infants and Children*

Cribra orbitalia and porotic hyperostosis are extremely rare among infants and children between six months and 14 years-old during the Wari period at Conchopata. Among the 19 frontal bones observed, only one exhibits cribra orbitalia ($1/19 = 5\%$): the

affected child was four to five years-old at the time of death. No infants or children display porotic hyperostosis (N=19) (Figure 6.2). The child with cribra orbitalia did not have a well-preserved calvarium, so observations for porotic hyperostosis could not be made on that particular individual.

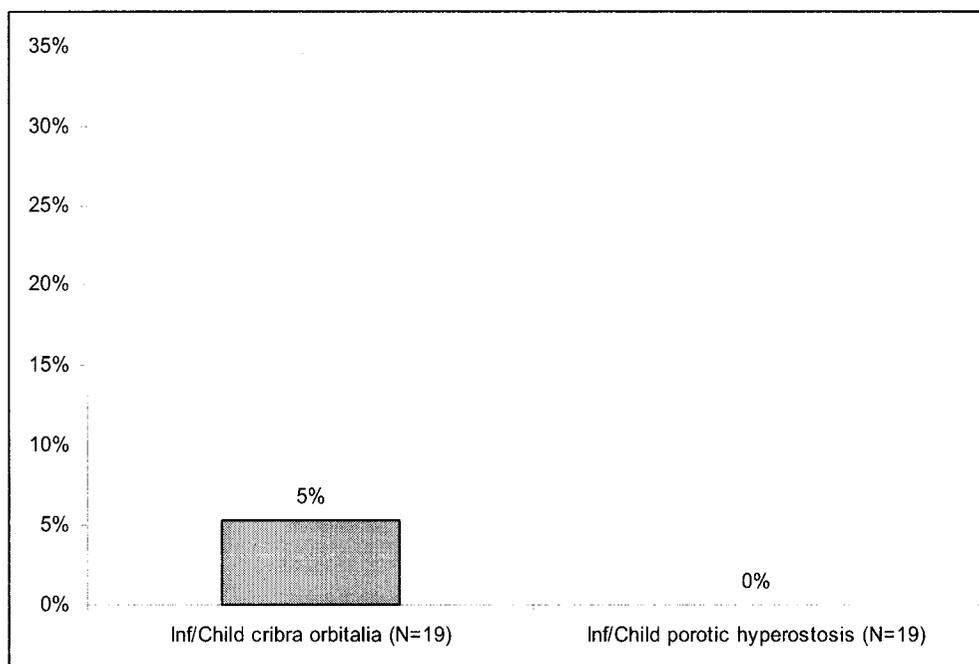


Figure 6.2. Frequencies of cribra orbitalia and porotic hyperostosis among juveniles from Conchopata during the Wari period. (N=sample size)

6.2.3 *Wari period: Cribra Orbitalia and Porotic Hyperostosis among Conchopata Adults*

Cribra orbitalia is uncommon among adults over the age of 18 years; only one out of 31 display cribra orbitalia ($1/31 = 3\%$). The one affected individual is a young female (21-24 years-old) who displays healed orbital lesions. Specifically, one out of 16 females exhibits cribra orbitalia ($1/16 = 6\%$), but none of the nine males were affected. The difference in cribra orbitalia frequency between the sexes is not statistically significant (Fisher's exact test, $p=0.640$; $N=25$) (Table 6.1). There are seven unsexed adults with well-preserved frontal bones, and none display cribra orbitalia.

Table 6.1. Comparison of cribra orbitalia (CO) frequencies between females and males during Wari period at Conchopata. There is no significant difference.

	Female	Male	Totals
CO Absent	15	9	24
CO Present	1	0	1
Totals	16	9	25

Fisher's exact test, $p=0.640$

Porotic hyperostosis is quite common, though most lesions are mild, and slightly more females than males are affected. Overall, one-third of the adult sample display vault lesions ($12/36 = 33\%$), and in all cases they are healed. Among the 12 adults with porotic hyperostosis, eight exhibit barely discernible lesions and four evince porosity only (Buikstra and Ubelaker, 1994:115). Nearly 44 percent of females ($7/16 = 44\%$) and 25 percent of males ($3/12 = 25\%$) evince porotic hyperostosis, and one-quarter of the unsexed adults show these bony changes ($2/8 = 25\%$). Although more women than men exhibit porotic hyperostosis, the difference is not statistically significant (Fisher's exact test, $p=0.268$; $N=28$) (Table 6.2).

Table 6.2. Comparison of porotic hyperostosis (PH) frequencies between females and males during Wari period at Conchopata. There is no statistically significant sex-based difference.

	Female	Male	Totals
PH Absent	9	9	18
PH Present	7	3	10
Totals	16	12	28

Fisher's exact test, $p=0.268$.

Cribra orbitalia and porotic hyperostosis are cranial lesions thought to be indicative of childhood iron-deficiency anemia (Garn, 1992; Stuart-Macadam, 1987; Ubelaker, 1992) (see Chapters 3 and 4 for a detailed discussion). However, these lesions exhibit significantly different frequencies among adults. Cribra orbitalia was present on three percent of adults

(1/31 = 3%), while porotic hyperostosis was observed on 33 percent of adults (12/36 = 33%) (Figure 6.3). These differences are statistically significant (Fisher's exact test, $p=0.002$; $N=67$) (Table 6.3), suggesting that, perhaps, different lesion types reflect differing levels of severity, differential manifestation rates of each lesion type, or age at which iron-deficiency anemia was experienced (Lallo et al., 1977; Stuart-Macadam, 1989; Walker, 1985).

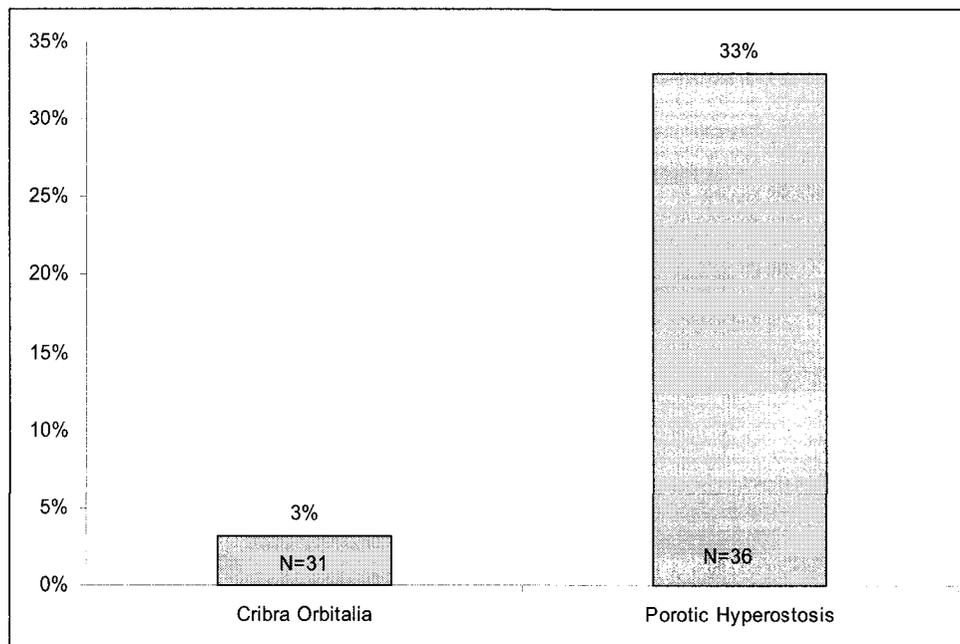


Figure 6.3. Frequency of cribra orbitalia and porotic hyperostosis among individuals over 18 years-old (Wari period at Conchopata). (N = sample size)

Table 6.3. Comparison of cribra orbitalia and porotic hyperostosis frequencies during the Wari phase at Conchopata

	No. of adults w/ cribra orbitalia	No of adults w/ porotic hyperostosis	Totals
Lesion Absent	30	24	54
Lesion Present	1	12	13
Totals	31	36	67

Fisher's exact test, $p=0.002$.

6.2.4 *Comparison of Cribra Orbitalia and Porotic Hyperostosis between Huarpa and Wari Time Periods at Conchopata*

The prevalence of childhood iron-deficiency anemia, as seen via cribra orbitalia and porotic hyperostosis (Garn, 1992; Larsen, 1997; Stuart-Macadam, 1987), does not significantly change from the pre-Wari to Wari period among the Conchopata population; this is evident in the lesion frequencies among children and adults (Figure 6.4 and Table 6.4).

⁴⁸ Although the Huarpa phase adults show a slightly higher frequency of cribra orbitalia relative to the Wari component, the difference is not statistically significant ($p=0.347$; $N=46$), and porotic hyperostosis frequencies are the same in both time periods. Thus, there is no change in developmental health among the Conchopata community, in terms of iron-deficiency anemia, from one time period to the next.

⁴⁸ Frequencies among children represent childhood iron-deficiency anemia, but adult frequencies provide a retrospective view of *childhood* iron-deficiency anemia; they do not reflect its prevalence among adults.

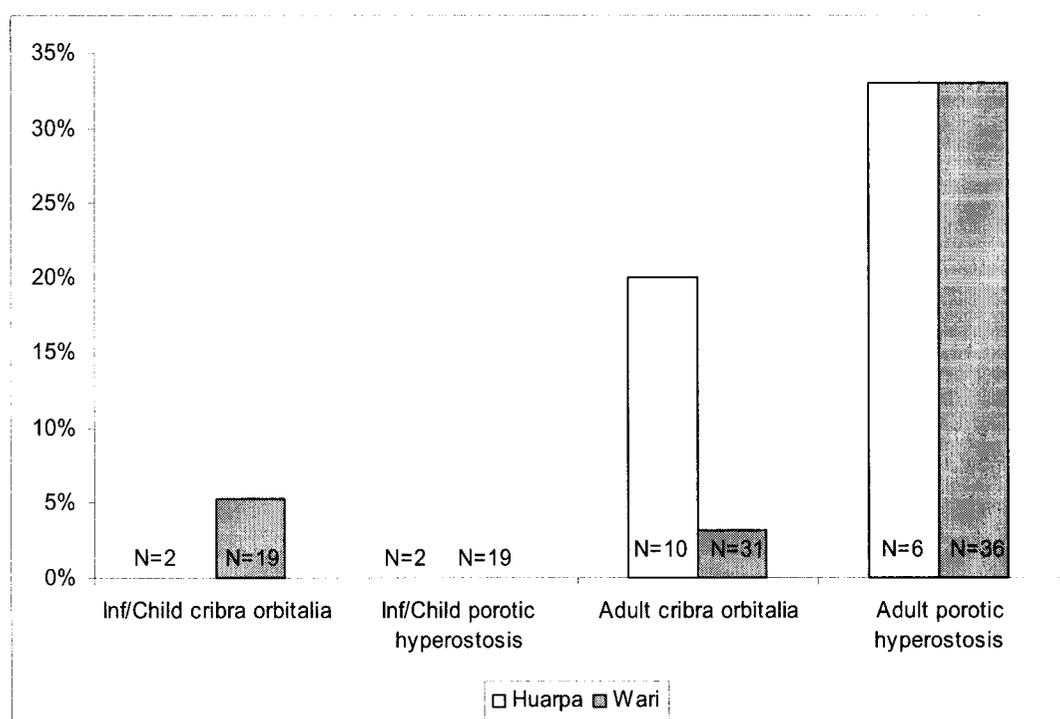


Figure 6.4. Comparison of child and adult cribra orbitalia and porotic hyperostosis frequencies for the Huarpa (white bar) and Wari (gray bar) temporal components.

Table 6.4. The percentages and sample sizes of child and adult crania affected with cribra orbitalia and porotic hyperostosis for the Huarpa and Wari temporal components.

	Child cribra orbitalia	Child porotic hyperostosis	Adult cribra orbitalia	Adult porotic hyperostosis
Huarpa	0% (N=2)	0% (N=2)	20% (N=10)	33% (N=6)
Wari	5.3% (N=19)	0% (N=19)	3.2% (N=31)	33% (N=36)

6.3 Cribra Orbitalia and Porotic Hyperostosis among Beringa Sample

6.3.1 Cribra Orbitalia and Porotic Hyperostosis among Beringa Infants and Children

Cribra orbitalia was common among infants (6 months–3 years-old) and children (4–14 years-old) from Beringa, but it was particularly prevalent among the latter age group (i.e., children). Among the 37 infants and children observed for cribra orbitalia, 16 show the orbital lesions ($16/37 = 43\%$) (Figures 6.5 and 6.6). However, the cribra orbitalia frequency

differed between the two young age groups: 21 percent of infants (N=19), and 66.7 percent of children (N=18) evince orbital lesions (Figures 6.7 and 6.8). The orbital lesions were visibly apparent, several with coalescing foramina, and all but one of the 16 youths with cribra orbitalia exhibit active lesions, signaling that they likely suffered from iron deficiency anemia at the time of death (Garn, 1992; Larsen, 1997; Stuart-Macadam, 1985).

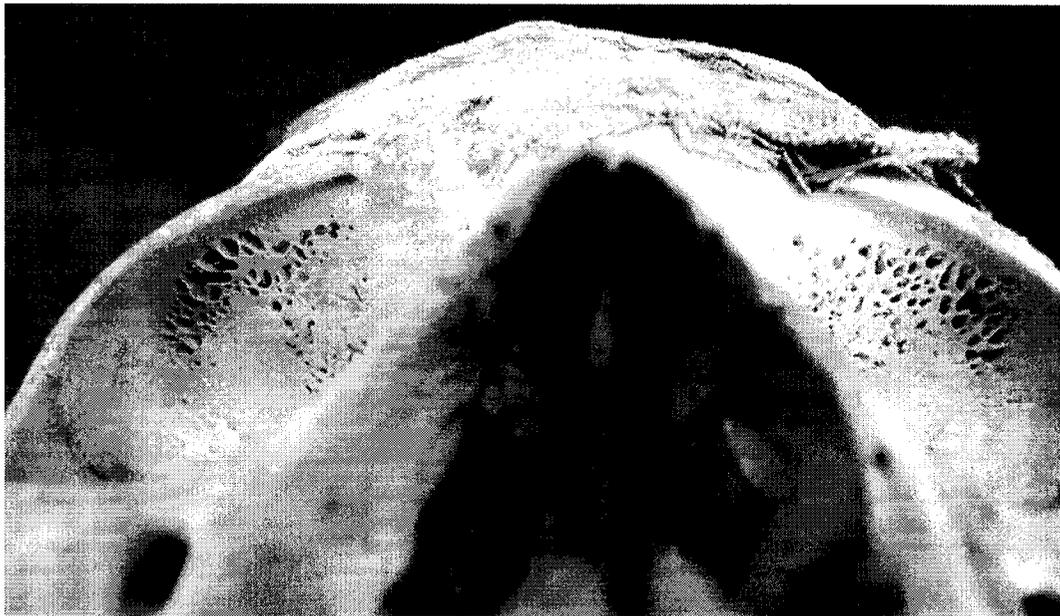


Figure 6.5. Older child (bone code 1001.0889.00) from Beringa with cribra orbitalia in both orbits. Note the coalescence of the foramina.

Porotic hyperostosis was similarly common among infants and children, but it was more evenly divided between the two young age groups. Overall, 15 out of 32 infants and children exhibit vault lesions (47%) (Figures 6.6 and 6.7). Specifically, eight out of 18 infants (44%) and seven out of 14 children show porotic hyperostosis (50%) (Figure 6.8). Other than one infant and two children with barely discernable porotic hyperostosis, the other 12 youths clearly exhibited vault lesions that were active at the time of death.

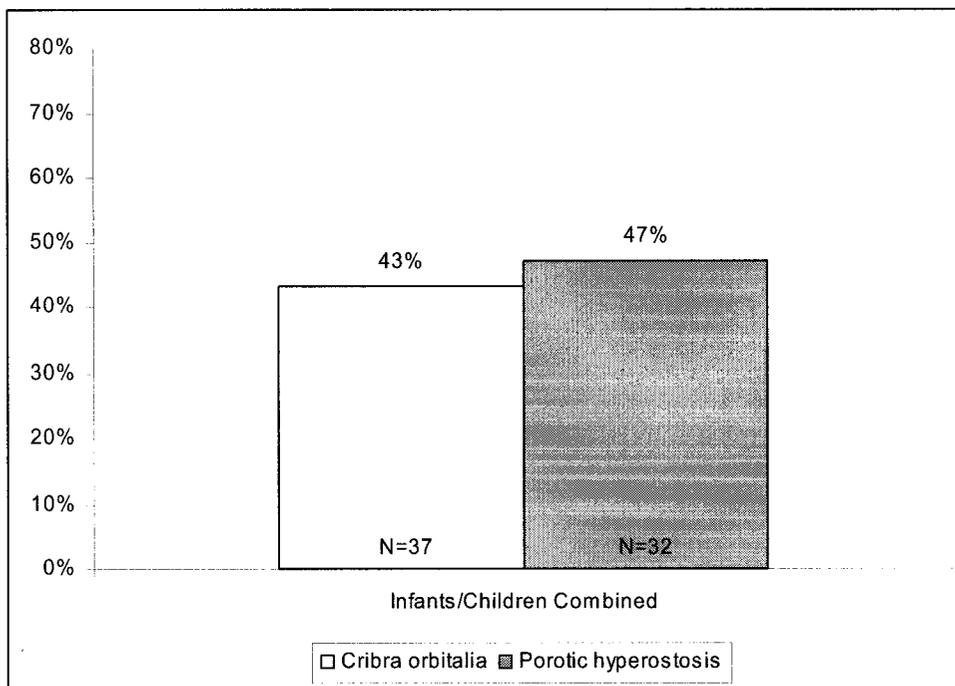


Figure 6.6. Frequencies of cribra orbitalia (white bar) and porotic hyperostosis (gray bar) for Beringa infants and children combined. (N=37 frontal bones observed for cribra orbitalia; N=32 calvaria observed for porotic hyperostosis.)

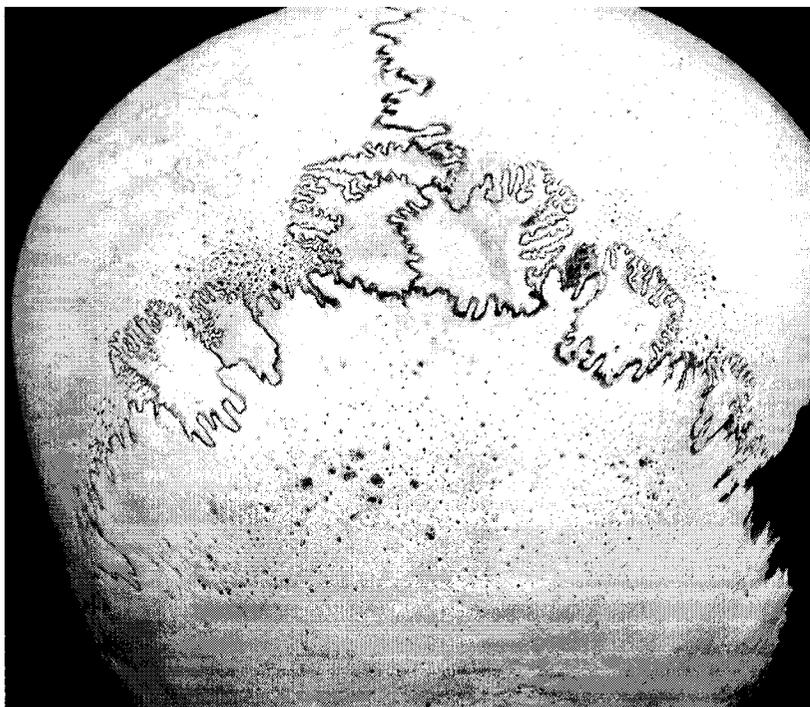


Figure 6.7. Older child from Beringa with porotic hyperostosis on the occipital bone and along the lambdoidal suture.

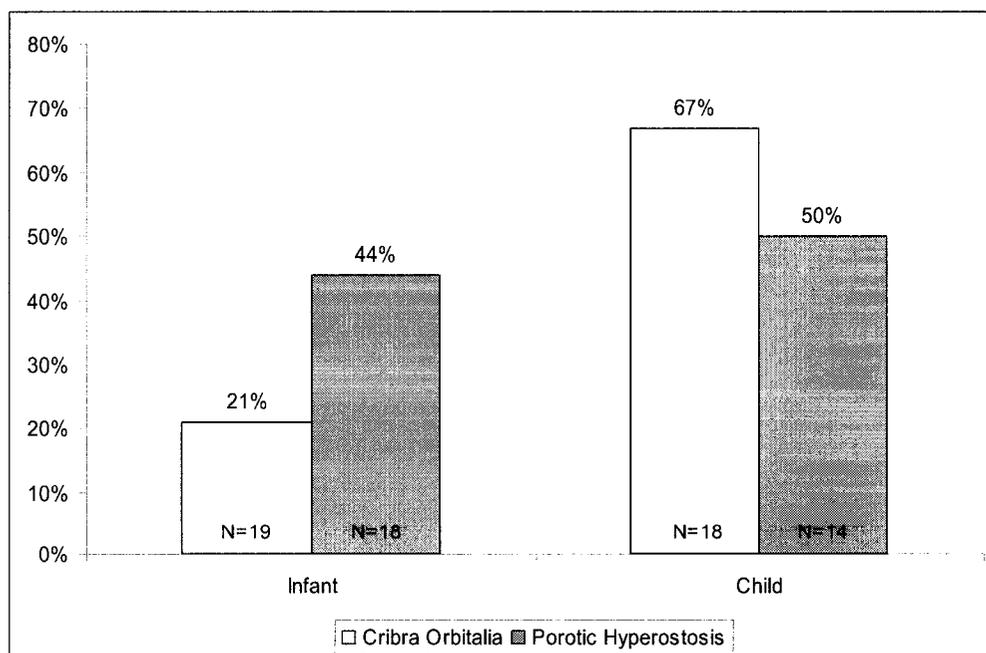


Figure 6.8. Frequencies of cribra orbitalia and porotic hyperostosis for Beringa infants and children.

When well-preserved, complete crania that can be observed for cribra orbitalia and porotic hyperostosis are taken from the infant/child sample, half of them show at least one of these cranial lesions ($7/14 = 50\%$). Among the seven *affected* complete crania, one shows porotic hyperostosis only ($1/7 = 14\%$), three exhibit cribra orbitalia only ($3/7 = 43\%$), and three show both lesions types ($3/7 = 43\%$) (Figure 6.9). This suggests that porotic hyperostosis is less common on infant/child crania relative to cribra orbitalia.

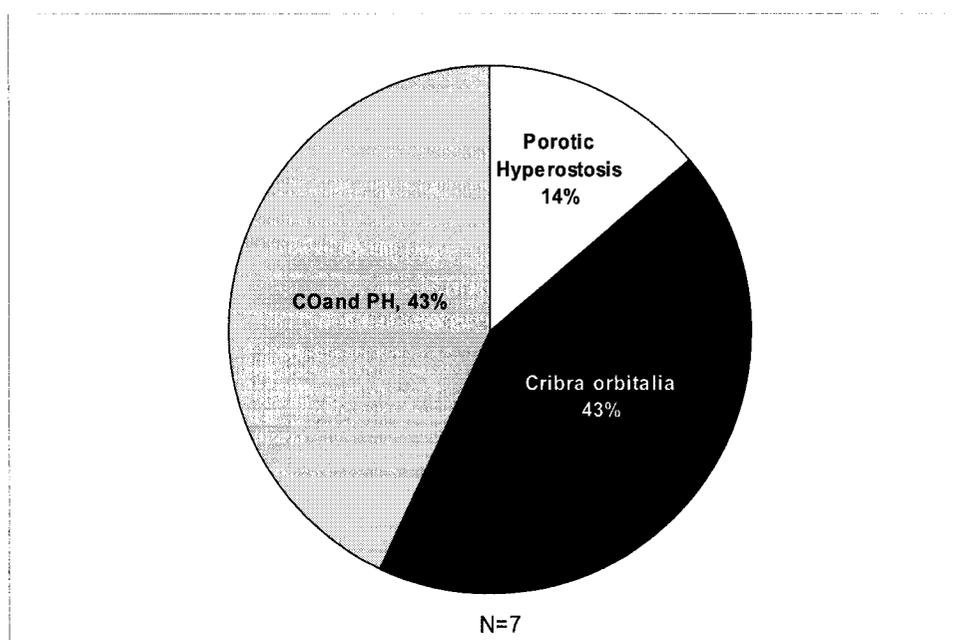


Figure 6.9. Pie chart showing the distribution of lesion types among seven complete infant and child crania from Beringa affected with either cribra orbitalia, porotic hyperostosis, or both. (N=7 affected crania)

6.3.2 *Cribra Orbitalia and Porotic Hyperostosis among Beringa Adults*

Cribra orbitalia was present on nearly one-quarter of the adults in the Beringa population, and female and male crania exhibit similar frequencies. Among the 22 well-preserved frontal bones from individuals over 18 years-old, 23 percent evince cribra orbitalia

5/22 = 23%). Specifically, two out of seven females (29%), one out of five males (20%), and two out of 10 unsexed adults (20%) display orbital lesions (see summary Table 6.5). The similar frequencies between the sexes suggest that during the developmental years, girls and boys were nearly evenly afflicted with iron deficiency anemia.

Table 6.5. Frequency of cribra orbitalia among females, males, and indeterminates from Beringa.

	Females	Males	Indeterminate Sex	Total
Cribra orbitalia	2/7 (29%)	1/5 (20%)	2/10 (20%)	5/22 (23%)

The cribra orbitalia lesions are clearly visible, the majority of which are healed. All five affected individuals exhibit clearly visible porosity in the orbits and four of the five show healed lesions, indicating that they likely recovered from the bout of anemia, which they probably suffered during childhood. The fifth individual, a female around 17-18 years of age, possibly displays active lesions, suggesting that she may have suffered from iron deficiency anemia at the time of her death. (See Figure 6.10 for examples of adults from Beringa with cribra orbitalia.)

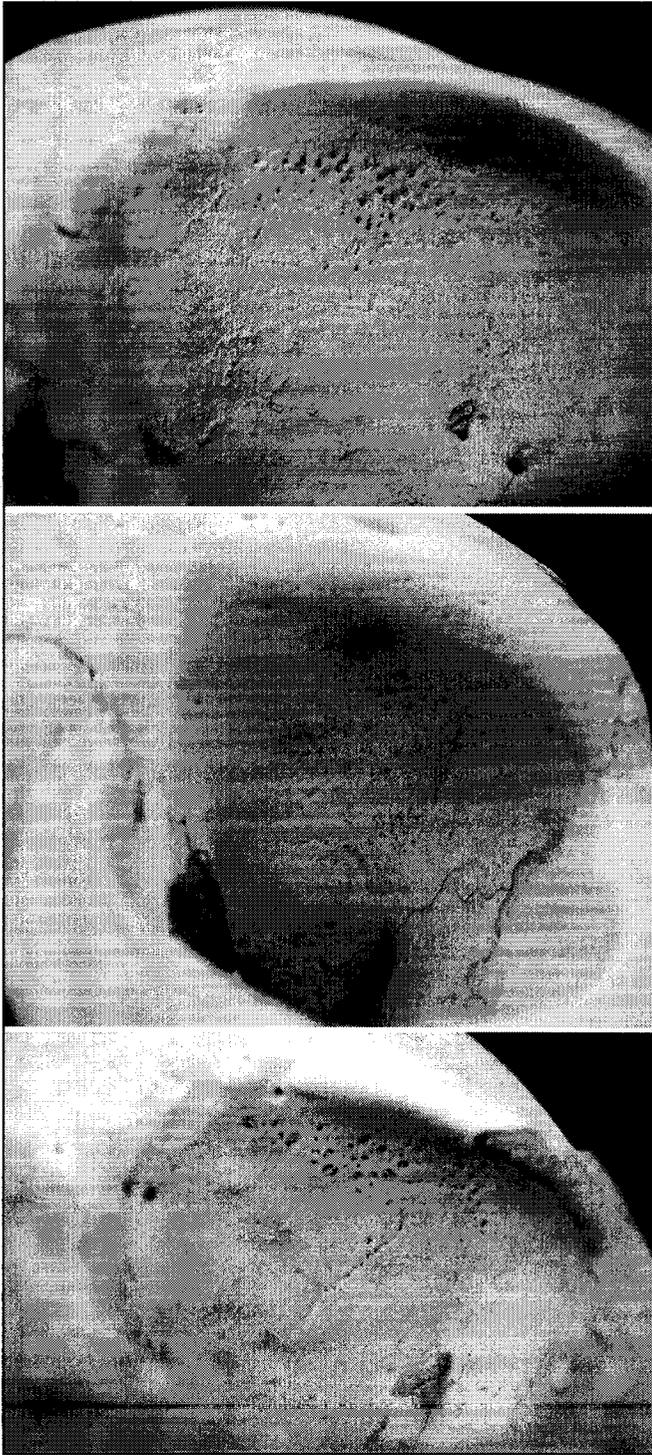


Figure 6.10. Cribra orbitalia visible in the orbits of three separate adults from Beringa.

Porotic hyperostosis was much more common among adults relative to cribra orbitalia. Among the 29 individuals with well-preserved calvaria, 22 exhibit these porotic lesions (22/29 = 76%) (see summary Table 6.6). Males show a higher frequency than females: six out of six males (100%) and seven out of nine females (78%) show porotic hyperostosis, but the difference is not statistically significant (Fisher's exact, $p=0.343$; $N=15$) (Table 6.6). Also, nine out of 14 unsexed adults show vault lesions (64%). All of the adults with porotic hyperostosis exhibit healed lesions, and a majority of them exhibit clearly discernable lesions (18 out of 22). That is, only four show lesions that are "barely discernible" (Buikstra and Ubelaker, 1994): two of which are female, one is male, and one is unsexed. (See Figure 6.11 for examples of Beringa adults showing porotic hyperostosis.)

Table 6.6. Frequency of porotic hyperostosis among females, males, and indeterminates at Beringa.

	Females	Males	Indeterminate Sex	Total
Porotic Hyperostosis	7/9 (78%)	6/6 (100%)	9/14 (64%)	22/29 (76%)

Table 6.7. Comparison of porotic hyperostosis (PH) frequencies between females and males at Beringa. There is no statistically significant sex-based difference.

	Female	Male	Totals
PH Absent	2	0	2
PH Present	7	6	13
Total	9	6	15

Fisher's exact test, $p=0.343$.

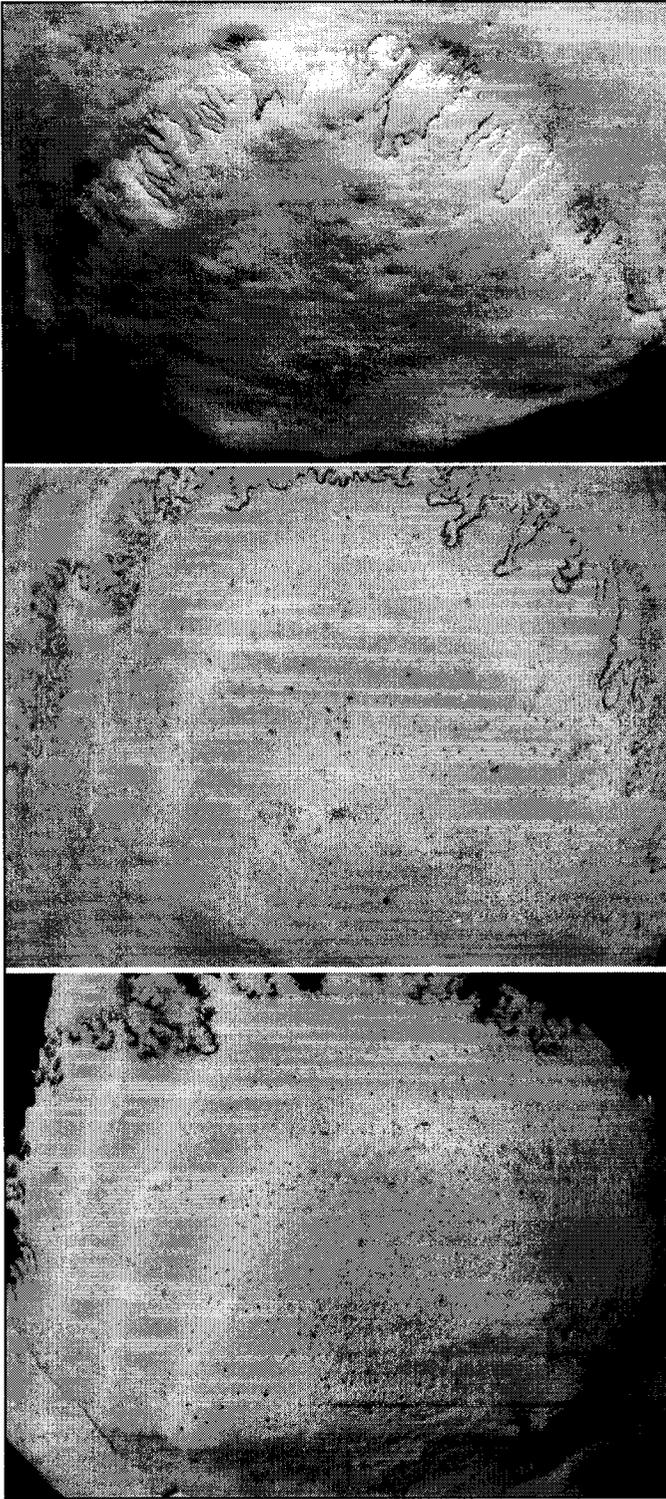


Figure 6.11. Porotic hyperostosis on the occipital bone of three separate adults from Beringa.

Although cribra orbitalia and porotic hyperostosis are both indicative of iron deficiency anemia (Garn, 1992; Larsen, 1997; Stuart-Macadam, 1989; Ubelaker, 1992), there was a significant difference between the frequencies of cribra orbitalia and porotic hyperostosis in this sample: 23 percent and 76 percent, respectively (Figure 6.12) (Fisher's exact, $p < 0.001$; $N = 51$) (Table 6.7). However, this does not appear to be a sampling error because the complete, well-preserved skulls exhibit similar cribra orbitalia to porotic hyperostosis ratios (discussed below). Instead, these data may reflect differing severity of iron deficiency anemia or distinct ages when individuals suffered from the disease (Stuart-Macadam, 1989). Additionally, this author suggests that perhaps vault lesions are more common in adults because they permanently "scar" the vault surface, as opposed to orbital lesions which can potentially completely heal (i.e., disappear).

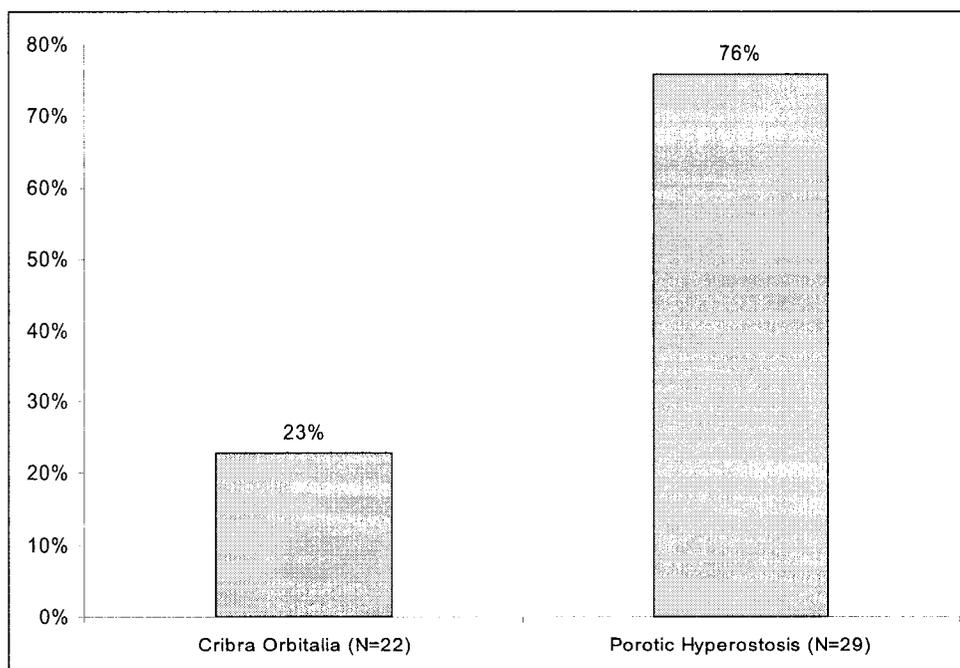


Figure 6.12. Frequencies of cribra orbitalia and porotic hyperostosis among Beringa adults. Observations are based on 22 frontal bones and 29 cranial vaults.

Table 6.9. Fisher's exact test to compare frequencies between cribra orbitalia and porotic hyperostosis among Beringa adults.

	Cribra Orbitalia	Porotic Hyperostosis	Totals
Lesions Absent	17	7	24
Lesions Present	5	22	27
Totals	22	29	51

Fisher's exact test, $p < 0.001$.

As indicated above, complete, well-preserved crania with easily observable bone surfaces also show differences between orbital and vault lesion frequencies. Within this sample, there are 12 well-preserved skulls with all parts present, and 10 of them show at least one kind of porotic lesion. ($10/12 = 83\%$). Among these 10 *affected* complete crania, six display porotic hyperostosis only ($6/10 = 60\%$), one exhibits cribra orbitalia only ($1/10 = 10\%$), and three show both the orbital and vault lesions ($3/10 = 30\%$) (Figure 6.13). These numbers undergird the notion that porotic lesions more frequently marked the cranial vault of adults, relative to the orbits.⁴⁹

⁴⁹ The pattern whereby porotic hyperostosis is more common than cribra orbitalia among adults in the Andes suggests that the former lesion type may repair at a slower rate relative to the latter. That is, if an individual temporarily suffered from anemia during childhood and then recovered, the lesions in the orbit may have repaired, while the vault lesions may have remained visible. Thus, this author suggests that differential healing rates could partially explain the differences between cribra orbitalia and porotic hyperostosis frequencies.

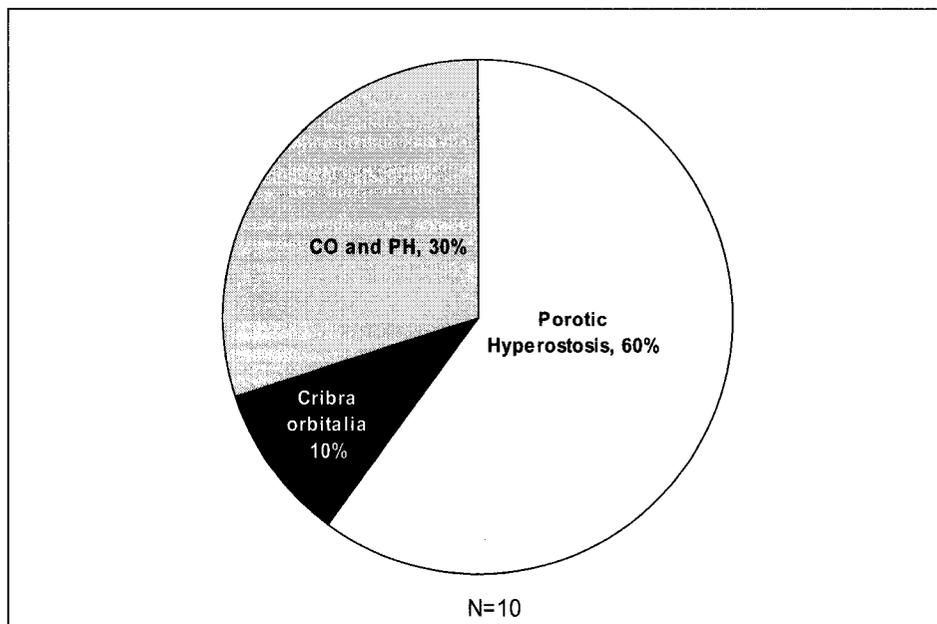


Figure 6.13. Pie chart showing the distribution of lesion types among ten complete adult crania from Beringa affected with either cribr orbitalia, porotic hyperostosis, or both. (N=10 affected crania)

6.3.3 *Comparison of Cribr Orbitalia and Porotic Hyperostosis between Beringa Infants/Children and Adults*

Cribr orbitalia is more common in infants/children relative to adults at Beringa: 43 percent and 23 percent, respectively (Figure 6.14). The difference between these rates is nearly statistically significant (Fisher's exact, $p=0.094$; $N=59$) (Table 6.8). In contrast, adults display significantly more porotic hyperostosis than infants/children: 76 percent and 47 percent, respectively (Figure 6.14) (Fisher's exact, $p=0.019$; $N=61$) (Table 6.9). In short, it appears that orbital lesions are more common among infants/children than adults, which is common among many skeletal samples (Larsen, 1997), but cranial vault lesions are more common among adults than infants/children.

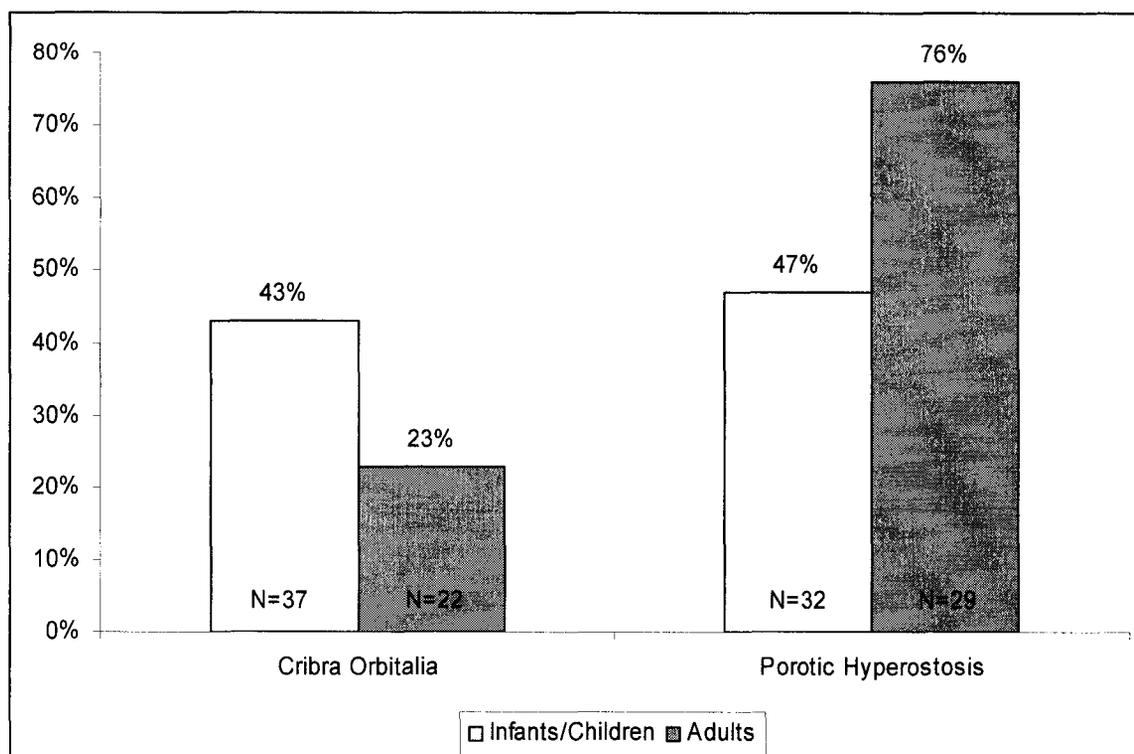


Figure 6.14. Frequencies for cribra orbitalia and porotic hyperostosis among Beringa infants/children and adults.

Table 6.9. Fisher's exact test to compare cribra orbitalia (CO) frequencies between infants/children and adults. Differences are nearly statistically significant.

	Infant/Child	Adult	Total
CO Absent	21	17	38
CO Present	16	5	21
Total	37	22	59

Fisher's exact, $p=0.094$

Table 6.10. Fisher's exact test to compare porotic hyperostosis (PH) frequencies between infants/children and adults. Differences are statistically significant.

	Infant/Child	Adult	Total
PH Absent	17	7	24
PH Present	15	22	37
Total	32	29	61

Fisher's exact, $p=0.019$

6.4 Results: Cribra Orbitalia and Porotic Hyperostosis among La Real Sample

6.4.1 *Cribra Orbitalia and Porotic Hyperostosis among La Real Infants and Children*

Sixty-four percent of infant and child frontal bones from La Real exhibit cribra orbitalia (16/25 = 64%). Specifically, seven out of 12 infants (58%) and nine out of 17 children (53%) evince these orbital lesions. Among the 16 affected infant/children, 10 display mild cases (porosity only), while the other six exhibit more severe bony changes, such as porosity with coalescence of foramina (Figure 6.15). Associated thickening of the orbital roof is present in two of these latter cases. Fifteen of the 16 youths with cribra orbitalia show unhealed lesions, suggesting they suffered from iron deficiency anemia at the time of death. While it is unknowable if this was the cause of death, it is likely that it was a contributing factor.

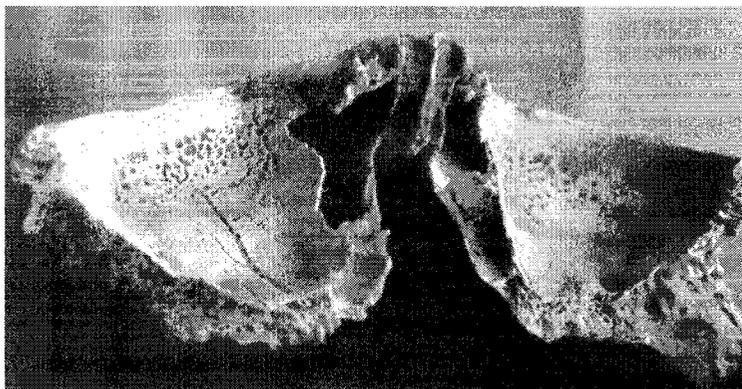


Figure 6.15. Older child (bone code 566.03) from La Real who exhibits cribra orbitalia in both orbits. Note the coalescence of the foramina.

There are 12 infant and child crania with well-preserved parietal bones observable for porotic hyperostosis: six of these 12 exhibit lesions (50%). In particular, one out of four infants (25%) and five out of eight children (62.5%) show porosity on the vault. Among these six youths with porotic hyperostosis, three exhibit unhealed lesions, suggesting they

were afflicted with anemia when they died. No occipital bones were observed for porotic hyperostosis because their condition was too poor.

Overall, when looking at infants and children combined, cribra orbitalia is more common than porotic hyperostosis: 64% versus 50%, respectively (Figure 6.16). However, the differences are not statistically significant (Fisher's exact, $p=0.323$; $N=37$) (Table 6.11).

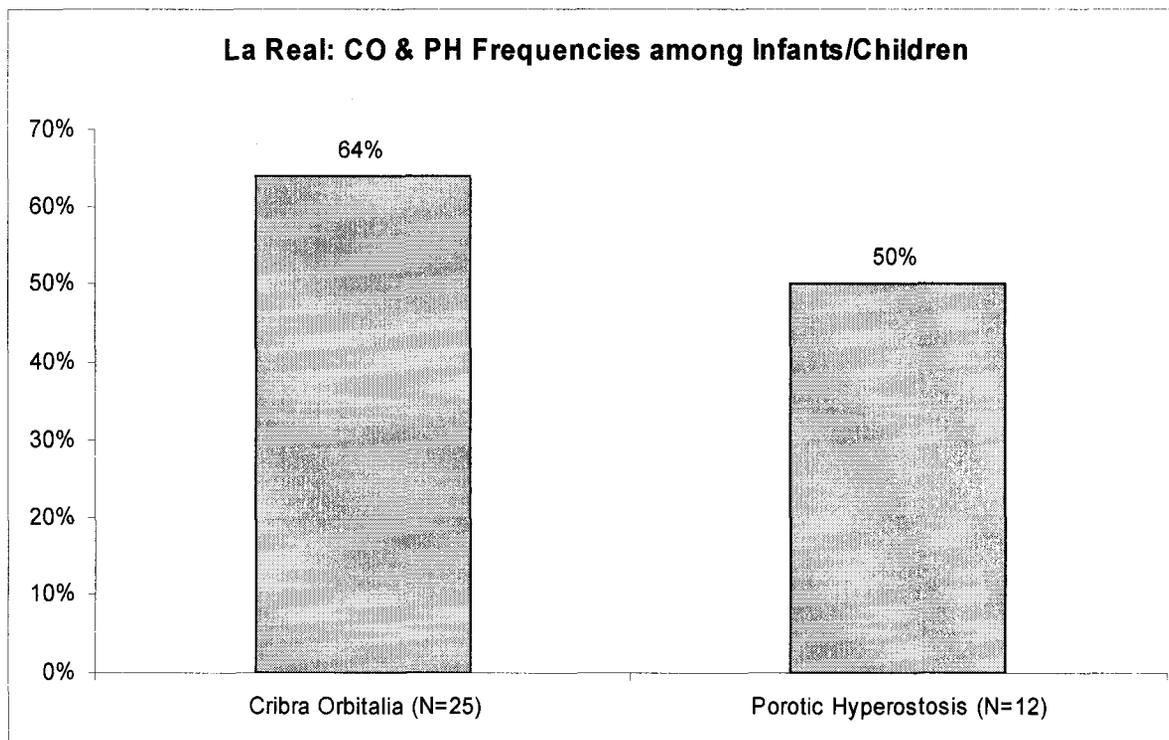


Figure 6.16. Frequencies of cribra orbitalia and porotic hyperostosis among La Real infants and children.

Table 6.11. Fisher's exact test to compare cribra orbitalia and porotic hyperostosis frequencies among La Real infants and children. Differences are not statistically significant.

	Cribra Orbitalia	Porotic Hyperostosis	Totals
Absent	9	6	15
Present	16	6	22
Totals	25	12	37

Fisher's exact, $p=0.323$

6.4.2 *Cribra Orbitalia and Porotic Hyperostosis among La Real Adults*

There are a total of 64 crania with at least one orbit well enough preserved to observe for cribra orbitalia, and 14 out of 64 display these orbital lesions (22%). Two out of the 14 affected orbits show active (un-healed) lesions, signaling that they suffered from compromised iron levels at the time of their deaths. Female and male prevalence is similar: 22% of females ($4/18 = 22\%$) and 19% of males ($6/32 = 19\%$) exhibit cribra orbitalia. The remaining 14 adults are of indeterminate sex, and 29 percent of them were affected ($4/14 = 29\%$) (Table 6.12).

Table 6.12. Frequency of cribra orbitalia among females, males, and indeterminates at La Real.

	Females	Males	Indeterminate Sex	Total
Cribra Orbitalia	4/18 (22%)	6/32 (19%)	4/14 (29%)	14/64 (22%)

Among the 109 adult crania, 64 are observable for porotic hyperostosis, though they are not the same 64 observed for cribra orbitalia. Of these 64 crania, 61 percent are affected. That is, 39 adults display porotic hyperostosis lesions on either the parietal or occipital bone, two of whom display unhealed lesions. These are not the same two adults who show unhealed orbital lesions. Females exhibit slightly higher rates of porotic hyperostosis than males, but the difference is not significant (Fisher's exact, $p=0.275$; $N=44$) (Table 6.13). More than three-fourths of females ($13/27 = 76.5\%$) and nearly two-thirds of males ($17/27 = 63\%$) evince cranial vault lesions. Twenty adults could not be sexed, and nine of them were affected (45%) (Table 6.14).

Table 6.13. Fisher's exact test to compare sex-based frequencies for porotic hyperostosis (PH) among La Real sample. Differences are not statistically significant.

	Females	Males	Totals
PH Absent	4	10	14
PH Present	13	17	30
Totals	17	27	44

Fisher's exact, $p=0.275$

Table 6.14. Frequency of porotic hyperostosis among females, males, and indeterminates from La Real .

	Females	Males	Indeterminate Sex	Total
Porotic Hyperostosis	13/17 (76.5%)	17/27 (63%)	9/20 (45%)	39/64 (61%)

The differences in cribra orbitalia and porotic hyperostosis frequencies are striking: 22% versus 61%, respectively (Figure 6.17), and the difference is significantly different (Fisher's exact, $p<0.001$; $N=128$) (Table 6.15). Given that both lesion types are suggestive of anemia, it may be that the differences reflect degrees of severity, differential rates of appearance, or age of person when disease was experienced (Lallo et al., 1977; Stuart-Macadam, 1989; Walker, 1985) or variability in healing rates between the orbits and cranial vault (discussed above).

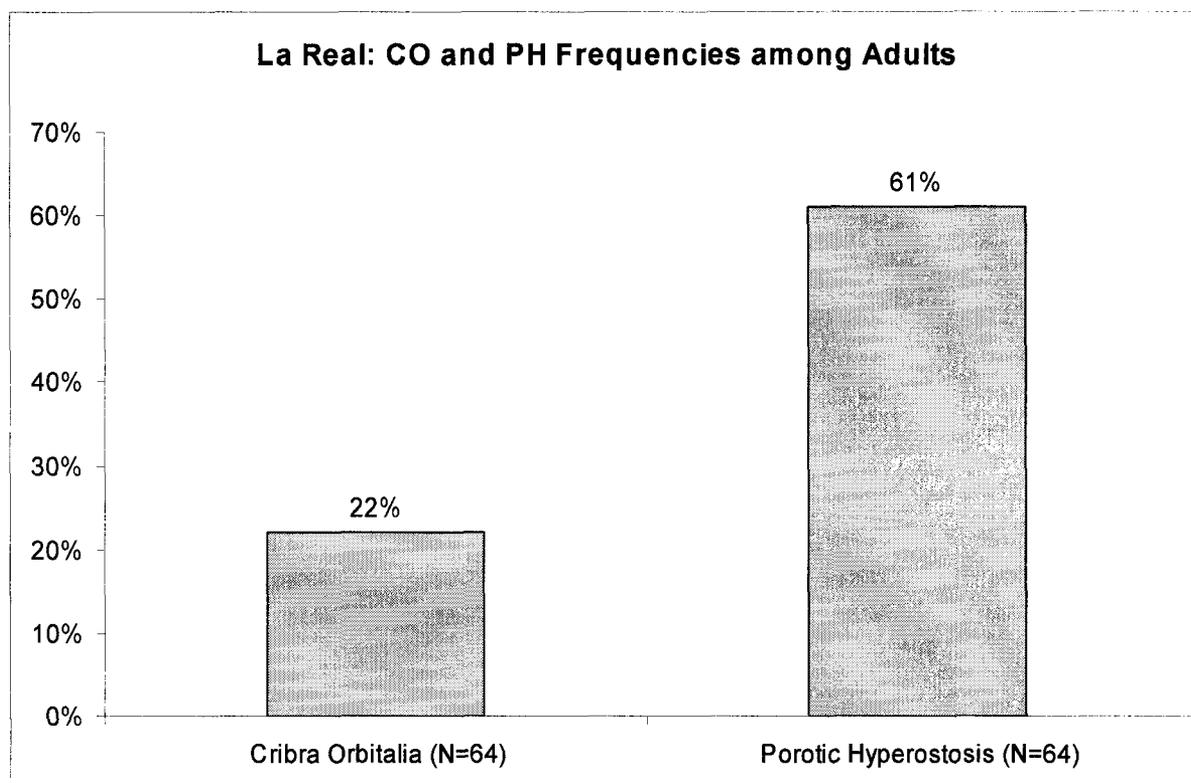


Figure 6.17. Frequencies of cribra orbitalia and porotic hyperostosis among La Real adults. (The 64 crania observed for CO are not the same 64 crania observed for PH: only 44 crania are the same.)

Table 6.15. Fisher's exact test to compare cribra orbitalia and porotic hyperostosis frequencies among La Real adults. Differences are statistically significant.

	Cribra Orbitalia	Porotic Hyperostosis	Totals
Lesion Absent	50	25	75
Lesion Present	14	39	53
Totals	64	64	128

Fisher's exact, $p < 0.001$

Among the 44 complete, well-preserved crania that could be observed for both lesion types, 29 exhibit at least one lesion ($29/44 = 66\%$). Among these 29 *affected* complete crania, 21 display porotic hyperostosis only ($21/29 = 73\%$), three show cribra orbitalia only ($3/29 = 10\%$), and five exhibit both lesion types ($5/29 = 17\%$) (Figure 6.18).

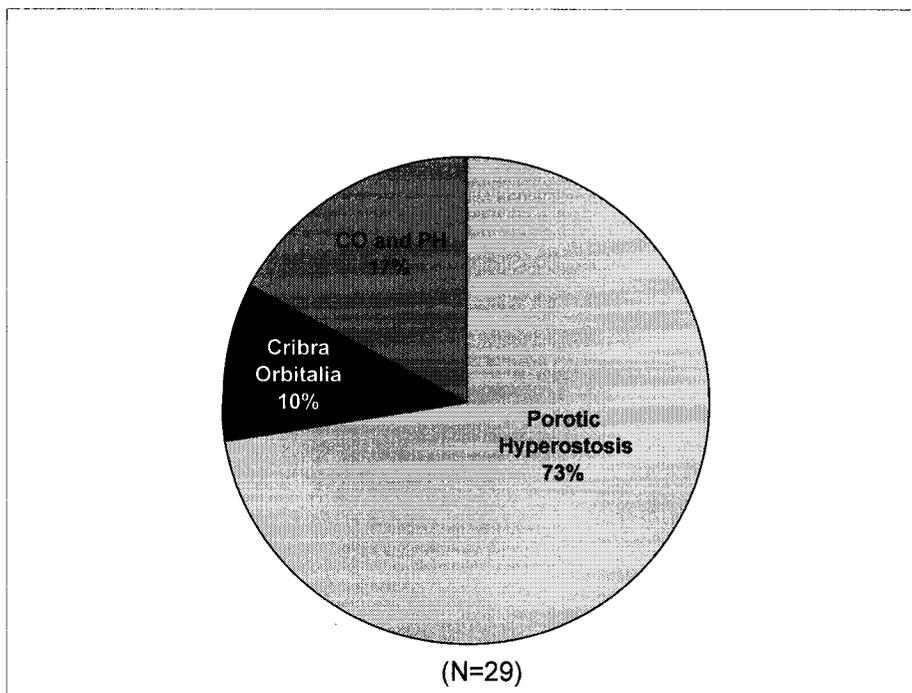


Figure 6.18. Pie chart showing the distribution of lesion types among 29 complete adult crania from La Real affected with either cribrra orbitalia, porotic hyperostosis, or both. (N=29 affected crania)

Among individuals with complete skulls, slightly more women than men exhibit at least one type of porotic lesion. Twelve out of 14 females were affected (86%), all of which were healed. One of these 12 women—aged 22-30 years—exhibits both porotic hyperostosis and cribrra orbitalia. Nearly two-thirds of the males exhibit porotic lesions on the cranial vault (14/22 = 64%). One of these 14 affected men—a 17-24 year-old—likely suffered from iron deficiency anemia at the time of his death, as indicated by unhealed lesions. Four of the 14 males display both porotic hyperostosis and cribrra orbitalia: one is an adolescent (14-17 years-old), two are young adults (18-26 years-old), and the fourth is middle-aged (30-40 years-old). Although a smaller percentage of men than women show at least one type of cranial lesion, the difference is not statistically significant (Fisher's exact, $p=0.144$; $N=36$) (Table 6.16), suggesting that both sexes experienced similar developmental health, insofar as

iron deficiency anemia is concerned. There are eight adults who can not be sexed, and two show lesions ($2/8 = 25\%$).

Table 6.16. Fisher's exact test to compare sex-based differences in porotic lesions (includes either cribra orbitalia or porotic hyperostosis). Differences are not statistically significant.

	Female	Male	Totals
Porotic lesions absent	2	8	10
Porotic lesions present	12	14	26
Totals	14	22	36

Fisher's exact, $p=0.144$

6.4.3 Comparing Cribra Orbitalia and Porotic Hyperostosis between La Real Infants/Children and Adults

Cribra orbitalia is significantly more common in La Real infants/children than adults: 64 percent and 22 percent, respectively (Figure 6.19) (Fisher's exact, $p<0.001$; $N=89$) (Table 6.16). In contrast, porotic hyperostosis is less common in infants/children than adults: 50 percent versus 61 percent, respectively (Figure 6.19). However, these differences are not statistically significant (Fisher's exact, $p=0.262$; $N=76$) (Table 6.18). These data indicate that La Real youths exhibit significantly more cribra orbitalia than La Real adults, an observation that parallels the other two series in this study, as well as previous studies (Blom et al., 2003; Lallo et al., 1977; Larsen et al., 1992; Larsen and Sering, 2000; Stuart-Macadam, 1985; Stuart-Macadam, 1989). It may be that cribra orbitalia is the first bony response to iron deficiency anemia (Lallo et al., 1977; Walker, 1985) or reflects anemia experienced at a young age (Hengen, 1971; Hrdlicka, 1914; Stuart-Macadam, 1989). Additionally, La Real adults show a greater percentage of porotic hyperostosis relative to cribra orbitalia, similar to other populations in this study. Thus, it may be that vault lesions are retained for a longer period of time relative to the orbital lesions, resulting in significantly different rates between the two areas of the skull.

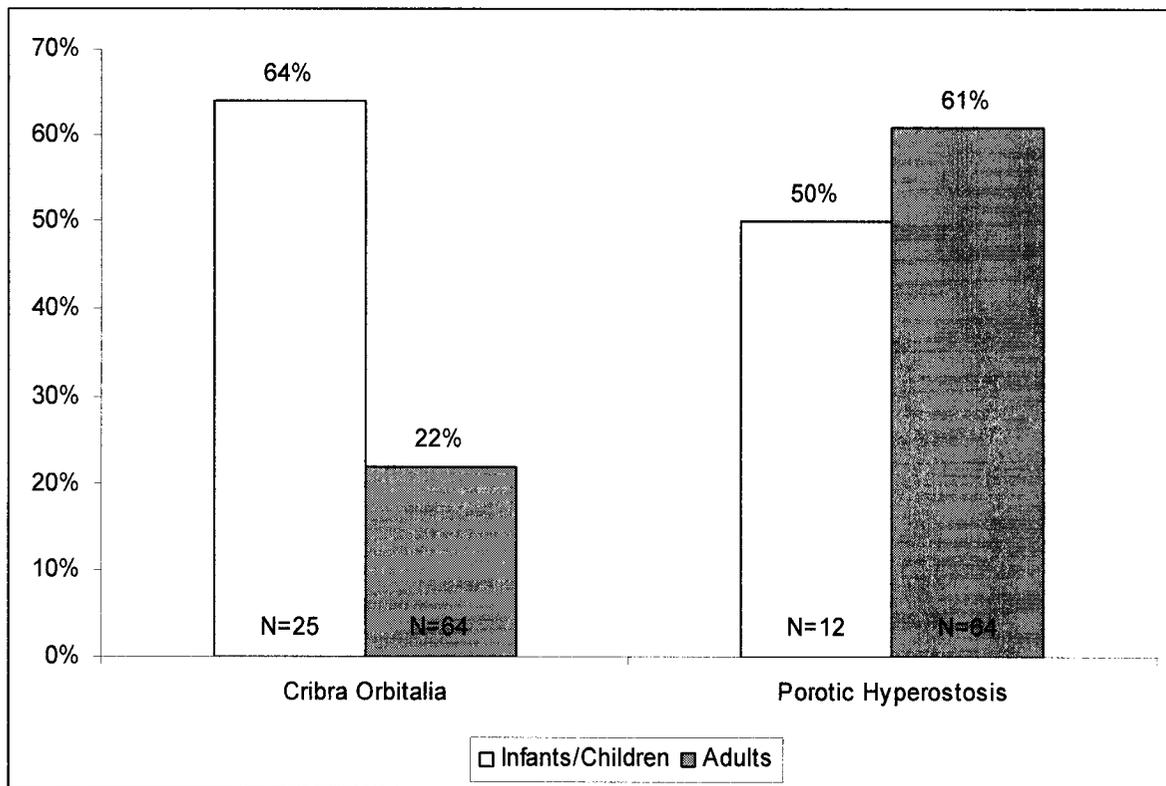


Figure 6.19. Frequencies for cribra orbitalia and porotic hyperostosis among La Real infants/children and adults.

Table 6.17. Fisher's exact test to compare cribra orbitalia (CO) frequency between infants/children and adults. Differences are statistically significant.

	Infant/Child	Adult	Totals
CO Absent	9	50	59
CO Present	16	14	30
Totals	25	64	89

Fisher's exact, $p < 0.001$

Table 6.18. Fisher's exact test to compare porotic hyperostosis (PH) frequency between infants/children and adults. Differences are not statistically significant.

	Infant/Child	Adult	Totals
PH Absent	6	25	31
PH Present	6	39	45
Totals	12	64	76

Fisher's exact, $p = 0.262$

6.5 Discussion and Comparison

The following section discusses the frequencies of cribra orbitalia and porotic hyperostosis at each site. This is then followed by a comparison of the frequencies and patterns between the three sites, as well as comparisons to other sites in the Andes.

6.5.1 *Discussion of Cribra Orbitalia and Porotic Hyperostosis among the Conchopata Skeletal Sample*

Among the Conchopata population, the frequency of cribra orbitalia and porotic hyperostosis did not significantly increase from the Huarpa (pre-Wari) to Wari period. As indicated above, these cranial lesions are indicative of iron deficiency anemia that probably stems from inadequate iron consumption, poor iron absorption, and iron loss via parasitic infection (see Chapter 4), it appears that there was no significant change in the community's diet or exposure to parasites through time.

The frequency of cribra orbitalia and porotic hyperostosis was low among infants and children, suggesting that only a few of them suffered from iron-deficiency anemia. It appears that those who died young (between six months to 14 years-old) suffered from some lethal condition or event other than iron-deficiency anemia. Although some youths could have suffered from this disease in the short-term without exhibiting the pathological changes, iron-deficiency anemia appears to have contributed little to the deaths among infants and children.

Overall, rates of cribra orbitalia and porotic hyperostosis among the Conchopata population were low compared to the hinterland sites, suggesting that relatively few suffered from iron deficiency anemia (discussed below). Females were afflicted with the disease at a slightly higher rate than males, but the differences were not significantly different. Thus, it appears that boys and girls who lived to adulthood similarly experienced childhood health,

insofar as it related to consumption of iron-rich (e.g., meat and fish) and iron-inhibiting foods (e.g., maize) and exposure to iron-depleting pathogens (e.g., from contaminated water sources) (see Chapter 4). This is similar to other bioarchaeological studies in the Andes that have observed no statistically significant differences in cribra orbitalia and porotic hyperostosis between the sexes (Blom et al., 2004; Kellner, 2002; Ubelaker and Newson, 2002; Verano, 2003; Williams, 1990). Although populations from the Andes appear to display this pattern, there are populations that show higher frequencies among females relative to males. Webb (Webb, 1995) examined 1,411 crania from 6 skeletal populations from Australia and in all series, females showed a higher frequency than males.⁵⁰

6.5.2 *Discussion of Cribra Orbitalia and Porotic Hyperostosis among Beringa Skeletal Sample*

Given that nearly 50 percent of the infants and children at Beringa exhibited porotic lesions, it appears that approximately one-half of those who died in childhood were affected with iron deficiency anemia. The illness may have resulted from poor nutrition, excessive pathogen load, or a combination of both (see Huss-Ashmore et al., 1982). In turn, the iron deficiency anemia may have contributed to their early deaths.

A large portion of the adult population—76 percent—exhibited porotic hyperostosis, suggesting that about three out of four had been afflicted with childhood iron deficiency anemia. Notably, there were no sex-based differences in the prevalence of this disease, suggesting that during the time of Wari influence boys and girls experienced similar health statuses during childhood, inasmuch as iron consumption, iron absorption, and iron retention were concerned. Again, the absence of sex-based differences in cranial lesion frequency

⁵⁰ It is unknown if these frequencies are statistically significantly different between the sexes, as those data were not presented.

mirror that of previous bioarchaeological studies in coastal Ecuador (Ubelaker and Newson, 2002), at the Inka site of Machu Picchu (Verano, 2003), the Nasca valley of south-central Peru (Kellner, 2002), and Moquegua valley of southern Peru (Blom et al., 2004; Williams, 1990).

The rate of iron deficiency anemia among the Beringa community was quite high, but because there is no pre-Wari skeletal sample from Beringa, it is unknown if this frequency represents a change from the earlier period. Nonetheless, given that half of the infants/children and three-quarters of the adults suffered from this ailment during childhood, it is clear that a greater proportion of the Beringa population suffered from childhood iron deficiency anemia relative to those in the Wari heartland (discussed below). Thus, it appears that Wari presence in the Majes valley was concomitant with a social and ecological environment that failed to provide sufficient dietary iron and protection from iron-depleting pathogens. Perhaps the inferred high-maize diet⁵¹ consumed in non-fermented forms inhibited iron absorption and contributed to the high prevalence of anemia (see El-Najjar et al., 1976). Conversely, if much of the maize was ingested in the form of *chicha* (maize beer) as was commonly done in the precolumbian Andes (Moore, 1989), then maize may not have been a primary culprit for this ailment. More likely, exposure to pathogens, perhaps from contaminated water or poor sanitary conditions may have been factors in the high anemia rates (Ubelaker, 1992; Walker, 1985). Based on cribra orbitalia and porotic hyperostosis frequencies among populations from coastal Ecuador, Ubelaker (Ubelaker, 1992) notes that these lesions exhibit an irregular correlation with a heavy maize diet; rather, he argues that the lesions are indicative of iron deficiency anemia resulting from chronic rates of infectious

⁵¹ The majority of botanical remains recovered from the site included maize (see above). Future studies will include carbon stable isotope analysis to determine levels of maize consumption.

disease, stemming from unsanitary conditions in crowded settlements. This is in contrast to what Milner (Milner, 1991) has noted among pre-Columbian New World skeletons regarding the correlation between high rates of anemia and diets reliant on maize. In a study of iron deficiency anemia among prehistoric populations in the southwest US, Walker (Walker, 1985) argues that anemia was the result of iron loss caused by ingesting parasites from contaminated water sources. It is possible that Beringa inhabitants ingested contaminated water from the Majes River, as it is low on the water shed. Moreover, the river shrimp and fish that Beringa inhabitants consumed (Tung, n.d.) certainly could have been contaminated, leading to parasitic infection and diarrheal disease, thus resulting in iron loss. Of course, all of these factors working in tandem, most of which can not yet be parsed out at this level of the analysis, likely contributed to the observed frequencies of iron deficiency anemia.

6.5.3 Discussion of Cribra Orbitalia and Porotic Hyperostosis among La Real Sample

Data on cribra orbitalia and porotic hyperostosis frequencies indicate that during the time of Wari influence, nearly two-thirds of the La Real population who died in childhood suffered from iron deficiency anemia. Perhaps this ailment contributed to their early deaths. As Huss-Ashmore and colleagues (Huss-Ashmore et al., 1982) have shown, mortality rates are higher in the first 10 years of life among those who exhibit porotic hyperostosis relative to those who do not. Similarly, Blom (2004) has shown in her study of 1,465 prehispanic individuals from coastal Peru, there is a strong association between childhood anemia and childhood mortality.

Among those who lived to adulthood, two-thirds also suffered from anemia during their developmental years. There were no sex-based differences in cribra orbitalia or porotic hyperostosis frequencies, suggesting that anemia was uniformly experienced by boys and

girls. That is to say, boys and girls who lived to adulthood probably shared similar lifeways during their childhood in terms of diet and pathogen load, inasmuch as these factors affected anemia rates. These results parallel those from other Andean skeletal series that show no sex-based differences in iron-deficiency anemia (Blom et al., 2003; Kellner, 2002; Ubelaker and Newson, 2002; Verano, 2003; Williams, 1990).

The high rate of anemia among children and adults from La Real indicate that among those who were selected for burial at this high status site, many of them suffered from poor nutritional status due to insufficient consumption and retention of iron. Similar to their neighbors at the site of Beringa, those from La Real probably suffered parasitic infections as a result of consuming contaminated water, fish, and river shrimp.

6.5.4 Comparisons of Cribra Orbitalia and Porotic Hyperostosis Frequencies

The Wari heartland community exhibits a lower frequency of cribra orbitalia and porotic hyperostosis among juveniles and adults relative to the two communities from the Wari hinterland (Figures 6.20 and 6.21). The frequency of porotic hyperostosis among juveniles is significantly different between the Wari heartland and the combined Wari hinterland sites in the Majes valley (Fisher's exact, $p < 0.001$; $df = 1$; $N = 63$). Similarly, adult porotic hyperostosis frequencies are significantly different between the Wari heartland and the combined hinterland communities (Fisher's exact, $p = 0.001$; $df = 1$; $N = 129$). As hypothesized, Conchopata anemia rates were lower, which was probably related to differences in exposure to iron-depleting pathogens. It is also possible that differences in maize consumption—an iron inhibitor—contributed to the observed differences. Maize was found in great quantities at Beringa suggesting that it contributed heavily to the Beringa diet (Tung, n.d.), but it is unknown how common maize was in the La Real diet because this

ceremonial and mortuary site revealed no domestic refuse. Similarly, patterns of maize consumption are poorly understood at Conchopata because the soil conditions are not conducive to the preservation of botanical remains. Future studies of carbon and nitrogen isotope ratios from human bone will aid in addressing these issues (see Ambrose, 1993; Schoeninger, 1989).

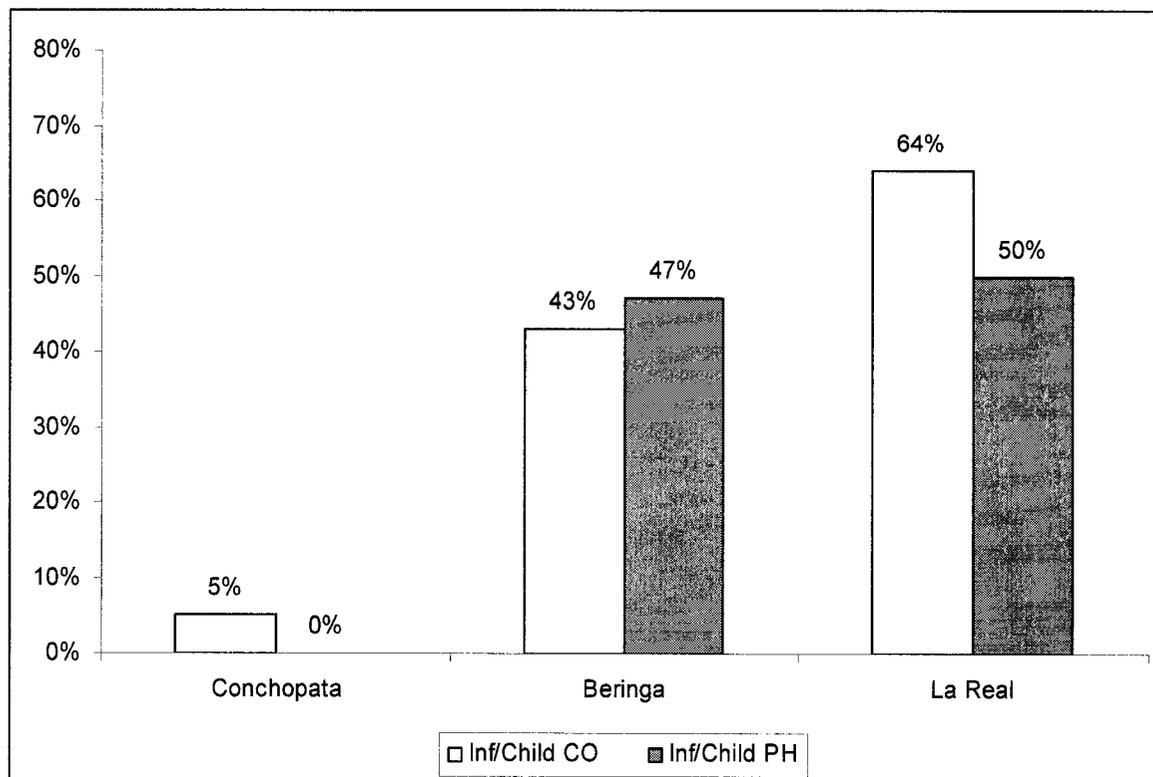


Figure 6.20. Comparison of infant/child cribra orbitalia (CO) and porotic hyperostosis (PH) frequencies between Conchopata, Beringa, and La Real (Wari period only).

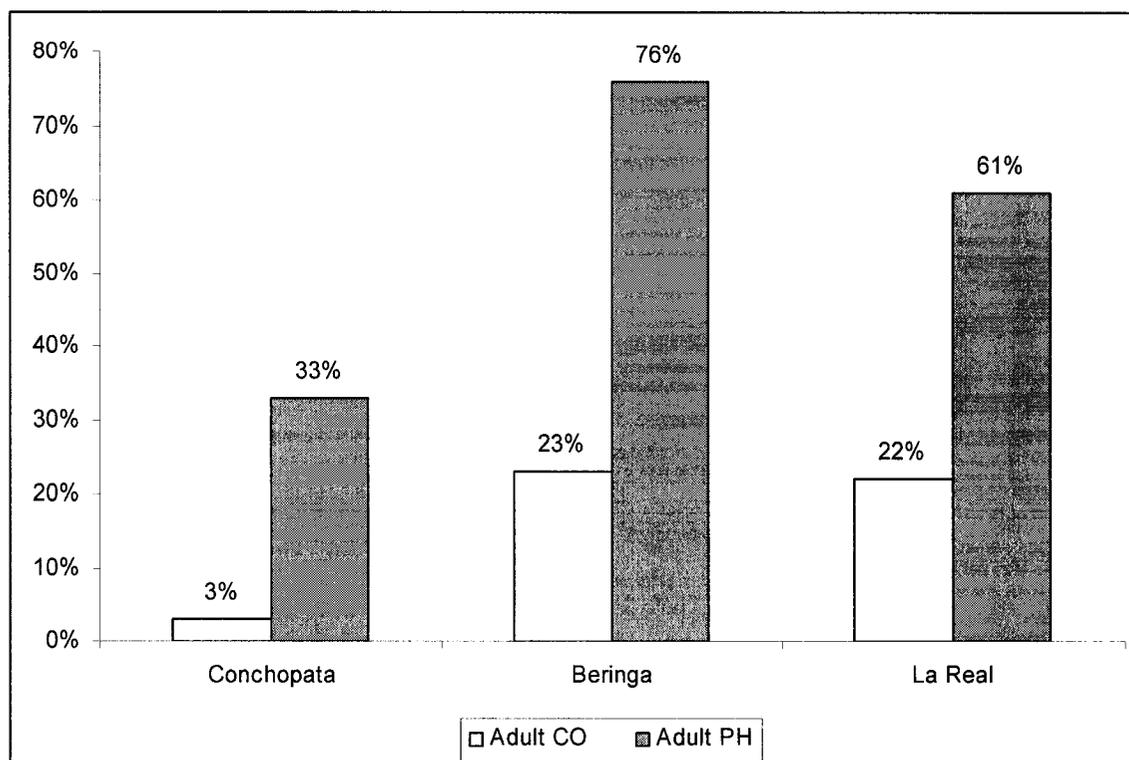


Figure 6.21. Comparison of adult cribra orbitalia (CO) and porotic hyperostosis (PH) frequencies between Conchopata, Beringa, and La Real (Wari period only).

While anemia rates in the heartland were significantly lower than the hinterland, the two hinterland series show no significant difference in frequency of adult porotic hyperostosis (Fisher's exact, $p=0.121$; $df=1$; $N=93$). This suggests that the village community at Beringa and the high status individuals buried at the ceremonial and funerary site of La Real similarly experienced childhood anemia. Perhaps Wari imperial policies did not differentially affect childhood health status among subject populations in the southern region of the empire. Rather, the similar frequencies between the Beringa and La Real series may be due to similar diets and pathogen load, resulting from ingesting contaminated water and resources from the Majes River. As previous studies have shown, there is a synergistic relationship between diet, nutritional stress, and pathogen load, so these factors were likely

working in concert affecting the prevalence of anemia among these populations (Huss-Ashmore et al., 1982; Larsen and Harn, 1994).

The overall difference between the heartland-hinterland distribution of cribra orbitalia and porotic hyperostosis parallel what has been observed regarding Andean highland-coastal differences. Based on analysis of Andean skeletal samples, Hrdlička (1914) observed a higher rate of anemia among coastal populations relative to those in the highlands, and Ubelaker has documented a similar trend in prehistoric Ecuador (Ubelaker, 1992). Among 199 individuals from the site of Cotacollao (540 BC) in highland Ecuador, no individual exhibited porotic lesions (Ubelaker, 1992).⁵² In contrast, among the 707 individuals from coastal Ecuadorian sites ranging from 6000 BC to AD 1730, 16 individuals ($16/707 = 2\%$) exhibit cranial lesions indicative of anemia (Ubelaker, 1992). Ubelaker (1992) suggests that these differences are related to population crowding and unsanitary conditions in the coastal settlements; moreover, the tropical environment of coastal Ecuador is an ideal setting in which many pathogens can flourish. Perhaps the ecological context (coastal, semi-tropical environment) in which pathogens could easily thrive was a major contributor to the higher rates of anemia among Wari hinterland populations near the coast.

The supposition that ecological context played a significant role in anemia rates can be evaluated by comparing frequencies between several communities from similar environmental contexts. Moving from north to south, the arid valleys of Cañete, Nasca, Majes, and Moquegua are all located in the central and southern coastal Andes. They are all Pacific drainages fed by snow melt and rain from the Andes mountains to the east. Blom and

⁵² However, among 19 individuals from the highland site of La Florida (AD 100–450) two “high-status women” exhibited cribra orbitalia (10.5%) (Ubelaker and Newson, 2002:361). Nonetheless, the absence of porotic lesions among the large sample of highlanders from Cotacollao suggests that there were indeed highland-coastal differences in the prevalence of these lesions. Conversely, temporal differences and associated changes in socio-political complexity could have been a factor.

colleagues (2004) recently documented the frequency of cribra orbitalia and porotic hyperostosis among 1,465 individuals from 12 Peruvian valleys, including several from the southern Andes. In particular, Cañete juveniles show the highest percentages of cranial lesions (75%-88%), yet to the south, Nasca valley populations show some of the lowest rates in their study: about one-third of juveniles are affected and only 16 percent of adults show cribra orbitalia (Blom et al., 2004) (see Table 6.18). This is paralleled by low cribra orbitalia and porotic hyperostosis frequencies reported by Kellner (2002) and Drusini (1991) for other Nasca valley skeletal series (see Table 6.19). In contrast, at the site of Chen Chen in the Moquegua valley in far southern Peru, more than half to nearly two-thirds of the juveniles show cranial lesions, and more than one-third of the adults show cribra orbitalia (Blom et al., 2004). The population at Chiribaya, also in the Moquegua valley, shows similar rates of lesions on juvenile crania, but more adults are affected at this site relative to Chen Chen (Blom et al., 2004) (see Table 6.18). Interestingly, the site of Estuquiña in the Moquegua valley shows the lowest rate of adult cribra orbitalia (Williams, 1990). Finally, the frequency of juvenile lesions from Majes valley show somewhat similar frequencies to those from Moquegua, but they are much higher than those from Nasca. Overall, coastal (and near-coastal) populations display higher frequencies of cribra orbitalia and porotic hyperostosis compared to those from the Andean highlands, suggesting that the semi-tropical environments may have provided ideal breeding grounds for iron-depleting pathogens. However, the frequency differences between the southern coastal series indicate that there were other contributing factors to childhood iron deficiency anemia.

Table 6.19. Summary of cribra orbitalia and porotic hyperostosis frequencies among children and adults from the southern Andes. See Figure 2.1 for the location of each of the valleys.

Site, Valley (Time Period)	Child [^] Cribra Orbitalia	Child [^] Porotic Hyperostosis	Adult Cribra Orbitalia	Adult Porotic Hyperostosis
Cañete valley (EIP-LIP) (Blom et al, 2004)	75% (N=8)	88% (N=8)	35% (N=54)	No data
Nasca valley (EIP-LIP) (Blom et al, 2004)	38% (N=8)	33% (N=9)	16% (N=74)	No data
Nasca valley (EIP) (Kellner, 2002)	17.6% (N=17)	0% (N=18)	5.4% (N=56)	3.2% (N=63)
Nasca valley (MH) (Kellner, 2002)	28.6% (N=14)	0% (N=16)	5% (N=77)	6.3% (N=80)
Pueblo Viejo, Nasca valley (MH) (Drusini 1991)	No data	No data	25.4%* N=?	No data
Beringa, Majes valley (MH) (this study)	43% N=37	47% N=32	23% N=22	76% N=29
La Real, Majes valley (MH) (this study)	64% N=25	50% N=12	22% N=64	61% N=64
Chen Chen, Moquegua valley (MH) (Blom, 2004)	59% (N=131)	64% (N=171)	36% (N=165)	No data
Chiribaya, Moquegua valley (MH-LIP) (Burgess, 1999)	61% (N=152)	52% (N=153)	43% (N=292)	36% (N=290)
Estuquiña, Moquegua valley (LIP) (Williams, 1990)	44%[†] (N=72)	No data	4.5%[†] (N=67)	No data

[^]Child = 0-18 years, except in Blom et al. 2004 where child = 0-10 years.

*All ages combined.

[†] Any lesion.

Highlighted rows represent Middle Horizon sites, which will be compared to the Middle Horizon sites in this study.

Early Intermediate Period (EIP): AD 1 – 550.

Middle Horizon (MH): AD 550 – 1000).

Late Intermediate Period (LIP): AD 1000 – 1450).

As discussed in Chapter 2, the Middle Horizon is defined by the presence of two powerful empires: the Wari and Tiwanaku. The Wari empire incorporated the Nasca and Majes valleys into its domain and Tiwanaku incorporated most of the Moquegua valley in the far south. It is noteworthy that the Wari empire also expanded into the Moquegua valley,

but, to date, there are no skeletal populations that can be affiliated with Wari occupations in Moquegua, so Wari's role in Moquegua is not discussed in this dissertation. Instead, the Wari era populations from Majes valley will be compared to Wari era communities from the Nasca valley and to the series from Chen Chen in the Moquegua valley, which was integrated into the Tiwanaku empire in the Middle Horizon (Blom, 1999) (Goldstein, 2000).

In the Nasca valley during the time of Wari rule, six percent of adults show porotic hyperostosis, which represents only a slight increase from the preceding (pre-Wari) period (Kellner, 2002).⁵³ However, among adult females, there is a statistically significant increase in porotic hyperostosis from the pre-Wari (0%) to Wari period (16%) ($\chi^2=4.02$; $p=0.04$) (Kellner, 2002:52). Moreover, cribra orbitalia among those who died in childhood increases from the pre-Wari to Wari period—17.6 percent to 28.6 percent, respectively (Kellner, 2002). Kellner (2002: 59, 112) suggests that these cranial lesions are suggestive of systemic infection and anemic response, probably resulting from increased pathogen loads created by densely populated communities. Moreover, it is possible that Wari imperialism contributed to poorer childhood health among Nasca populations, as the significant changes in childhood health seen through anemia rates occurs with the intrusion of Wari. Similarly, at the site of Pueblo Viejo in Nasca, Drusini (1991) documents an increase in anemia from the pre-Wari to Wari period; no pre-Wari populations exhibit cranial lesions, yet 25 percent of Wari era peoples do (no N values are reported).⁵⁴ Among the Majes valley skeletal series assessed in this study, there are no pre-Wari skeletal populations to establish if anemia rates changed.

⁵³ Based on results published in Kellner's dissertation, this author recalculated percentages for EIP and MH populations to make them more comparable with previously reported results and results from this study. These recalculations were done with permission by the original author (Kellner, pers. comm., 2003).

⁵⁴ In summing up age-at-death tables presented by Drusini (1991:153), there are a total of 37 pre-Wari individuals and 106 Wari era individuals from Pueblo Viejo, Nasca. However, it is unknown how many of these were observable for cribra orbitalia and porotic hyperostosis.

However, relative to the Wari era Nasca populations, it is clear that the Majes communities suffered significantly higher rates of anemia; based on adult porotic hyperostosis frequencies between Nasca and Majes populations, the difference is statistically significant (Fisher's exact, $p < 0.001$; $df = 1$; $N = 173$). This suggests that the impact of Wari imperialism on childhood health may have been dissimilar among subject populations from different valleys. Thus, while intra-valley frequencies of anemia were similar (i.e., Beringa vs. La Real), there were significant inter-valley differences in anemia rates (i.e., Majes vs. Nasca), suggesting that, perhaps, Wari imperial policies differed between the two regions, leading to dissimilar childhood health statuses.

Among the Chen Chen (Tiwanaku affiliated) population in the Moquegua valley (Blom, 1999), which is contemporaneous with the Wari era populations from Majes, the frequency of porotic hyperostosis on juvenile crania was significantly higher than that of the combined Wari affiliated populations in the Majes valley (Fisher's exact, $p = 0.040$; $df = 1$; $N = 215$). Porotic hyperostosis rates among juveniles from Chen Chen were also higher than those from Wari era Nasca communities (64% vs. 0%, respectively). Similarly, the frequency of adult cribra orbitalia was higher among those from Chen Chen than those from the Majes valley (Fisher's exact, $p < 0.001$; $df = 1$; $N = 258$) and the Nasca valley (Fisher's exact, $p < 0.001$; $df = 1$; $N = 242$).⁵⁵ In sum, the Tiwanaku affiliated population from the Moquegua valley show significantly higher rates of anemia relative to Wari affiliated populations from the Nasca and Majes valleys. The environmental conditions are quite similar in Nasca, Majes, and Moquegua (i.e., arid Pacific drainages where mountain water runoff feeds agricultural fields along the valley floor), but the manner in which communities

⁵⁵ There are no data for adult porotic hyperostosis from Chen Chen.

from each valley altered the landscape for irrigation and agricultural production differs.⁵⁶ Perhaps the significantly different anemia rates are related to differences in imperial policies regarding agricultural planning and production between the contemporaneous empires of Wari and Tiwanaku. Interestingly, the Nasca valley has little available water on the surface of the valley floor; therefore, Nasca populations built irrigation systems (*puquios*) to tap into the underground water source (Schreiber and Lancho Rojas, 1995). Given the relatively low rates of childhood anemia among the Nasca populations (see Kellner, 2002), it may be that drinking water obtained from the *puquios* was cleaner than water from the Majes and Moquegua Rivers.

Wari communities in the southern hinterland show lower childhood anemia rates relative to the Tiwanaku community from Moquegua; perhaps Wari promoted relatively more access to a heterogeneous diet and avoided consolidating populations into crowded urban centers that would have exacerbated pathogen loads. The urban setting of Chen Chen (Goldstein, 2000), in contrast, may have been conducive to the spread of pathogens, resulting from population crowding.

In the Middle Horizon Andes, anemia rates were higher among populations in the Wari hinterland of Majes valley relative to those from the imperial center. Overall, this parallels the trend whereby higher anemia rates are observed in coastal communities relative to those from the highlands (Blom et al., 2004; Burgess, 1999; Hrdlicka, 1914; Ubelaker, 1992; Weiss, 1961; Williams, 1990) (but see Drusini, 1991; and Kellner, 2002). Thus, ecological context certainly played a role in the prevalence of iron deficiency anemia, but this was not the only factor. Individual communities in similar ecological zones negotiated

⁵⁶ However, the site of Chen Chen is located at a higher elevation (~1400m.a.s.l.) than those sites from Majes and Nasca, but it is not considered a highland community.

their interaction with the environment, leading to widely different frequencies of anemia. Some of those interactions may have been mediated by imperial policies. The differences in anemia rates between Wari period Nasca and Majes communities may be related to differing imperial strategies that may have controlled access to fresh water and the means for agricultural production. Similarly, the differences between Wari and Tiwanaku affiliated communities may reflect differences in how each empire governed and mediated interaction between their subject peoples and access to water, agriculturally productive lands, and dietary resources. Moreover, imperial policies may have determined how communities were organized, whether in dispersed settlements or urban centers, thereby affecting the communicability of pathogens.

Chapter 7 Trauma and Violence in the Wari Empire

7.1 Introduction

Cranial and postcranial trauma frequencies and distributions are presented in this chapter. The first section reports the prevalence of skeletal trauma during the Huarpa (pre-Wari) period at Conchopata, followed by the results on trauma rates during the subsequent Wari period. The second section includes the results on trauma from the Wari hinterland site of Beringa, and the third section presents the same for the site of La Real. Cranial and postcranial trauma is reported separately for all three skeletal series. The fourth section presents a discussion of the results from each of the sites individually. This is followed by a comparison of trauma frequencies and patterning between the three series. Throughout the discussion sections, the results presented in this dissertation will be compared to other studies on violence, injury, and trauma.

7.2 Results: Trauma and Violence at Conchopata (Pre-Wari and Wari Periods)

7.2.1 Huarpa (pre-Wari) Period Cranial Trauma at Conchopata

Evidence for cranial injury was rare in the Huarpa skeletal sample from Conchopata. Only one person among the 11 observable crania shows a head/facial wound ($1/11 = 9\%$). The affected individual was a middle-aged to old adult male (45 – 50 years-old) with a healed fracture on the left zygomatic; he was the only male observable for head trauma. The location of the wound suggests it resulted from being struck by a right-handed attacker

during face-to-face conflict (see Walker, 1997). Cranial trauma was absent among the four females and six unsexed persons.

7.2.2 Huarpa Period Postcranial Trauma at Conchopata

A total of nine females with at least 75 percent of all long bones and 50 percent of ribs and vertebrae were observed for bone fractures. Two (and possibly three) showed healed fractures (N=9). One old adult female from Architectural Space 104T5 exhibited healed spondylolysis in the 11th and 12th thoracic vertebrae, and one middle to old aged female from Tomb 1 (Eb-3, 1977 excavations) exhibited a Colles' fracture (wrist fracture) that affected the left radius and left ulna (Figure 7.1); it is common in this kind of injury to see both lower arm bones broken (Lovell, 1997). This left radius displays evidence for healing and also shows trauma-related osteoarthritis. The associated left ulna is diagnosed as a nonunion. That is, the marrow cavity sealed before the fractured distal end could mend to the shaft, resulting from either insufficient blood supply to the injured region, an infection that inhibited bone healing, excessive movement of the joint while healing, incomplete contact between the distal end and shaft, the presence of soft tissue between the fragments, or total destruction of the styloid process (Lovell, 1997). Within the same tomb (Tomb 1, Eb-3, 1977 excavations), a right radius exhibited a Colles' fracture, but it is not clear if it belonged to the same women with the fractured left wrist or to the other female in the tomb.⁵⁷ If it belongs to the former, then she suffered from two broken wrists. If it belongs to the latter, then there are two women with fractured wrists within Tomb 1. Neither of these lower arm fractures were parry fractures. Instead, they seem to have resulted when the woman (women)

⁵⁷ All bones from Tomb 1 (1977 excavations) were placed in the same box and labeled as "Entierro 1" (Burial 1). However, there were actually two nearly complete female skeletons and the arm bones of a third person near/within this tomb. Therefore, it is impossible to determine to which person the fractured right radius belongs. All bones are generally equal in size and all show similar taphonomic changes.

flung out her (their) hands to brace a fall. Overall, two out of nine (22%) or three out of nine (33%) females suffered from postcranial trauma involving the back and wrists. The one male with a facial fracture showed no injuries to his body. The second male was too poorly preserved to observe for postcranial fractures. Overall, it appears that Huarpa females were more likely to suffer postcranial trauma than cranial trauma, suggesting that, while they were not the victims of violence that led to skull fractures, they may have engaged in activities with high risks for bodily injury.

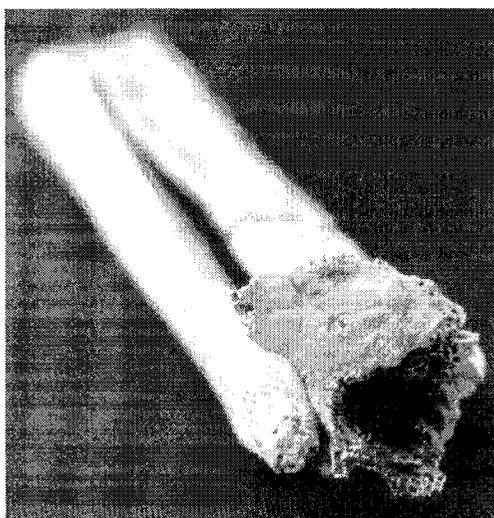


Figure 7.1. Colles' fracture of left radius and associated fracture and nonunion of left ulna. Note the trauma-related osteoarthritis on radius (middle-aged adult female from Tomb 1 (1977 excavations, Conchopata)).

One of the Huarpa tombs (Tomb 1, Eb-3,) warrants additional discussion because it includes five individuals, all of whom are adolescent females. The similarity in age and sex among them has raised much suspicion regarding human sacrifice (Isbell and Cook, 1987; Isbell and Cook, 2002); however, no female displayed peri-mortem skeletal trauma indicative of this practice. Nevertheless, as seen at the Sun Temple at Pachacamac, strangled females (i.e., human sacrifices) were identified by the presence of cloth ropes around their necks, not

by peri-mortem skeletal trauma (Uhle 1903). Therefore, based solely on the absence of this type of trauma, the possibility of sacrifice among these five young females can not be ruled out, particularly given the uniqueness of their shared age and sex.

7.2.3 *Wari Period Cranial Trauma Frequencies at Conchopata*

During the subsequent Wari period, seven out of 27 adult crania exhibit head injuries (26%), and slightly more females than males display cranial wounds. Nearly one-third of females ($5/16 = 31\%$) and one-quarter of males ($2/8 = 25\%$) were affected. However, these differences are not statistically significant (Fisher's exact, $p=0.572$; $N=24$) (Table 7.1). Thus, it appears that males and females were similarly affected by cranial injuries.

Table 7.1. Fisher's exact test to compare sex based differences in cranial trauma at Conchopata. There is no statistically significant difference.

	Female	Male	Totals
No Head Trauma	11	6	17
Head Trauma	5	2	7
Totals	16	8	24

Fisher's exact, $p=0.572$

Six of the seven individuals with head wounds display well-healed cranial depression fractures, indicating their head injuries were not the cause of death. A well-healed trauma suggests that the injury was not fatal, whereas a partially healed or non-healed peri-mortem wound suggests it may have contributed to the death of the victim (Galloway et al., 1999; Lambert, 1994; Lovell, 1997; Milner et al., 1991; Wilkinson and M, 1993). Thus, it appears that the violent actions that resulted in head wounds were intended to injure, not to kill. One exception is an old adult female who suffered a cranial fracture near bregma that never completely healed (woven bone is present around the wound, signifying partial healing).

There are no examples of peri-mortem cranial trauma, suggesting that no one in the sample died shortly after receiving a lethal blow to the skull.

Although the majority of adults with head trauma exhibit only one wound, several display a pair of cranial traumata: four out of seven (57%) show one wound and three out of seven (43%) evince two wounds (Table 7.2). This suggests that some may have been engaged in several separate physical conflicts leading to additional head wounds. Conversely, they could have suffered two blows to the head in one incident. Two of the three adults with multiple wounds display well-healed cranial fractures, which precluded determining if they were coterminous or sequential. The third individual, the old female with a partially healed fracture near bregma (mentioned above), also exhibits a well-healed wound on the parietal boss. This indicates that she was a victim of violence on two separate occasions: she first received a non-lethal blow to the parietal boss, which healed, and second, she received a severe head trauma near bregma that probably eventually contributed to her death. Interestingly, this female displayed circumferential cranial deformation—a style uncommon at Conchopata—suggesting that she may have been a non-local resident. Perhaps her “foreign” identity contributed to the likelihood of becoming a victim of violence; however, this is inconclusive.

Table 7.2. Tabulation of crania showing number of head wounds per adult at Conchopata.

	1 head wound	2 head wounds	Totals
No. of adults	4	3	7
No. of wounds in sample	4	6	10

7.2.4 Wari Period Locational Patterning of Cranial Trauma at Conchopata

Eighty percent of the cranial wounds are located on the posterior of the head, suggesting that head injuries were not randomly incurred. Among the 10 total head wounds, eight are on the posterior of the skull (occipital and parietal bosses), and two are on the superior portion (Figures 7.2 and 7.3). Given that 80 percent of wounds are on the posterior and 20 percent are on the superior, while none are on the anterior or sides of the head, it appears their distribution was not random. Instead, the locational patterning of cranial traumata suggests specific, almost systematic, physical violence that consistently targeted the posterior of the head relative to all other regions. Perhaps individuals received blows to the back of the head while being attacked from behind (i.e., fleeing) or from ducking to avoid an oncoming blow (Walker, 1989; Webb, 1995:), which could have been related to raiding and abduction events (Wilkinson, 1997) (also see Wilkinson and M, 1993). Conversely, much of the trauma could have resulted from culturally defined punitive actions in the form of corporal punishment or ritualized interpersonal conflict resolution (Smith, 2003:314) (also see Conklin, 2001) (and see discussion in Chapter 3 regarding corporal punishment by the Inka state). (These interpretations are explored more fully in the discussion section.)

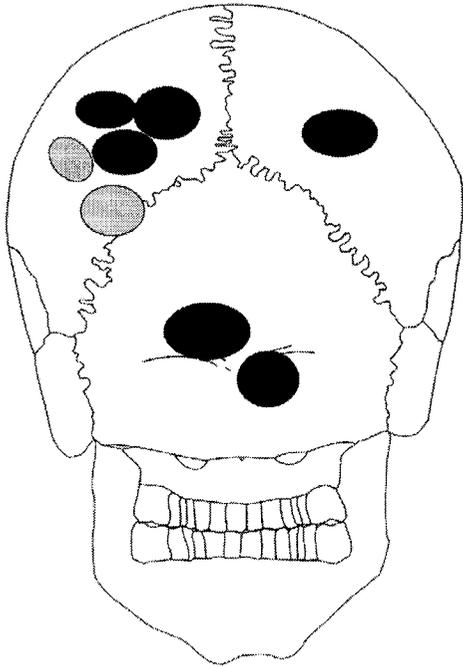


Figure 7.2. Conchopata: posterior view of cranial trauma (female wounds are in black; male wounds are in gray).

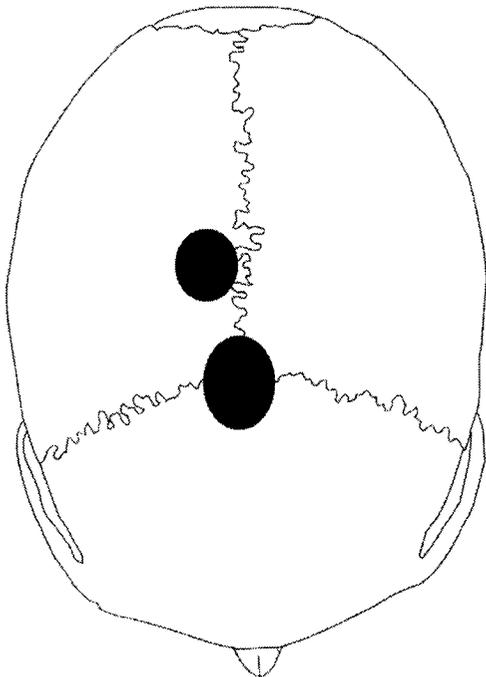


Figure 7.3. Conchopata: superior view of cranial trauma (female wounds are in black).

Sex-based comparisons of locational patterning show that males and females both received blows to the back of skull (Table 7.3). Both male wounds are located on the left parietal boss, suggesting that no men in the sample engaged in face-to-face conflict leading to bone fractures of the facial/anterior region (see Walker, 1997). Conversely, if they were involved in some form of interpersonal violence, it appears that the facial area was not targeted. Females also display a majority of head wounds on the posterior of the cranium, while also showing wounds on the superior. This, too, suggests that females did not engage in face-to-face combat. For both sexes, it appears that the posterior of the cranium was a primary target by attackers or punishers and suggests that men and women similarly experienced violence.

Table 7.3. Tally of wound locations on females and males from Conchopata.

	Anterior	Posterior	Superior	Left lateral	Right lateral	Total No. of head wounds
Females	0	6	2	0	0	8
Males	0	2	0	0	0	2
All	0	8	2	0	0	10

However, given that slightly more women than men suffered from head trauma, and none of it appears to stem from face-to-face combat, it may be that females were the victims of male on female domestic violence (see Lambert, 1994; Walker, 1997; Wilkinson and M, 1993) or female-female violence (Webb, 1995:205). Webb (1995:205) has documented more cranial trauma among females than males in many Australian aboriginal skeletal populations, leading him to suggest that some female wounds resulted from women fighting amongst themselves (also see Burbank, 1994). Given that the sex profile shows significantly more females than males at Conchopata (see previous chapter) who may have been organized around polygynous households, it may be that co-wives were fighting, which is relatively

common among polygynous societies (Levinson, 1989:25, 32). In contrast, female-female violence could have been between women of different social and generational ranks. Given rules of Andean kinship regarding parallel descent that is traced through the female or male line (Isbell, 1997; Zuidema, 1977a), higher ranked women could have controlled and physically punished lower ranked women.⁵⁸

7.2.5 *Wari Period Postcranial Trauma at Conchopata*

A complete picture of risk for violence and injury must include an overall view of bodily trauma. As Lovell (1997) has noted, injuries to the hands and ribs, as well as the cranium (discussed above), are some of the best indicators for violence. Other bone fractures, in contrast, may provide insight regarding physical activities and occupational hazards. This section reports the frequency of bone fractures per person (over 15 years-old) for five main body areas: 1) hand; 2) arm; 3) leg; 4) foot; and 5) trunk. Only those with at least 50 percent of the bones from a specific body area are considered in the following calculations.

During the Wari phase, 15 percent of adults with half of their hand bones present exhibit a healed hand fracture (4 out of 27). Among these four persons with hand injuries, one is an old female and the others are of indeterminate sex.⁵⁹ The most common hand fracture is a broken metacarpal: three of the four are in this location. The fourth injury is a fractured hand phalanx. Each person is from a different tomb group.

Fractures and dislocations of the arm and shoulder joint, respectively, are uncommon, and parry fractures are nonexistent. Among the 30 adults observed, only two display arm

⁵⁸ In short, females trace their ancestry through their mothers and males trace their ancestry through their fathers (i.e., sex-specific parallel descent)

⁵⁹ The old female with the fractured right metacarpal exhibits circumferential cranial deformation, head wounds, and broken ribs (discussed below).

fractures (6.7%), both of which are elbow injuries. Specifically, one individual fractured the distal end of the right humerus and the proximal end of the right ulna. The bones healed, but they show evidence for trauma-induced arthritis. The second person fractured the proximal end of the left ulna, and it, too, resulted in osteoarthritis; the distal end of this person's left humerus also exhibits osteoarthritis, likely a result of the ulnar fracture. Both individuals are from Architectural Space 64 (see Conchopata map for location).

Foot fractures, though rare overall, were apparently more common among females. Of the 32 adults observed for foot injuries, four show healed fractures (12.5%), three of whom are female. The fourth is of indeterminate sex. Three of the fractures occurred on foot phalanges, and the fourth affected the fourth left metatarsal. The four adults with foot injuries are from three different mortuary spaces.

Bone fractures and dislocations involving the leg and acetabulum (hip socket) were infrequent, but probably fatal. Only two out of 26 adults (7.7%) display a broken leg. Both fractures affected the proximal third of the left femur and show incomplete healing. One of the two femora exhibits an incomplete union, and each exhibit woven bone around the primary fracture area, indicating associated infection. Thus, it appears that both persons died from complications of a fractured femur (or some other unobserved fatal injury). The two individuals are from Architectural Space 89A.

Injuries that affected the skeletal trunk included vertebral and sacral compression fractures and rib fractures. Nearly 14 percent of adults exhibit these kinds of bone breaks (N=22). No fractures of the clavicle bone are observed. One adult suffered a compression fracture of a lumbar vertebra and the sacrum, and a probable female suffered a fracture to the left rib, which was well-healed at the time of her death. The third individual, the old female

with circumferential cranial deformation who also shows cranial fractures and a broken metacarpal, exhibits six compression fractures in thoracic vertebrae 10-12 and lumbar vertebrae 3-5, as well as fractures to the left ribs. The impact primarily affected the sternal portion of ribs four through seven (Figure 7.4), though the second and third ribs were partially fractured as well. All show evidence for healing, but given the incomplete union between normal bone and the bony callous on the broken ribs, it appears the rib fractures occurred shortly before her death. Conversely, her elderly age could have inhibited swift and total healing of the fracture sites.



Figure 7.4. Left rib fractures on elderly female from Conchopata. The post-mortem breaks occurred at the site of the partially healed rib fractures.

Overall, the spatial distributions of those injured show some interesting patterns. The elbow fractures affected two adults from Architectural Space 64, while femur fractures were present in two adults from Architectural Space 89A. Perhaps the arm and leg injuries are related to physical activities that specific burial groups shared in common. Hand and rib

fractures, in contrast, were distributed among different burial areas, suggesting that violence-related injuries may have been randomly dispersed among the community.

7.3 Results: Trauma and Violence at Beringa (Middle Horizon only)

7.3.1 Cranial Trauma Frequencies at Beringa

Among the 39 individuals more than 15 years-old, 14 show at least one head wound (14/39 = 36%). Males exhibit more cranial trauma than females, but the difference is not statistically significant (Fisher's exact, $p=0.306$; $N=23$) (Table 7.4). Half of the males (5/10 = 50%) and 31 percent of females show head wounds (4/13 = 31%). Five out of 16 crania that could not be confidently sexed display cranial trauma (5/16 = 31%).

Table 7.4. Comparison of trauma frequencies between females and males from Beringa.

	Female	Male	Totals
No head trauma	9	5	14
Head trauma	4	5	9
Totals	13	10	23

Fisher's exact, $p=0.306$

Although the majority of persons with head trauma did not die as a result of the blow to the skull, more than a quarter show peri-mortem cranial fractures, suggesting that the head trauma led to death. Among the 14 adults with head injuries, 10 exhibit complete healing at the fracture site (71.3%), three display peri-mortem injuries (21.3%), and one shows both a healed and peri-mortem fracture (7.3%).⁶⁰ These data indicate that in nearly three out of four

⁶⁰ Although the peri-mortem cranial fractures could have occurred after death, this is unlikely because of the radiating fractures that accompany two of the four wounds. Also, the peri-mortem wounds are located on the same part of the head (two on the right parietal boss and two on the occipital), suggesting intentional lethal blows to vulnerable parts of the skull.

cases the violent encounter was non-lethal, and in more than one out of four cases, the assailant may have attacked with murderous intent.

Among the 14 adults with head trauma, there are a total of 19 wounds. Three of the 14 individuals with head trauma exhibit more than one head wound ($3/14 = 21\%$), and the other 11 exhibit only one cranial trauma ($11/14 = 79\%$) (see Table 7.5 for tally of head wounds), demonstrating that most individuals received only one blunt force trauma to the head. However, two males and one female show more than one wound. One adult male exhibits two healed head wounds: one on the left and right parietal boss each. Another male shows three healed injuries on his left frontal bone, right nasal, and central area of his maxilla, but because all wounds are well-healed, it is unknown if he was injured in one or more violent events. The third individual was an old adult female with one healed trauma on the right parietal boss and two peri-mortem fractures on the right lateral side. Given that one of the three wounds was healed, it is clear that she was in two separate violent incidences. In the first, she received a non-lethal blow to the back of her head, and in the second, two lethal, closely placed strikes to the side of her head apparently resulted in her death (Figure 7.5). The radiating fracture line emanating from the wound site is characteristic of peri-mortem trauma (Courville, 1962) (Ortner, 2003). The location of the lethal, peri-mortem wounds on the side of the head is similar to what has been reported for prehistoric populations from coastal California, for which Lambert (1994:119) notes were distinct in “severity and intent from the sub-lethal [cranial] wounds;” the peri-mortem wounds were larger and concentrated on the *side* and *posterior* of the cranium, while sub-lethal wounds were smaller and located on the anterior. Peri-mortem wounds on the posterior of the head suggest that the attacker assaulted the victim from behind (Webb, 1995), likely with lethal intent (Lambert, 1994;

Walker, 1997). This is the kind of wound that might be expected in raiding events (Wilkinson and M, 1993)

Table 7.5. Tabulation of crania showing number of head wounds per adult at Beringa.

	1 head wound	2 head wounds	3 head wounds	Totals
No. of adults	11	1	2	14
No. of wounds in sample	11	2	6	19

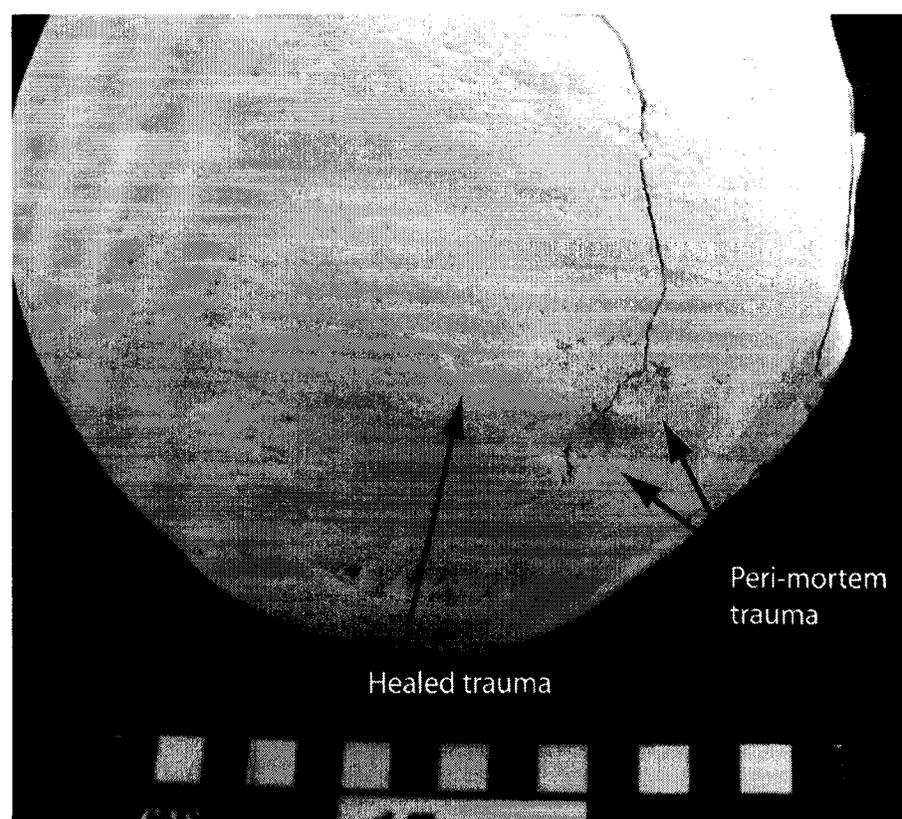


Figure 7.5. Peri-mortem and healed trauma on the right parietal of an old adult female from Beringa.

7.3.2 Locational Patterning of Cranial Trauma at Beringa

As indicated above, there are a total of 19 cranial wounds among the 14 affected individuals, and nearly two-thirds of the 19 wounds are located on the posterior of the head

(the occipital and parietal bosses) ($12/19 = 63\%$) (Figure 7.6). The next most common site for cranial trauma is the frontal/facial area where five wounds are located ($5/19 = 26\%$), followed by the right lateral side with two wounds ($2/19 = 11\%$) (Figures 7.7 and 7.8). The left lateral side and superior portion of the skull show no head wounds. (See Table 7.6 for a tally of wounds and their locations.) Given that 89 percent of wounds are on the posterior and anterior of the skull, it appears their distribution is not random. That is, they likely did not result from accidental injuries. Rather, they probably resulted from specific violent activities in which the posterior of the head was primarily affected, followed by the anterior. This suggests that most people may have received blows to the back of the head while fleeing or while bowing the head to avoid an oncoming blow (Walker, 1989; Webb, 1995:); this kind of action is probably related to raids and abduction events (Wilkinson, 1997) (also see Wilkinson and M, 1993). However, given that there are wounds on the anterior of the cranium, it appears that some Beringa individuals also engaged in face-to-face fighting (see Lambert, 1994; see Walker, 1997) (discussed in more detail below).

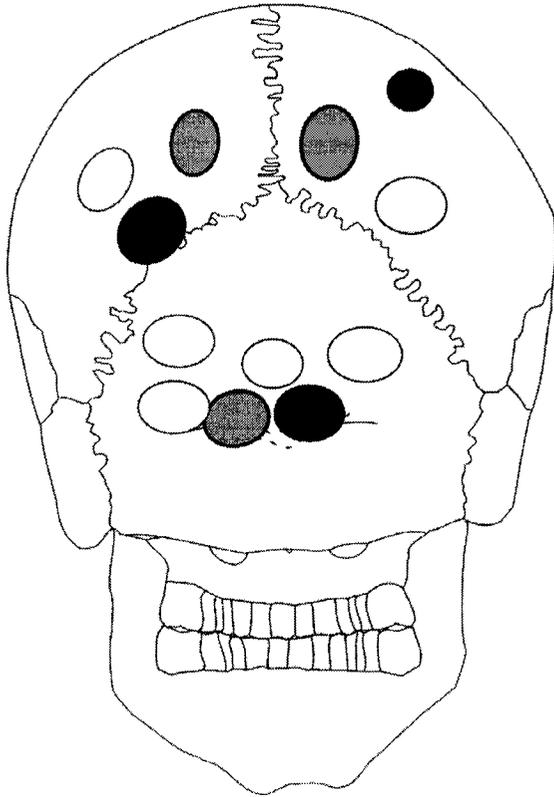


Figure 7.6. Beringa: posterior view of cranial trauma located on the occipital and parietal bosses. (Black= female wounds; Gray=male wounds; White=indeterminate sex.)

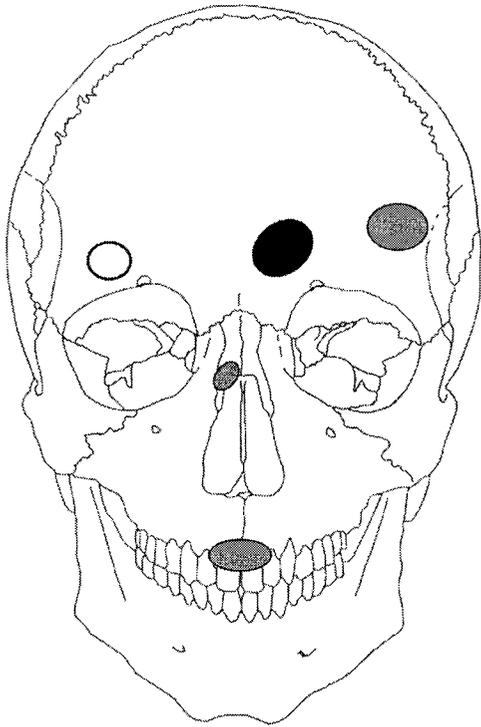


Figure 7.7. Beringa: anterior view of cranial trauma located on the frontal bone and facial region. (Black= female wounds; Gray= male wounds; White= indeterminate sex.)

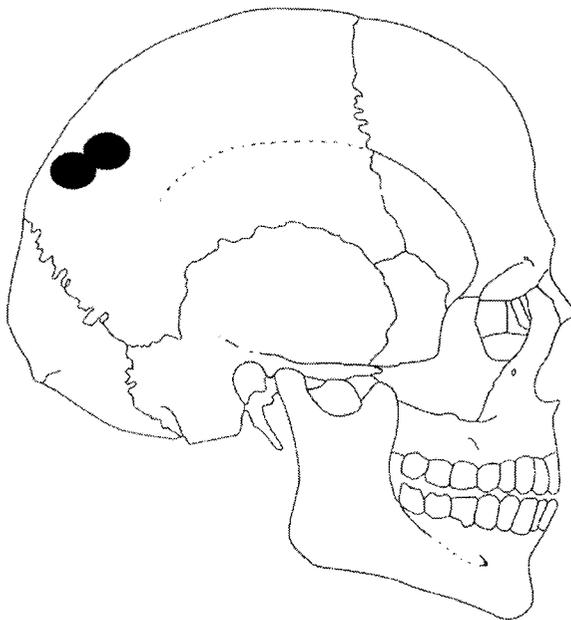


Figure 7.8. Beringa: right lateral view of cranial trauma located on the right parietal. (Black= female wounds; Gray= male wounds; White= indeterminate sex.)

Table 7.6. Tally of wound locations for all affected individuals.

	Anterior	Posterior	Superior	Left lateral	Right lateral	Total No. of head wounds
Females	1	3	0	0	2	6
Males	4	4	0	0	0	8
Unknown Sex	0	5	0	0	0	5
Sum of all	5	12	0	0	2	19

The location of head wounds differs between the sexes, suggesting that men and women sustained their injuries in different kinds of violent encounters. Among the six wounds present on female crania, three are located on the posterior of the skull, two wounds are on the right side, and one is on the anterior (see Figures 7.6, 7.7, and 7.8, above, and see Figure 7.9, below). Males, in contrast, show half of their wounds on the anterior and half of their wounds on the posterior (see Figures 7.6 and 7.7, above). All of the wounds on the unsexed crania are on the back of the head. (See Table 7.6 for a listing of wounds and their location.) These results suggest that women rarely engaged in face-to-face combat, but were commonly in situations where they were vulnerable to other kinds of physical injury. In contrast, men were more frequently engaged in face-to-face physical conflicts as evidenced by wounds on the frontal bone and facial area. However, they also show an equal number of wounds on the posterior of the cranium, indicating they were victims of violence in other settings, perhaps similar to those encountered by women. Overall, 31 percent and 50 percent of females and males, respectively, exhibit head trauma, and notably, those wound locations are distinct between the sexes.

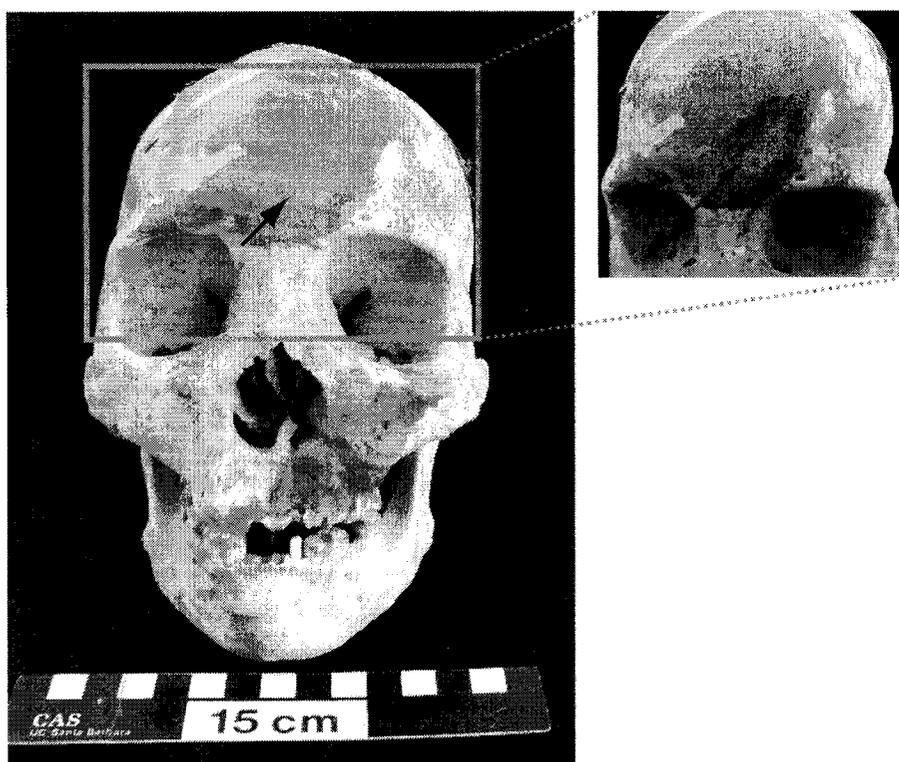


Figure 7.9. Blunt force trauma evident on the frontal bone of an adult female from Unit 17. Although soft tissue adheres to the surface of the bone, the depression fracture is still visible.

7.3.3 *Postcranial Trauma at Beringa*

The frequency and kind of postcranial trauma among a population provide insight regarding its physical activities and exposure to violence: information that may (or may not) complement the cranial trauma data. This section reports the percentages of postcranial bone fractures for individuals more than 15 years-old for five body areas: 1) hand; 2) arm; 3) leg; 4) foot; and 5) trunk.

Among the 52 persons with at least 50 percent of their hand bones present, five exhibit a hand fracture (9.6%). Three persons show fractured hand phalanges, all of whom were from Unit 1 (the oversized tomb at the northern end of the site), and two individuals display broken metacarpals, both of whom were from units situated near to each other (Unit

16W and Unit 17). Notably, the female with the fractured metacarpal from Unit 17 also shows healed cranial trauma.

Although no shoulder joints were dislocated and humeral fractures were rare, bone breaks and dislocations of the lower arm bones and elbow affected slightly more than 10 percent of the population. Among the 44 left humeri, only one displays a healed fracture on its distal end (2.3%). In contrast, five out of 44 left radii exhibit a fracture or dislocation (11.4%). Two are traumatic injuries (e.g., dislocations) to the proximal radius (elbow), and two are healed bone breaks on the distal end of the radius (Colles' fractures). As discussed in the Methods Chapter, the latter injury probably resulted when the individuals flung out their hands to brace a fall (Figure 7.10). One of these Colles' fractures is associated with a broken, but healed, styloid process of the adjoining ulna, a common occurrence in this kind of injury (Lovell, 1997) (Figure 7.11). The fifth radial injury is a healed fracture on the midshaft, which is probably related to an ulna parry fracture (discussed below) (Figure 7.12).

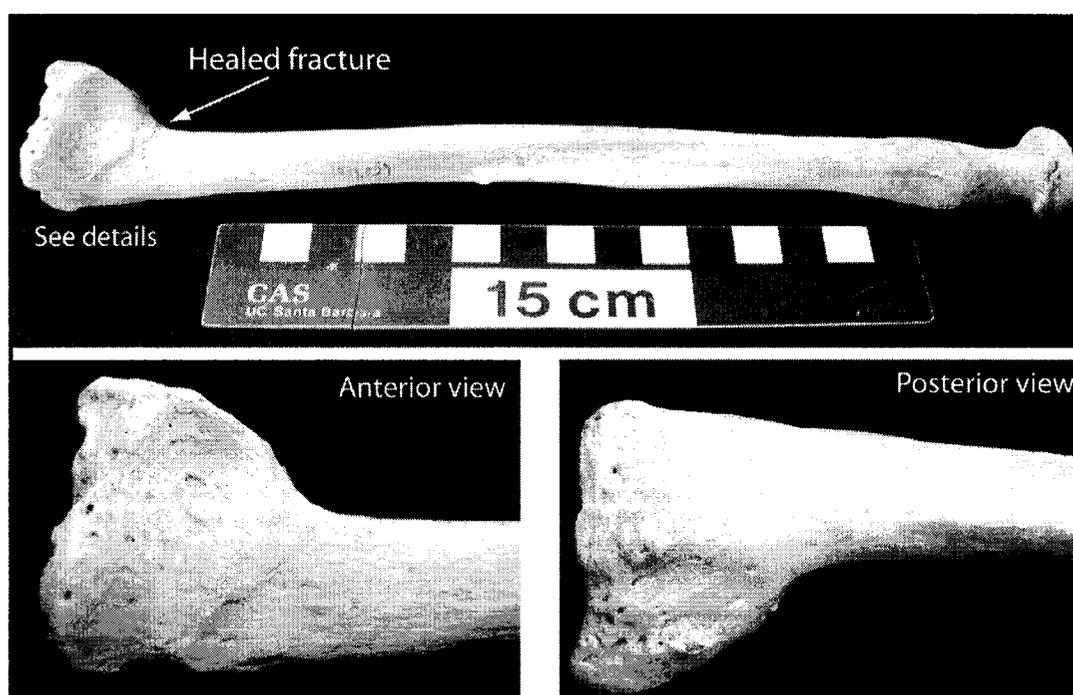


Figure 7.10. Healed Colles' fracture on the distal end of a left radius.

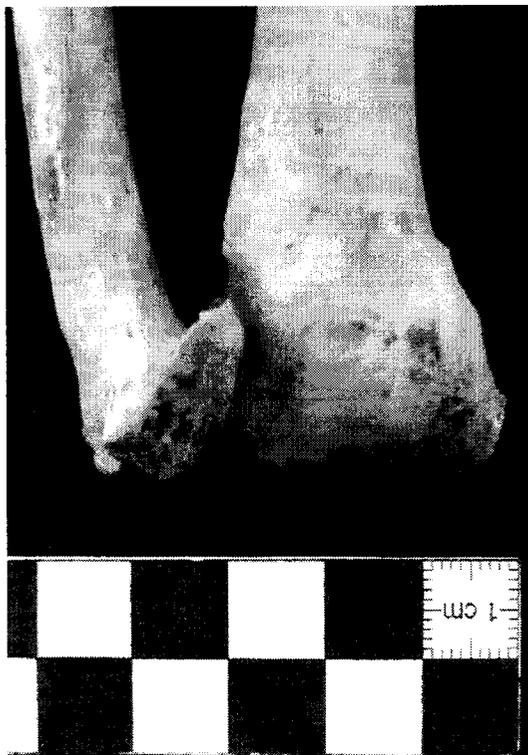


Figure 7.11. Colles' fracture on the distal end of a left radius and associated fracture on the distal end, including the styloid process, of the adjacent left ulna.

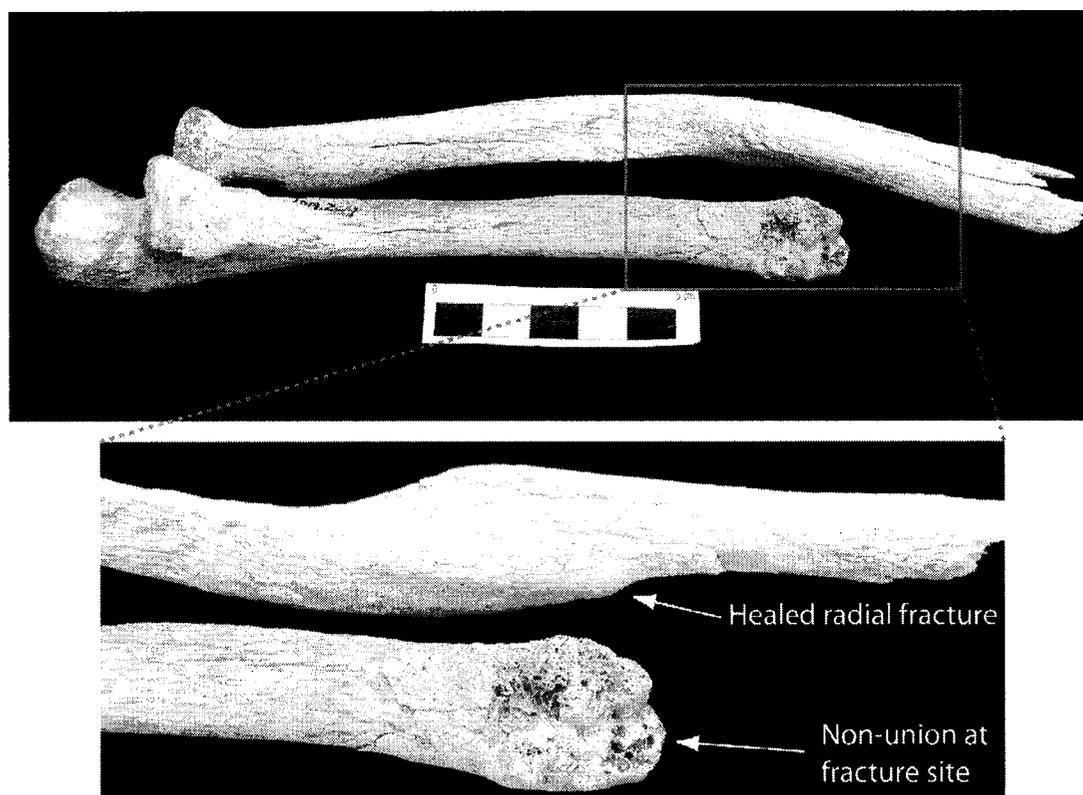


Figure 7.12. Probable parry fracture of left ulna and radius.

Injuries to the left ulna were similarly common and two of these are identified as parry fractures. Out of 51 ulnae, six exhibit a fracture or dislocation (11.8%). Three are dislocations on the proximal end of the ulna, one of which is associated with a radial dislocation mentioned above, and the other three are healed fractures. Among the ulnar fractures, one shows a break on the distal end, and the second exhibits a probable parry fracture with a nonunion at the fracture site (associated with the fractured radius mentioned above) (Figure 7.12). The latter is identified as a probable ulna parry fracture, and not related to a Colles' fracture, because the break is located superior to the distal epiphysis and involves more than just the styloid process. Also, the nonunion implies a complete break, a characteristic of parry fractures (Lovell, 1997). In this case, the distal end is completely separated from the diaphysis, as identified by callous formation and sclerosis near the

medial-distal end of the shaft; its distal end was never recovered. Finally, the third broken ulna is a clear example of a parry fracture with incomplete union (Figure 7.13).

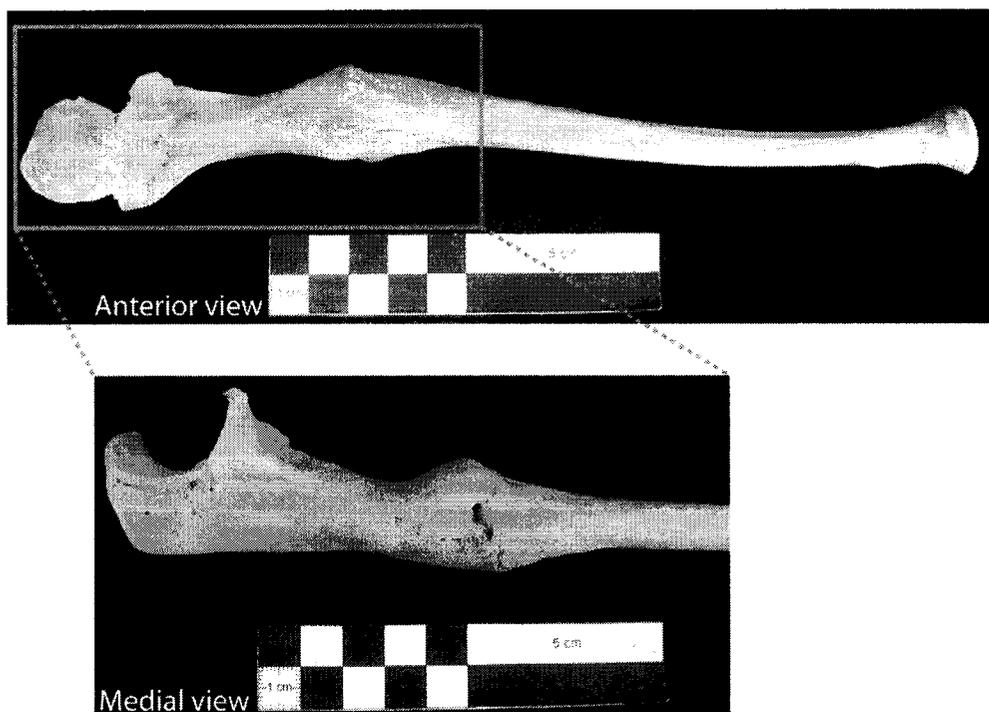


Figure 7.13. Parry fracture on left ulna.

Foot fractures are rare, but in those occasional instances, they appear to have been compression fractures involving the metatarsals and foot phalanges. Among the 58 individuals with at least half of their metatarsals present, four exhibit a healed fracture (6.9%). Fewer individuals suffered fractures in their foot phalanges: only 5.1 percent were affected (N=59). There are 46 individuals with a well-preserved left calcaneus, and one showed a healed fracture with associated trauma-induced osteoarthritis. Calcaneal fractures typically result when an individual falls from a great height and lands on their feet (Galloway, 1999e:211; Lovell, 1997). Thus, it is likely that this individual fell in one of the ravines or off of a cliff or river's edge (see photos of Majes valley and Beringa in Chapter 2).

None of the 46 individuals with well-preserved left femora show a fracture, and no individuals evinced pathological changes in the acetabulum or femoral head indicative of a hip dislocation (N=34).⁶¹ Among the 36 adults with a left tibia and the 51 adults with a left patella, none display fractures. The only leg bone to exhibit a fracture is the fibula: six percent of adults show a healed fracture on the distal end of the fibula ($2/32 = 6\%$), both of which are associated with periosteal reactions, indicating associated infection. Notably, both of these individuals derive from the oversized tomb on the northern end of the site (Unit 1) (See Chapter 2).

Fractures involving the skeletal trunk most commonly affected the ribs, a skeletal element often identified as a target in interpersonal violence (Lovell, 1997). Among the 43 individuals with at least half of their ribs present, 12 exhibit healed rib fractures (27.9%). Among them, two adults display two broken ribs, and one old adult exhibits three, while the other nine show only one rib fracture.⁶²

In other parts of the skeletal trunk, fractures are rare except in the spinal column where vertebral compression fractures are present in all three segments (i.e., cervical, thoracic, and lumbar), particularly in the lower thoracic region. Among 69 individuals with a well preserved atlas, three evince pathological changes indicative of traumatic injury to the articular facets ($3/69 = 4\%$), and six of the 69 adults show a compression fracture or dislocation in the lower cervical vertebrae ($6/69 = 9\%$). Moving down the spinal column, the twelfth thoracic vertebra was commonly affected: 13 percent show compression fractures ($4/31 = 13\%$), and in one of those cases, the eleventh thoracic vertebra is also affected.

⁶¹ However, two individuals who could not be securely dated to the MH period exhibit a hip fracture/dislocation and a broken pubis bone. They are excluded due to the uncertainty of their chronological association.

⁶² It is possible that these nine adults had more than one rib fracture, but all of their ribs were not recovered or well enough preserved to observe for breaks.

Lumbar compression fractures are rare relative to those in the lower thoracic region: only four out of 58 individuals exhibit this kind of injury ($4/58 = 7\%$), and one of them suffered a compression fracture to two lumbar vertebrae. The sacrum and coccyx were also affected: eight percent show a compression fracture or broken coccyx ($2/24 = 8\%$). Finally, among the 37 left clavicae, one exhibits a healed fracture near the medial end ($1/37 = 3\%$). The pelvis, scapula, sternum, and manubrium show no fractures.

7.4 Results: Trauma and Violence at La Real

7.4.1 Cranial Trauma Frequencies at La Real

Based on 104 adult crania observed for trauma, 32 show at least one head wound ($32/104 = 31\%$).⁶³ Among these crania, 16 out of 39 males exhibit cranial trauma ($16/39 = 41\%$) and five out of 26 females show head wounds ($5/26 = 19\%$) (Figure 7.14). These differences are nearly statistically significant (Fisher's exact, $p=0.056$; $N=65$) (Table 7.7). Thus, men were exposed to violence at a much higher frequency than women. Indeed, they engaged in violent acts more than twice as frequently as women: the ratio of female to male head trauma is 1:2.16. There were 39 adults that could not be sexed, and 11 exhibit cranial trauma ($11/39 = 28\%$).

⁶³ The five trophy heads (discussed below) were not observed for trauma, so they do not factor into these calculations.

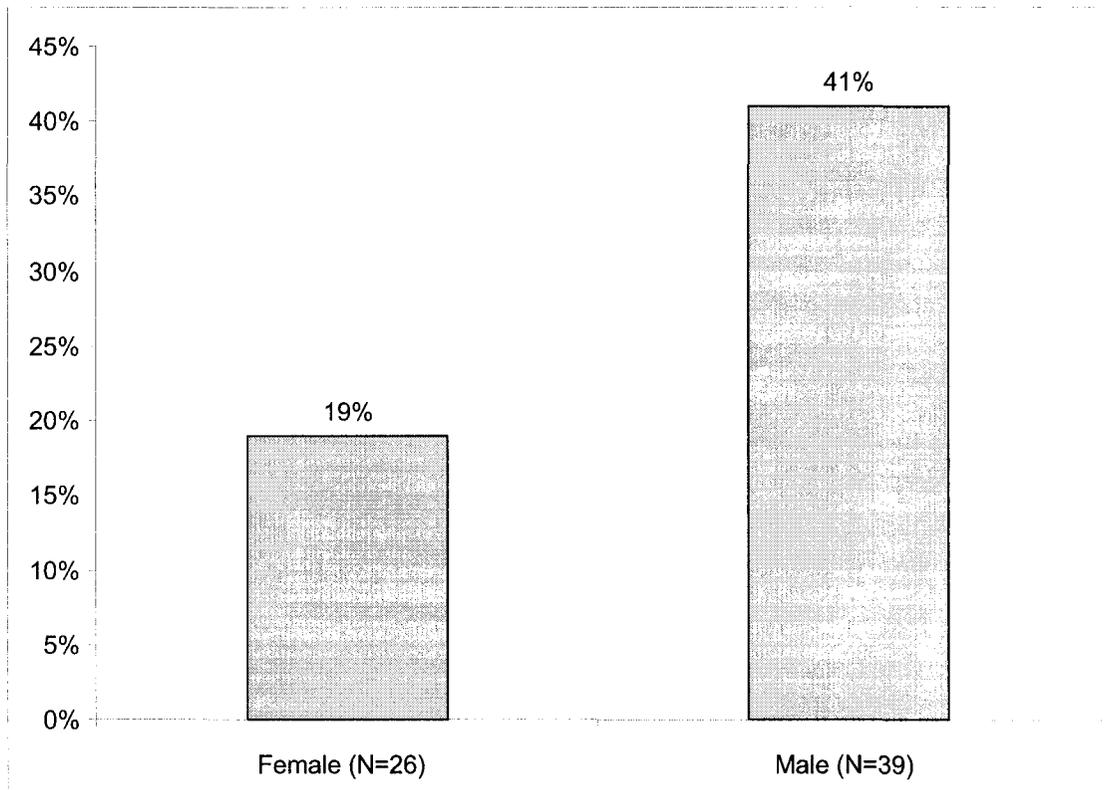


Figure 7.14. Percentage of adult females and males from La Real displaying at least one head wound.

Table 7.7. Fisher's exact test to compare cranial trauma frequencies between females and males from La Real. Differences are nearly statistically significant.

	Female	Male	Totals
No Head Trauma	21	23	44
Head Trauma	5	16	21
Totals	26	39	65

Fisher's exact, $p=0.056$

The majority of the head wounds are well-healed. Among the 32 individuals with head trauma, 27 exhibit healed wounds ($27/32 = 84\%$). This indicates that the preponderance of head wounds (84%) were not fatal; therefore, it appears the intent was to inflict injury, not death (see Lambert, 1994). That is, because healing only can occur while an individual is

alive, healed wounds indicate that the individual survived the physical assault (see Chapter 4 for detailed discussion).

The other skull traumas are peri-mortem, indicating that they occurred around the time of death. These include one individual with a slightly healed trepanation scar and probable wound, and another displaying a perimortem fracture with an associated, unhealed trepanation. Two adults display healed wounds and perimortem fractures both, while another shows a perimortem skull fracture only (Figure 7.15) (Table 7.8). Because 84% of adults with skull trauma exhibit healed head wounds (i.e., they recovered from the trauma), it is suggested that in the majority of cases, the intent of the attacker was not to kill. In contrast, the four adults who show perimortem fractures likely died as a result of blows to their heads, despite what appears to be an attempt to save one of them by conducting cranial surgery (i.e., trepanation). The fifth person with the slightly healed trepanation scar may have died from complications (i.e., infection) from the skull surgery.

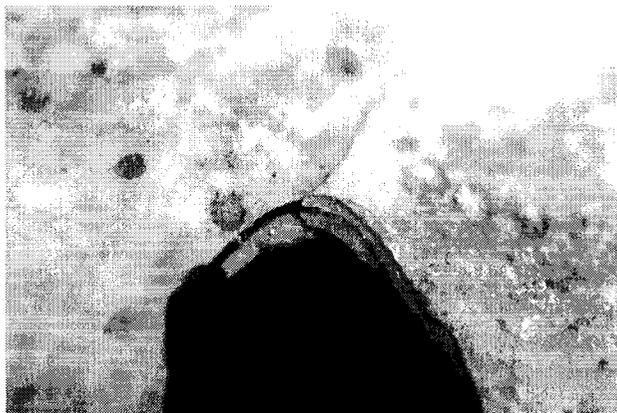


Figure 7.15. Close-up of a perimortem fracture on a La Real cranium. Note the “hinged” appearance on the edge, indicating a fresh break. Compare this to the well-healed skull fractures in Figures 7.21 – 7.24.

Table 7.8. Tally of 32 La Real crania with healed and perimortem fractures and associated trepanations.

	Healed fracture	Perimortem fracture	Perimortem & trepanation	Probable wound & slightly healed trepanation	Healed wound & perimortem fracture	Total
No. of adults	27	1	1	1	2	32

While the majority of individuals display only one head wound, nearly one-third display two or more wounds, suggesting that a sizeable portion of the community had engaged in non-lethal conflicts where an opponent could have delivered several blows to the head. Conversely, they could have been in several violent incidents where they suffered head wounds on separate occasions. However, because the multiple wounds were well-healed, it could not be determined if they were received in one incident or several. Among the 32 adults with skull fractures, there are a total of 53 wounds; 22 adults exhibit only one wound, and ten individuals display two or more cranial traumas, including one with six healed skull fractures (see Table 7.9 for a tabulation of all cranial wounds).

Table 7.9. Tally of La Real crania showing number of head wounds per adult.

	1 head wound	2 head wounds	3 head wounds	4 head wounds	5 head wounds	6 head wounds	Totals
No. of adults	22	4	3	2	0	1	32
No. of wounds in sample	22	8	9	8	0	6	53

7.4.2 *Locational Patterning of Cranial Trauma at La Real*

The head wounds are not randomly distributed on the surface of the cranium, but concentrated on the anterior and posterior. Among the 52 mapped wounds,⁶⁴ 27 wounds are on the anterior of the skull ($17/52 = 52\%$) (Figure 7.15), 13 wounds are located on the posterior (i.e., occipital and parietal boss) ($13/52 = 25\%$) (Figure 7.16), and the remaining 12 wounds ($12/52 = 23\%$) are dispersed among the superior and left and right lateral sides of the head (Figures 7.17, 7.18, and 7.19). Because more than three-fourths of the total wounds are concentrated on the anterior and posterior of the head, it appears that intentional acts of violence targeted these two portions of the head. In other words, the observed cranial trauma is not the result of accidental injury or frenetic, random violent encounters.

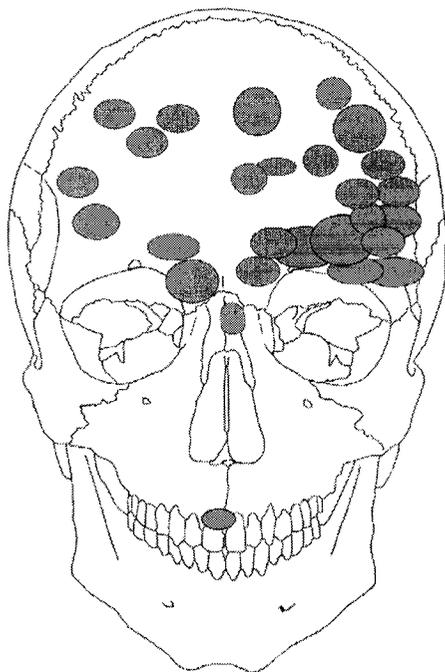


Figure 7.16. Anterior view of La Real skull showing location of all anterior head wounds.

⁶⁴ Although there are a total of 53 cranial wounds, the location of one wound is unknown because some skeletal material had been removed for museum display before I completed data collection.

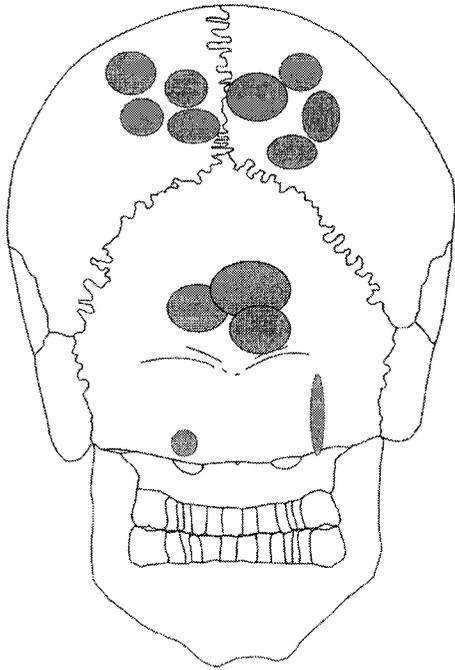


Figure 7.17. Posterior view of La Real skull showing location of all posterior wounds.

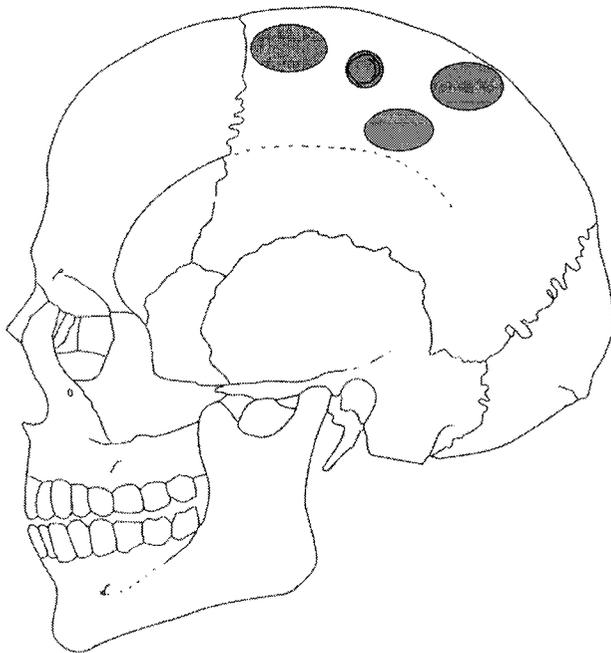


Figure 7.18. Left lateral view of La Real skull showing location of all wounds on the left side.

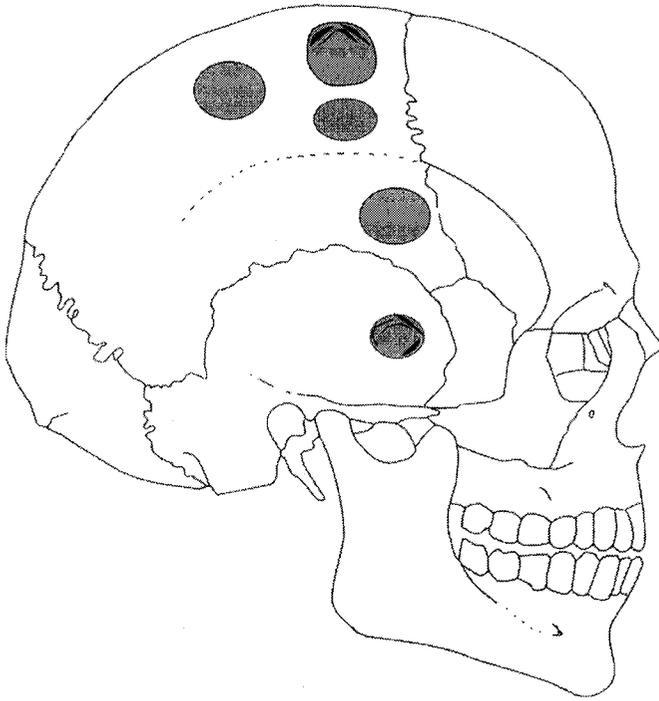


Figure 7.19. Right lateral view of La Real skull showing location of all wounds on the right side.

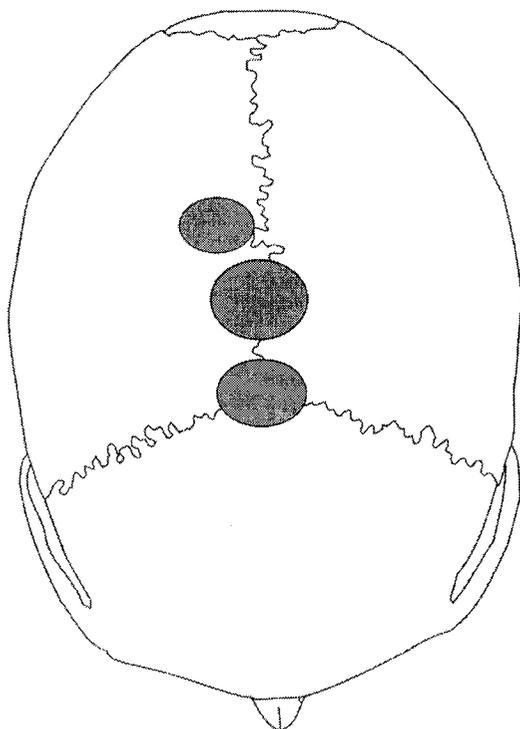


Figure 7.20. Superior view of La Real skull showing location of all wounds on the top of the head.

Among anterior traumata (see Figure 7.15, above), 70 percent are on the left and 30 percent are on the right (N=27) (Figure 7.20), indicating that the majority of frontal wounds were inflicted by a right-handed attacker. This is similar to what Lambert (1994) and Walker (1989) have observed among Chumash males from prehistoric coastal California, leading them to suggest that men may have been engaged in “head clubbing,” a ritualized form of fighting where men face each other and receive blows to the head. The shape of the wound gives insight regarding the kind of object used to inflict the trauma (Walker, 1997:153), and among the La Real victims, circular and oval shapes are the most common (Figures 7.21, 7.22, and 7.23). This suggests that the attacker was wielding a round object as a weapon,

similar to a mace with a doughnut stone or throwing sling stones while facing the opponent (see examples of these kinds of weapons in Chapter 2).

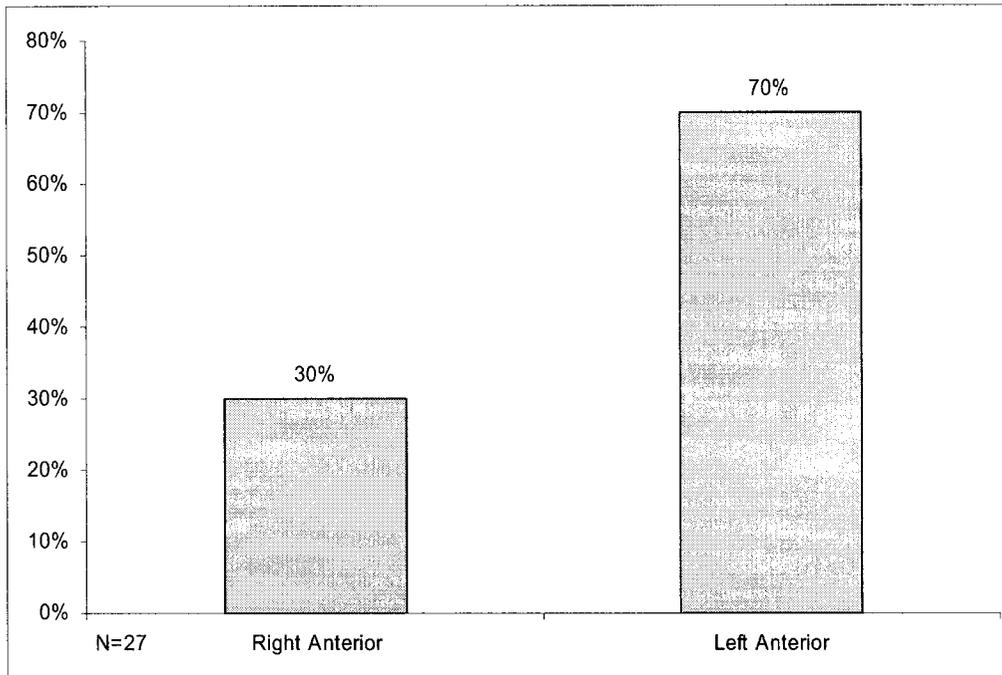


Figure 7.21. Percentage of left versus right wounds on the anterior of the cranium among the La Real population (N=27).

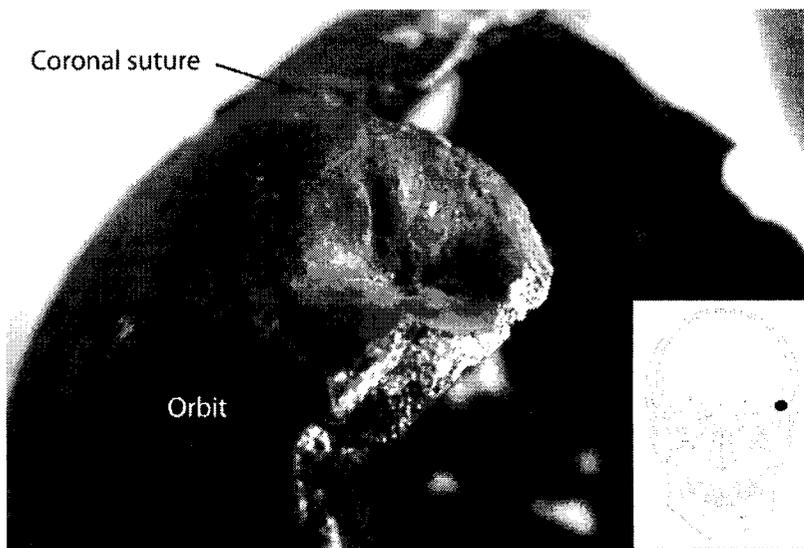


Figure 7.22. Ectocranial view of healed wound on left frontal bone, posterior to orbit. The cranium is tilted to its right so the view is an oblique angle of the left frontal and left side. (La Real)

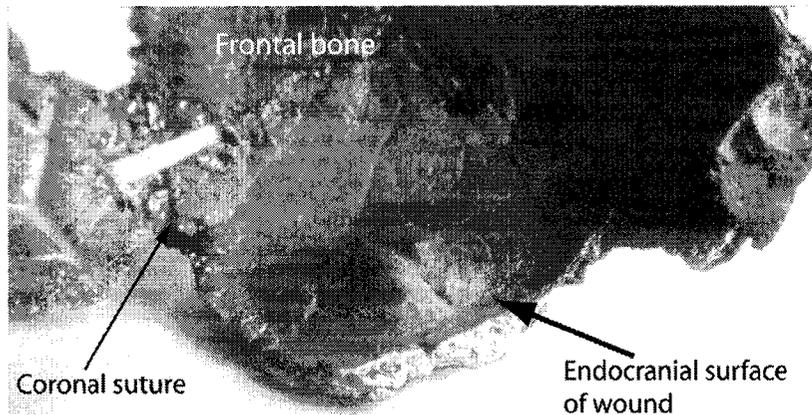


Figure 7.23. Endocranial view of the frontal bone wound shown in figure above. Note how the blunt force trauma depressed the inner table. (La Real)

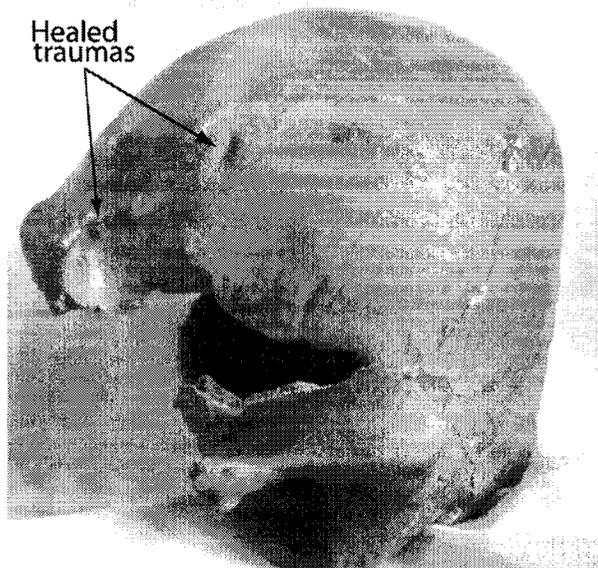


Figure 7.24. Left lateral view of cranium with two healed wounds on left frontal bone. Note the intentional tabular fronto-occipital cranial deformation, the common form in the coastal-yungas zones of the Andes. (La Real)

The posterior of the cranium was also the site of many wounds, and like the anterior, the majority of wounds are oval (Figure 7.24). This suggests use of the same weapons described above, particularly sling-stones that could have been hurled at the back side of fleeing victims, possibly during raids (see Webb, 1995; Wilkinson and M, 1993) or ritual

battles (i.e., *tinku*) that were recently somewhat common in the highland Andes (Bolin, 1998; Hartmann, 1972; Orlove, 1994; Sallnow, 1987) (also see discussion of *tinku* in Chapter 3). Given that the wounds appear to be patterned in their distribution, it seems that specific rules of engagement defined violent interactions. However, before interpretations regarding the behaviors behind the trauma can be posited, it must be shown that the locational distribution of wounds is indeed patterned.

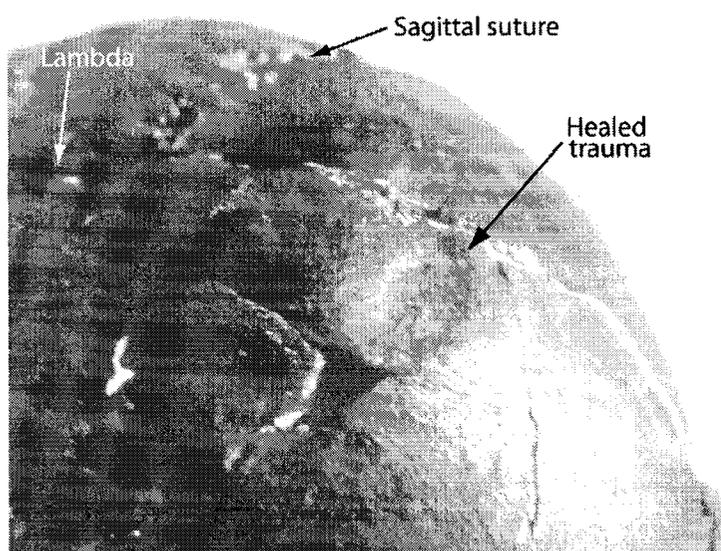


Figure 7.25. Posterior view of healed head wound on right parietal boss. (La Real)

To test the null hypothesis that wounds are not associated with location (i.e., the wounds are randomly (equally) distributed on the head), the observed wound locations were compared to that of an equal distribution by way of a contrast estimate, using a log linear model to compare the distributions. The equal distribution assumes that each of the five cranial areas (anterior, superior, posterior, left lateral, and right lateral) has an equal chance of being struck (i.e., each area has a 20% chance of receiving a trauma). In this case, the total number of wounds equals 52, so each cranial area should have 10.2 wounds, but this was not observed. Instead, 27 wounds are on the anterior, 13 are on the posterior, three are

on the top of the head, and four and five are on the left and right side, respectively (Table 7.10). When these observed data are contrasted to the expected even distribution (i.e., 10.2 wounds on each area), they are shown to be significantly different (Wald's $\chi^2=30.34$; $p<0.0001$; $df=4$).⁶⁵ Thus, the null hypothesis that head wounds and location are not associated is rejected (i.e., wounds are not equally distributed on the skull).

Table 7.10. Tabulation of wounds on each of the five cranial areas from La Real crania.

	Anterior	Posterior	Superior	Left lateral	Right lateral	Totals
No. of Wounds	27	13	3	4	5	52

Given that cranial wounds are not equally distributed across the surface of the cranium, it is hypothesized that the distribution is patterned, such that the anterior portion of the cranium exhibits significantly more wounds than the average of the other four areas. A contrast estimate compared the counts of wounds on the anterior to the average of all others, and the difference is statistically significant (Wald's $\chi^2=29.30$; $p<0.001$; $df=1$; $N=52$). (See Chapter 4 for a discussion of this statistical method.) In sum, there are significantly more wounds on the anterior of the skull relative to all other areas, and the contrast estimate value of 5.109 (Table 7.11) indicates that an individual was about five times more likely to receive a blow to the front of the head relative to all other areas. Clearly, this portion of the head was targeted in incidences of inter-personal violence.

Similarly, it is hypothesized that there are significantly more wounds on the back of the skull relative to the average of all other areas, excluding the anterior. Again, a contrast estimate compared the number of posterior wounds to the average number of wounds on the

⁶⁵ In this particular statistical test, Fisher's exact could not be performed in order to determine significance. Instead, an approximation of Fisher's exact test is used: Wald's chi-square.

superior, left side, and right side (the anterior is excluded in this calculation). The difference between the wound counts is statistically significant (Wald's $\chi^2=8.79$; $p=0.003$; $df=1$; $N=25$) (Table 7.11), indicating that the posterior of the skull is significantly more likely to exhibit a wound relative to the superior and sides of the head. In fact, a contrast estimate value of 3.3208 indicates that the posterior of the head was three times more likely to be struck relative to all other areas, excluding the anterior. In sum, among the La Real population, the front of the skull is the most likely place to receive a blow, followed by the posterior of the head. This suggests that rules of engagement associated with violent conflict influenced what sections of the head were to be struck.

Table 7.11. Contrast estimate results comparing cranial wound locations of La Real crania.

Comparison	Estimate	95% Confidence Limits		Chi2	P
		Lower	Upper		
Anterior vs. all other areas	5.109	2.8304	9.2223	29.3	<.0001
Posterior vs. superior, left, and right	3.3208	1.5016	7.3436	8.79	0.003

The sex-based differences in locational patterning of head wounds suggest that violence was experienced differently by men and women. The preponderance of male wounds is on the anterior, while females exhibit a majority of wounds on the posterior (Figure 7.24). Among males, 59 percent of wounds are on the frontal, 20.5 percent are on the posterior, and 20.5 percent are on all other areas combined ($N=29$). Thus, it appears that males primarily were involved in face-to-face combat that target the facial area, and because the majority of wounds are healed, it appears that those conflicts were non-fatal. In contrast, 57 percent of wounds on females are on the posterior, while the other 53 percent of wounds

are on three other areas (N=7). This suggests that females may have suffered injury while fleeing from an attack, perhaps during raids (Webb, 1995). Men also show wounds on the posterior of their head. This parallels what Webb (1995) has reported for Australian aboriginal populations, where wounds on the occipital bone of both sexes have been interpreted as attacks coming from behind; this suggests that men and women could have been victims in similar contexts. However, based on the overall frequency and patterning between the sexes, males suffered significantly more head trauma than females. Moreover, males were engaged in non-lethal face-to-face combat, while females were exposed to violence in distinct settings. This pattern parallels that of prehistoric groups from coastal California where males were afflicted with head trauma significantly more than females; also, the male wounds were concentrated on the frontal bone, while female wounds were more diffuse across the cranial vault (Lambert, 1997:89). Based on these data, Lambert (1997:89) suggests that males were engaged in face-to-face fighting that closely followed protocol about rules of engagement, similar to what would be expected in conflict resolutions, while females were victims of spousal abuse that did not include strict rules about male on female violence.

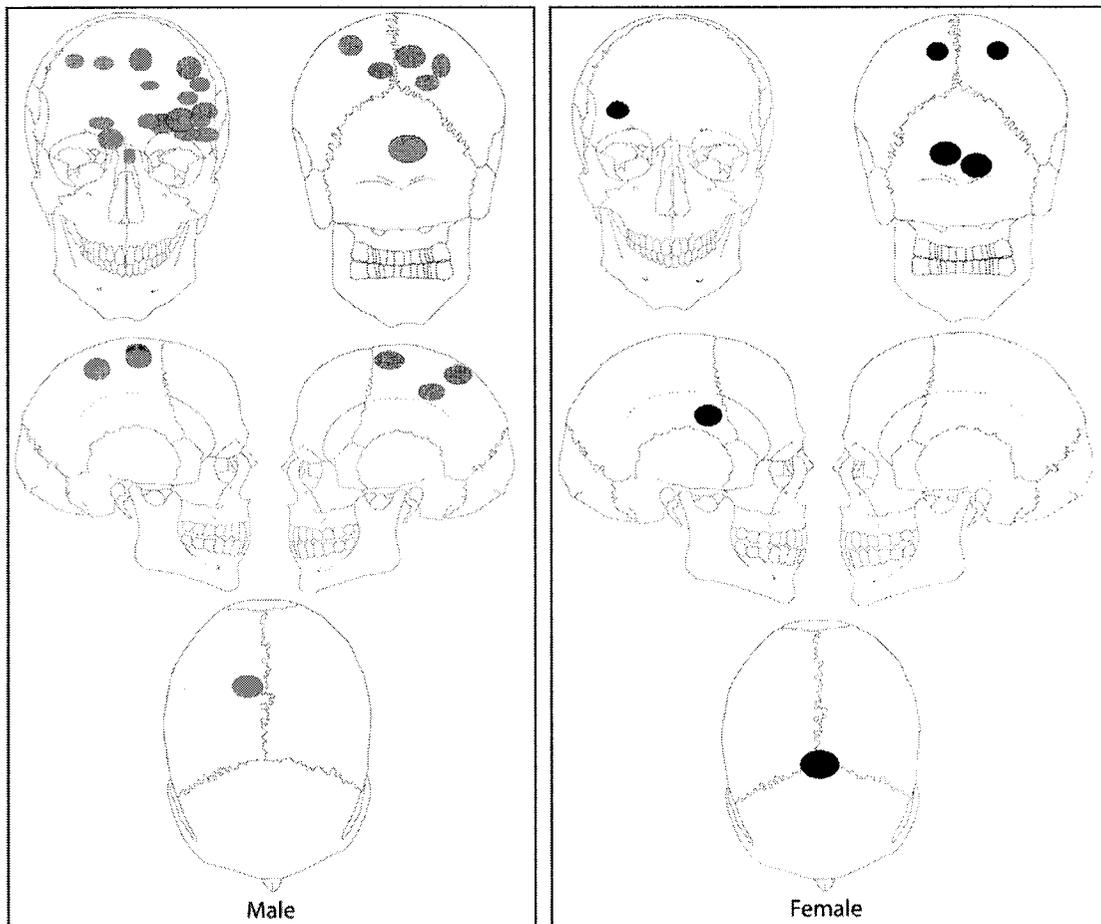


Figure 7.26. Comparison of wound locations on males and females from La Real.

7.4.3 *Postcranial Trauma at La Real*

Postcranial fractures on each bone type ranged from zero to 16.6 percent. Given the commingled nature of this skeletal series, each long bone was tallied for the left side only and the number of those with fractures was counted. The minimum number of individuals was calculated for left ribs and vertebral types each, and the number of persons with either kind of fracture was counted.

The most common long bone to exhibit a fracture is the tibia: 9.4 percent (N=32). Among the three fractured tibiae, two were broken along the proximal third of the diaphysis, one of which appeared to be a partial fracture and the other a complete fracture (Figure 7.23).

Both tibiae exhibit lesions and cloacae indicting associated infection. The third tibia exhibits a healed spiral fracture along the distal third of the shaft, resulting in a non-aligned tibia whereby the distal third of the shaft was laterally-twisted away from its normal position (Figure 7.24). Arm bone fractures included a humerus and an ulna; 3.8 percent of left humeri were affected (N=26) and 4.3 percent of left ulnae (N=23). The humerus and the ulna were fractured on the distal end, and both were well-healed. The ulnar break was not a parry fracture, but a Colles' fracture that likely resulted from bracing a fall. No other long bones exhibit breaks.

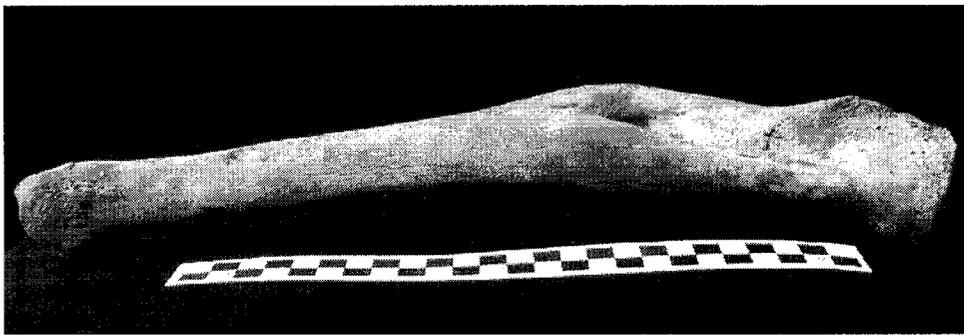


Figure 7.27. Healed fracture along the proximal third of the diaphysis of a left tibia from La Real.

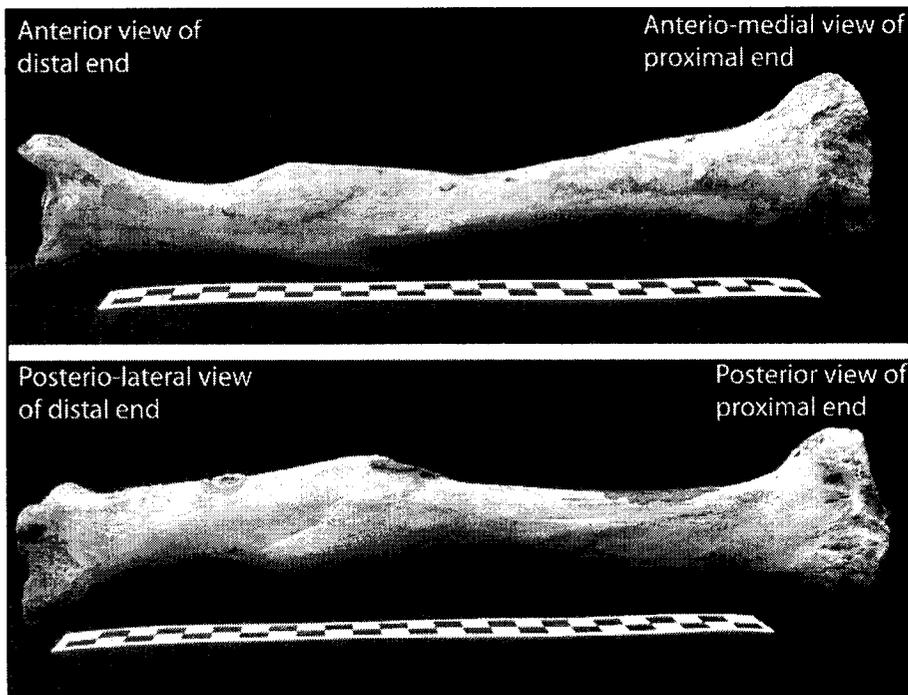


Figure 7.28. Healed spiral fracture along the distal third of a left tibia from La Real.

Injuries to the trunk of the body included clavicle, rib, and vertebral fractures. Twelve left clavicles are complete and well-preserved, and only one displays a healed fracture (8.3%). It was broken near the medial aspect and an associated infection developed as a result of this injury. Among the 77 well-preserved left ribs representing at least 12 individuals, two persons exhibit healed rib fractures ($2/12 = 16.6\%$); one adult shows one broken rib and the other exhibits two.⁶⁶ Among 96 cervical vertebrae from at least 29 individuals, none show compression fractures, but three persons exhibit probable trauma-induced osteoarthritis as evidenced by marked osteophytic development and eburnation on the articular facets ($3/29 = 10.3\%$). Compression fractures of the thoracic region affected four of the 36 individuals (11.1%). (A total of 287 thoracic vertebrae from the 36 individuals

⁶⁶ The MNI was based on articulated ribs and those from shared lot numbers; it was *not* calculated by dividing the total number of ribs (77) by the total possible for the left side (12). This would have resulted in an underestimation of number of persons with ribs present. The same was done for vertebral types.

were observed.) Among the 147 lumbar vertebrae representing at least 37 people, two individuals display lumbar fractures (8.1%): one person exhibits spondylolysis and another displays a probable fracture with associated trauma-induced osteoarthritis on the right inferior articular facet.

The postcranial fractures appear to reflect injuries resulting from accidents. Nearly 17 percent of the 12 individuals with an average of 6 left ribs exhibit a fracture, which is a high percentage relative to the other postcranial elements. The arm, leg, clavicle, and vertebral fractures were probably related to accidental falls from the steep cliffs and ravines that comprise the Majes valley landscape.

7.5 Discussion and Comparisons

7.5.1 Discussion of Trauma and Violence at Conchopata

There is an increase in the frequency of cranial trauma from the Huarpa to Wari period, from nine to 26 percent. However, these differences are not statistically significant (Fisher's exact, $p=0.245$; $N=38$), owing largely to the small sample size of Huarpa skeletons. Although there is clearly an increase in cranial trauma through time, possibly signaling changing social conditions that contributed to more violence, the absence of statistical significance indicates that this interpretation is tentative.

During the Wari temporal component at Conchopata, females show slightly higher frequencies of head trauma than males, but because the differences are not significantly different, it appears that they were similarly exposed to violence. Additionally, because all but one head wound are well-healed and the majority are on the posterior of the skull for both sexes, it appears that men and women experienced the same kind of injury—non-lethal

wounds to the back of the skull. This suggests that Conchopata individuals did not engage in face-to-face combat that resulted in fractures to the anterior of the skull.

It is notable that nearly a third of the Conchopata females exhibit cranial trauma, the majority of which is located on the posterior of the skull. This pattern can be best understood by comparing it to other skeletal populations that show a similar trend. In a study of cranial trauma among a Late Woodland population (AD 1000 – 1300) in southeastern Michigan, Wilkinson (1997) found that more women than men were affected by cranial trauma, leading him to conclude that it probably stemmed from raiding and abduction events (also see Wilkinson and M, 1993). He suggests the injured women may represent natal members who enemies tried, but failed to abduct, injuring them in the process, or they could represent women violently abducted from other communities many years prior who were subsequently “adopted” into the local community (Wilkinson, 1997). It is unlikely that the high status individuals at the site of Conchopata would have been victims of raids; however, it is possible that the women at Conchopata represent women from other communities who were abducted, injured in the process, and brought back to Conchopata where they assimilated into their new community.

Female-directed violence in the form of spousal abuse also could have resulted in the observed cranial trauma pattern (see Lambert, 1994). Although the preponderance of posterior wounds does not mirror the pattern for domestic abuse cases in the Western world during the 19th century (i.e., injury to the facial/anterior region) (Walker, 1997), perhaps socially sanctioned, or at least socially common, female-directed violence targeted the back of a bowed head. Typically, in the cases of domestic abuse, the perpetrator is the husband or some other significant male partner (Walker, 1997). However, if Conchopata was organized

around polygynous households (see Chapter 5), then perhaps the female trauma is a result of physical conflict between co-wives, not an uncommon practice among polygynous societies (Levinson, 1989:25, 32). Female-female violence has also been reported among Australian communities (see Burbank, 1994), leading Webb (1995) to suggest that some of the cranial trauma among prehistoric female skeletons may have resulted from female-female conflict.

However, given the extremely patterned location of the wounds, it seems that the head injuries were inflicted in controlled settings, not frenetic raiding events, spousal beatings, or physical scuffles between co-wives. Thus, violence against women could have occurred in other contexts. Among late prehistoric (AD 1300 – 1600) skeletal populations from east Tennessee, Smith (2003:314) observed that more females than males show head wounds, and based on the location, shape, and non-lethality of wounds, she suggests they “reflect a culturally defined punitive measure in the form of ritualized interpersonal conflict resolution,” an interpretation that coincides with ethnohistoric information on mid-South Indian groups where corporal punishment (which can be taken as a form of conflict resolution) was common. This is similar to what Spanish chroniclers reported for the Inka populations, where certain transgressions against the community were met with corporal punishment, such as stonings (Cobo, 1892 [1653]:III, xxi, xxvii, 238, 240-241; Moore, 1958; Murúa, 1946 [1590]:III, xx, 70, 211, 213; Valera, 1945 [1585]:58) (see Chapter 3 for a discussion of these practices). Perhaps the Wari state sanctioned corporal punishment, such that individuals from Conchopata, and females in particular, were punished by being struck on the back of the head while kneeling or bowing the head.

Although the trauma data can be interpreted in a variety of ways, it is clear that numerous women were victims of non-fatal violence at Conchopata, while men were less

affected. Given the low frequency of male cranial trauma, and the fact that no wounds are indicative of face-to-face combat, it seems unlikely that these particular males were engaged in warfare involving physical combat. If there were male warriors who were injured during battles, they do not appear to be buried in the areas that have been excavated at Conchopata. However, as will be discussed in the next chapter, individuals from Conchopata may have participated in raids in order to obtain human heads for use in Wari rituals.

In contrast to the cranial trauma that was intentional in origin, postcranial trauma appears to have resulted from accidents, particularly from falls that probably occurred in the rough terrain filled with ravines and mesas with steep cliffs. Postcranial trauma differs between the two temporal components. Postcranial trauma affected one-quarter to one-third of females during the Huarpa occupation, most of which were wrist fractures. No males show postcranial bone injuries. In contrast, Wari period postcranial trauma affected all parts of the body, from hands and arms to legs and feet and parts of the skeletal trunk. Foot fractures, which primarily afflicted women, could have resulted from heavy objects (e.g., *batanes* (stone grinding implements)) falling onto their feet (see Lovell, 1997). The elbow and femur injuries may have been the result of serious falls in the surrounding ravines. The vertebral compression fractures appear to be related to the senior ages of those affected, as osteoporotic bones are more susceptible to injury. Finally, it is important to highlight that no parry fractures were observed in this sample, which coincides with the cranial trauma data showing no frontal bone injuries.

7.5.2 Discussion of Beringa Trauma

A significant portion of the Middle Horizon population from Beringa (36%) show head wounds, and based on the patterning of the wounds, it appears that they resulted from

raids and occasionally from domestic violence or corporal punishment. Although a greater percentage of men than women show head wounds, the difference is not statistically different, suggesting that both sexes were exposed to violence at nearly equal frequencies. However, based on the location of wounds, the nature of those violent interactions appears to be distinct between men and women. The head wounds among men are evenly divided between the front and back of the head, indicating they occasionally engaged in face-to-face fights—possibly during raids—while also suffering wounds on the posterior of the skull like their female counterparts. The majority of female wounds are on the back of the head and two peri-mortem wounds are on the parietal, suggesting that perhaps women received blows to the back and side of the head while fleeing during raids (see Walker, 1989; Wilkinson, 1997) (also see Wilkinson and M, 1993). Conversely, the female wounds could stem from physical beatings in a domestic context (see Lambert, 1994; Walker, 1997) or from corporal punishment in a judicial context (see Smith, 2003), similar to what the Inkas practiced (see Cobo, 1892 [1653]:III, xxi, xxvii, 238, 240-241; Moore, 1958; Murúa, 1946 [1590]:III, xx, 70, 211, 213; Valera, 1945 [1585]:58). These kinds of wounds are not likely to be fatal; however, more than 25 percent of them appear to be lethal (i.e., peri-mortem), suggesting that in one out of four cases, the attacker assaulted the victim with what was probably lethal intent. While it is nearly impossible to know the true intent of any actor, particularly one from 1,200 years ago, the observation of lethal wounds among both sexes better correlates with raiding, although domestic abuse and corporal punishment may have occurred in some cases.

The frequency and kind of postcranial fractures suggest they resulted from accidents and violent engagements. The vertebral compression fractures, leg and foot injuries, and the

Colles' fractures (wrist fractures) likely stem from non-violent encounters.⁶⁷ In contrast, the rib, hand, and parry fractures suggest that violence may have played a role in these injuries (Lovell, 1997), but this remains inconclusive. Although Lovell (1997) warns against interpreting parry fractures of the ulna as indicators of violence, this author argues that the parry fractures and frontal head wounds among Beringa males undergird the notion that many injuries resulted from physical conflicts.⁶⁸

Given that trauma rates were so high—36 percent—it appears that the Beringa community did not enjoy an era absent of violence; the trauma rate indicates that almost four out of 10 people were involved in violent conflicts. Although there is no bioarchaeological data from the pre-Wari period for Majes valley populations, and thus, no comparative data to examine whether cranial trauma frequencies increased or decreased, it is clear that the level of cranial trauma was high among Beringa adults during the time of Wari interaction. Furthermore, this trauma frequency is high relative to Tiwanaku populations from the Titicaca basin and Moquegua valley; only six percent of adult males ($4/72 = 5.5\%$) and no adult females ($0/119 = 0\%$) from these Tiwanaku settlements exhibit depression fractures on the parietal bones of the cranium (Blom et al., 2003). While the parietal bones were little affected by trauma, there was one older adult female from the site of Chen Chen in the Moquegua valley with fractures to the ribs, zygomatic, and nasal bones, which Blom and colleagues (2003) suggest resulted from domestic violence—a very reliable interpretation, particularly given the locational distribution of the wounds (see Draper, 1992; Walker, 1997).

This trauma rate is similar to what Williams (1990:191) has reported for the Late

⁶⁷ It is assumed that the Colles' fractures resulted from accidental falls, though an act of aggression could have led to this kind of injury (i.e., shoving).

⁶⁸ Although it is unclear whether the parry fractures and frontal head wounds are from the same individuals, the fact that both wound types are present suggests that the former was also a result of violence.

Intermediate period skeletal sample from Estuquiña, also in the Moquegua valley, in which 5.4% of the sample exhibit cranial depression fractures. Overall, the cranial trauma frequency among the Beringa inhabitants is about six times higher than that among the Moquegua valley and Titicaca Basin populations.

In sum, it appears that the presence of a foreign state in the Majes valley did little to ameliorate tensions and may have even created conflict or exacerbated native conflicts that existed prior to its arrival. Furthermore, the kinds of physical conflicts differed between the sexes, showing that Wari presence was concomitant with a social environment where men and women were exposed to violence in somewhat different contexts; men occasionally engaged in face-to-face combat, but females consistently received blows to the back of the head, suggesting they were fleeing or attempting to evade a blow by ducking their head.

7.5.3 Discussion of La Real Trauma

The data on trauma indicate that interpersonal violence was very common among those interred at La Real. Perhaps engagement in violent activities was a factor in determining one's right to burial at this high-status, ceremonial, mortuary site. Nearly one-third of the adults display cranial trauma, and males have more than twice as many head wounds as females, suggesting sex-based differences in exposure to violence.

Males and females also differ in terms of wound location, and this implies sex-based differences regarding violent behavior. Men primarily engaged in face-to-face fighting, resulting in anteriorly-placed wounds, most of which were non-fatal. This kind of patterning suggests that men were involved in violent conflicts that were structured by rules of engagement, similar to what has been observed among societies that practice physical forms of conflict resolution. For example, club fights among the Yanomamo of Venezuela

(Chagnon, 1992) and club fights among the Warí of the southern Amazon in Brazil (Conklin, 2001)⁶⁹ are both reminiscent of the kinds of ritual fights that might have led to the trauma patterns observed at La Real. Ethnographic studies in the highland Andes have documented another form of ritual battle known as *tinku*, and this kind of ritualized fighting could have resulted in cranial depression fractures like those observed among the La Real males (see Chapter 3). During *tinku*, communities converge at some predetermined location, usually some boundary between the two communities, and engage in ritual battle. While deaths occasionally occur, most injuries are non-fatal (Allen, 1988; Bolin, 1998; Hartmann, 1972; Orlove, 1994). Perhaps the individuals who were buried at La Real were *tinku* fighters who sustained head injuries in these ritual conflicts. Given that *tinkus* occur annually (or even more frequently) it is not surprising that one-third of the injured exhibit more than one wound. It is possible that the multiple wounds were received in separate conflicts, but this remains unconfirmed. The patterning (i.e., wounds concentrated on the front), the kinds of wounds (i.e., non-lethal), and the repeated injuries all support the interpretation that these men may have engaged in ritual battles. Moreover, because *tinkus* were intended for humans to shed blood as offerings to the earth (Bolin, 1998; Chacon et al., 2004; Orlove, 1994), a serious hit to the head certainly would ensure the spilling of blood. Therefore it may have been culturally inappropriate to use the lower arm to protect the head; perhaps this is why no parry fractures were observed. This is similar to what Lambert (1994:116-118) observed among prehistoric Chumash males from California: frequencies of frontal bone fractures were high (60/94 = 64%), but frequencies of parry fractures were low. She suggested that ritualized club fights among Chumash males meant taking “their blows like a man,” meaning

⁶⁹ The Warí are a modern population from southern Amazonia, not to be confused with the Wari of the Middle Horizon Andes.

they should not attempt to deflect a blow. Importantly, Lambert (1994:118) notes that if the physical conflicts were unregulated forms of lethal battles, then there should have been more evidence for individuals attempting to parry hits to the head (i.e., ulnar parry fractures). She sees little evidence for that among the Chumash skeletal remains, leading her to conclude that males were engaged in standardized forms of physical conflict resolution. Similarly, the males from La Real were probably engaged in *tinku*-like battles, or some form of ritualized combat. Participation in this kind of activity may have increased their social status and provided them with the “credentials” for burial at the high status ceremonial and mortuary site of La Real.

In contrast to the males, females received the majority of blows to the posterior of the head. These may have occurred while fleeing from a violent scene, an action not uncharacteristic of raids or ritual battles. Although ethnographic accounts of *tinku* in the Andes clearly demonstrate that women are involved in these violent encounters (Allen, 1988; Bolin, 1998; Schuller and Petermann, 1992), the bioarchaeological data suggest that this was probably not the case for Middle Horizon women from Majes valley. Instead, the data suggest that men may have engaged in ritual battles, while women may have been injured in a variety of other social settings. For example, the female injuries may be the result of domestic violence. Conversely, the female wounds may have been received as punishment for transgressions against an individual or the community, not unlike the physical punishments (e.g., stonings) dispensed by the later Inka State (Cobo, 1892 [1653]:III, xxi, xxvii, 238, 240-241; Moore, 1958; Murúa, 1946 [1590]:III, xx, 70, 211, 213; Valera, 1945 [1585]:58) (see Chapter 3 for a discussion of these practices).

7.5.4 Comparisons of Cranial Trauma between the Three Populations

In a comparison of cranial trauma frequencies between the three populations examined in this study, Beringa shows the highest frequency (Figure 7.28). However, the difference in cranial trauma frequencies between the three sites is not statistically significant ($\chi^2=0.684$; $df=2$; $N=170$). Similarly, when cranial trauma frequency among the Wari heartland population is compared to the combined frequency of the two Majes valley populations, the difference is not statistically significant (Fisher's exact, $p=0.345$; $df=1$; $N=170$). This suggests that individuals in the Wari heartland and hinterland were similarly exposed to violent encounters. Thus, the hypothesis that Conchopata individuals would show significantly lower frequencies of trauma because of their high social status is unsupported.

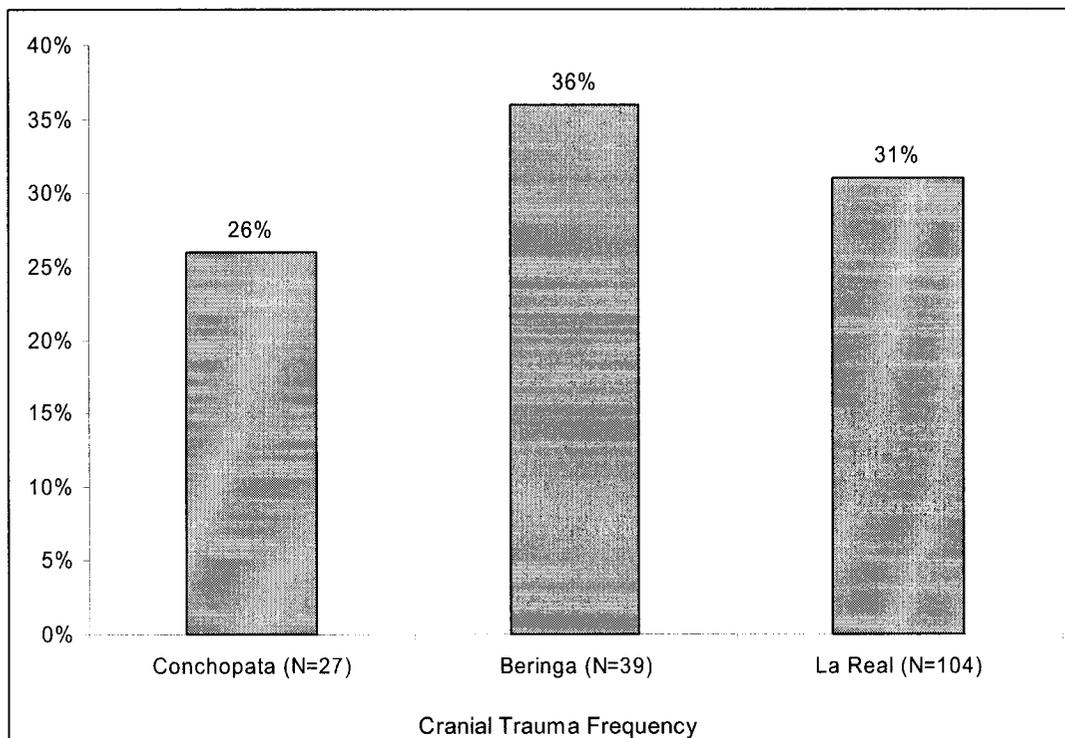


Figure 7.29. Cranial trauma frequencies among the populations from Conchopata, Beringa, and La Real.

As discussed in previous chapters, the La Real skeletal population was likely organized at the supra-settlement level and probably represents an exclusive category of high

status peoples. Thus, this series probably reflects trauma rates and patterns for that particular social class and is likely not representative of a single village population. Nonetheless, while this author has argued that La Real represents an exclusive social class, the trauma frequencies are not atypical for populations from the Majes valley; Beringa, a single settlement community, exhibits similar trauma rates.

Differences in cranial trauma frequencies between the sexes show that the Conchopata population is distinct from the two hinterland communities in that slightly more women than men suffered from cranial trauma; however, the difference is not statistically significant. In contrast, the Beringa and La Real series show more head wounds on the men than the women; however, only the La Real series shows a statistically significant difference. As this author has argued, these data indicate that men and women from La Real were differentially exposed to violence, not only in frequency, but in kind. Notably, women from Conchopata and Beringa show the same trauma frequency (31%), yet only 19 percent of women from La Real suffered head trauma. Although La Real women are distinct in this regard, women from all three series exhibit the majority of head wounds on the posterior of the skull (Figure 7.29). This suggests a broader pan-Andean behavior where women were victims of violence involving blows to the back of the head.

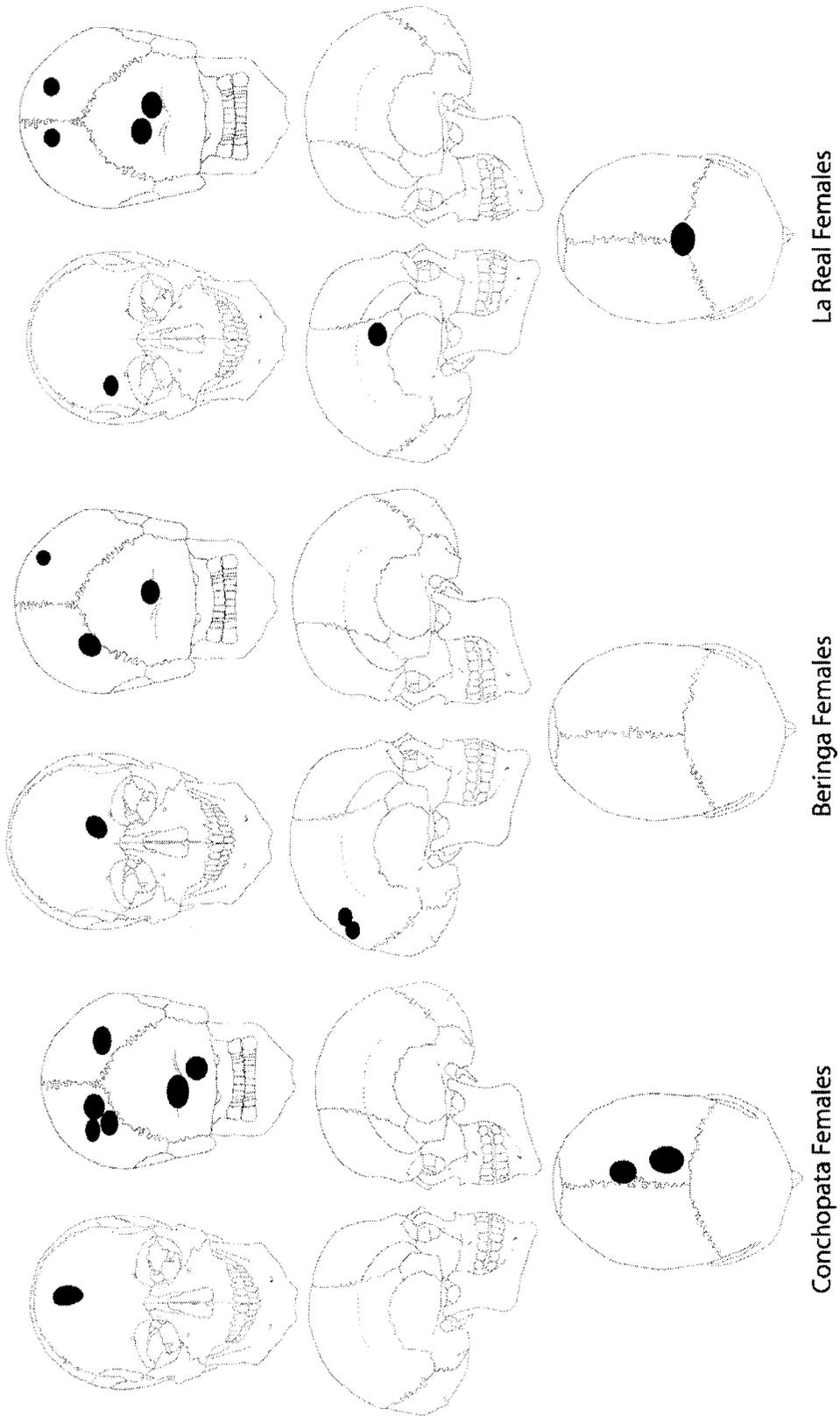


Figure 7.30. Wound locations for females from the three sites in this study.

In contrast, the location of head wounds among males is not uniform between the three skeletal series. Conchopata men show head wounds only on the posterior of the skull, suggesting that some men from Conchopata were injured in similar ways as the women. Beringa males, in contrast, show head wounds that are evenly divided between the anterior and posterior of the skull, suggesting that they were involved in various kinds of violent encounters; perhaps these included injuries sustained while fleeing during raids, as well as face-to-face combat. At La Real, men show a significant concentration of wounds on the anterior of their cranium, suggesting, as this author has argued, that they were involved in standardized or ritualized physical combats akin to *tinku*. Given the similar percentages of head trauma among Beringa and La Real populations, these data do not support the hypothesis that the two communities would show different frequencies of cranial injury due to their distinct social statuses. However, it is important to note that data on the locational distribution of wounds, particularly among males, demonstrate that the social context in which the violence occurred was distinct among each of the communities. Moreover, the differences in the lethality of wounds were different between the two series; Beringa individuals showed a greater proportion of lethal wounds than La Real individuals. Therefore, trauma frequencies alone do not provide a thorough picture of inter-personal violence; data on the location and lethality of wounds are also necessary to provide a more nuanced view of violence.

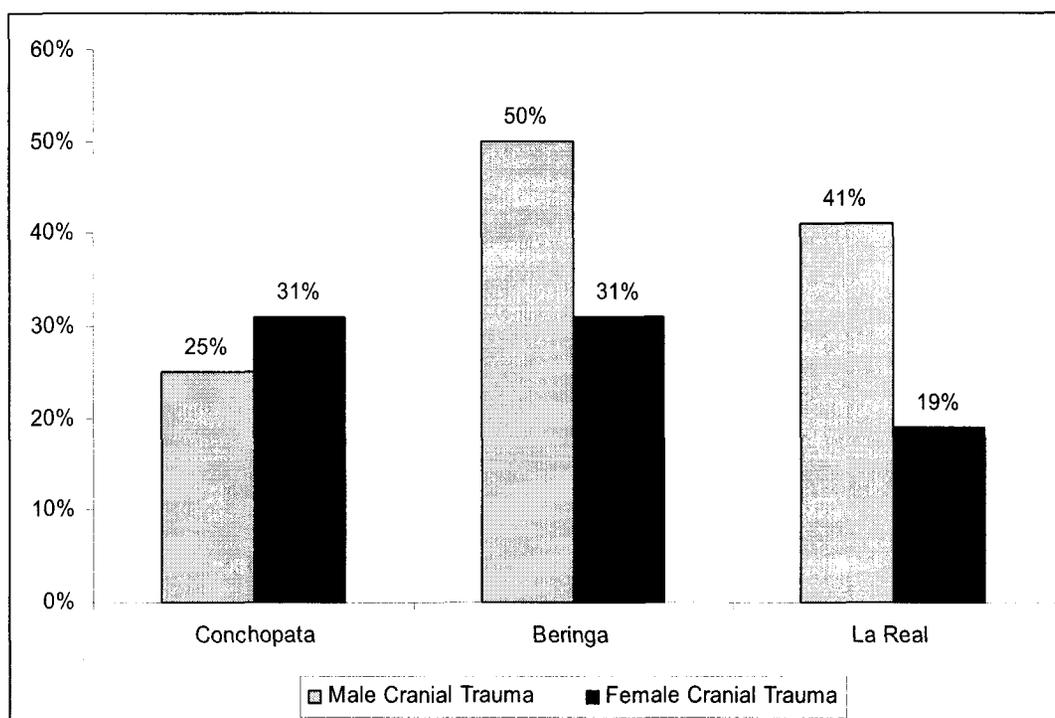


Figure 7.31. Male and female cranial trauma frequencies among those from Conchopata, Beringa, and La Real.

It was also hypothesized that cranial trauma rates would be high among Wari subjects in the hinterland because imperial presence may have generated conflict by breaking down or recreating new political alliances, causing unrest and intra-valley conflict. Given that there are currently no skeletal samples from the pre-Wari period in the Majes valley, it is unknown if the trauma frequencies presented here represent an increase from the preceding period. Nevertheless, trauma rates are high, and when they are considered in conjunction with cranial trauma data from Wari era populations from Nasca, it is not surprising that the Wari period in Majes was concomitant with high levels of violence. Kellner (2002:83,110) reports that trauma levels for males are at their highest during the Wari period relative to the preceding Nasca periods. Based on her data presented in Table 8.3 (Kellner, 2004:156), male cranial trauma for the entire Nasca period is 10 percent ($4/39 = 10\%$) (these numbers are from Early,

Middle, and Late Nasca combined). During the subsequent Wari period in Nasca, cranial trauma among all men increases to 19 percent ($7/36 = 19\%$); however, this difference is not statistically significant (Fisher's exact, $p=0.213$; $df=1$; $N=75$). This indicates that although levels of male violence were slightly higher during the time of Wari rule, it does not represent a significant increase from the preceding period. Moreover, when cranial trauma rates from *all* adults from the pre-Wari period are compared to *all* adults from the Wari period, the frequency is the same: 7/81 pre-Wari period adults show head wounds (9%) and 9/97 Wari period adults show head wounds (9%) (numbers are based on data tables presented by Kellner, 2002).⁷⁰ This suggests that Wari presence did little to alter rates of indigenous violence in the Nasca region. If the Majes valley is similar to Nasca in this regard, then perhaps levels of violence were high among the native populations in Majes before the Wari expansion; however, this remains inconclusive.

The frequency of cranial trauma among the two Wari era populations from Majes valley is 32 percent ($46/143 = 32\%$), while cranial trauma among their counterparts in the Nasca valley is nine percent ($9/97 = 9\%$) (Kellner, 2002). These trauma frequencies are significantly different (Fisher's exact, $p<0.001$; $df=1$; $N=240$), suggesting that during the time of Wari imperialism, populations from two valleys in the southern hinterlands of the Wari empire experienced significantly different lifeways, particularly in regards to exposure to violence. Perhaps Wari imperial policies differed between the two valleys, thereby contributing to distinct levels of violent interaction between the subject communities within the Wari empire. Granted, the trauma differences between the two valleys may have had

⁷⁰ Kellner's (2002) rich dataset presents trauma frequencies for Early, Middle, and Late Nasca periods, but for the purposes of this summary, I collapsed the three Nasca time periods. This does not alter the general pattern whereby trauma frequencies are essentially similar during all periods. That is, there are no statistically significant changes through time.

greater historical depth and did not simply emerge with Wari imperial presence. However, these data indicate that Wari presence did little to lower levels of indigenous violence to frequencies more similar to those among Middle Horizon Nasca populations.

Chapter 8 Human Trophy Heads in the Wari Empire

8.1 Introduction

This chapter presents the results from the bioarchaeological analysis of trophy heads recovered from the Wari heartland site of Conchopata and the Wari-era trophy heads recovered from the hinterland sites in Majes valley. The first section describes the trophy heads and other disembodied skeletal parts recovered from ritual buildings at Conchopata, as well as their demographic distribution and trauma patterns. This is followed by a report on the trophy heads from the sites of Beringa and La Real.

8.2 Results: Conchopata Trophy Heads

During the Wari occupation, circular and D-shaped buildings were used as ritual arenas, inside which disembodied human heads and hands were modified into trophies for display and eventual destruction. The human body parts were often accompanied by intentionally smashed oversized ceramic urns, some with iconography depicting individuals (possibly warriors) wearing trophy heads (Ochatoma and Cabrera, 2002). Although these human trophies likely played a significant role in Wari rituals and politics, the source of the Conchopata trophy heads is unknown, and their use within Wari society is only beginning to be understood. This section aims to shed light on the practice of trophy head modification and use within the Conchopata community and Wari society at large, and the following chapter addresses the question regarding the geographic origin of these trophy heads via strontium isotope analysis.

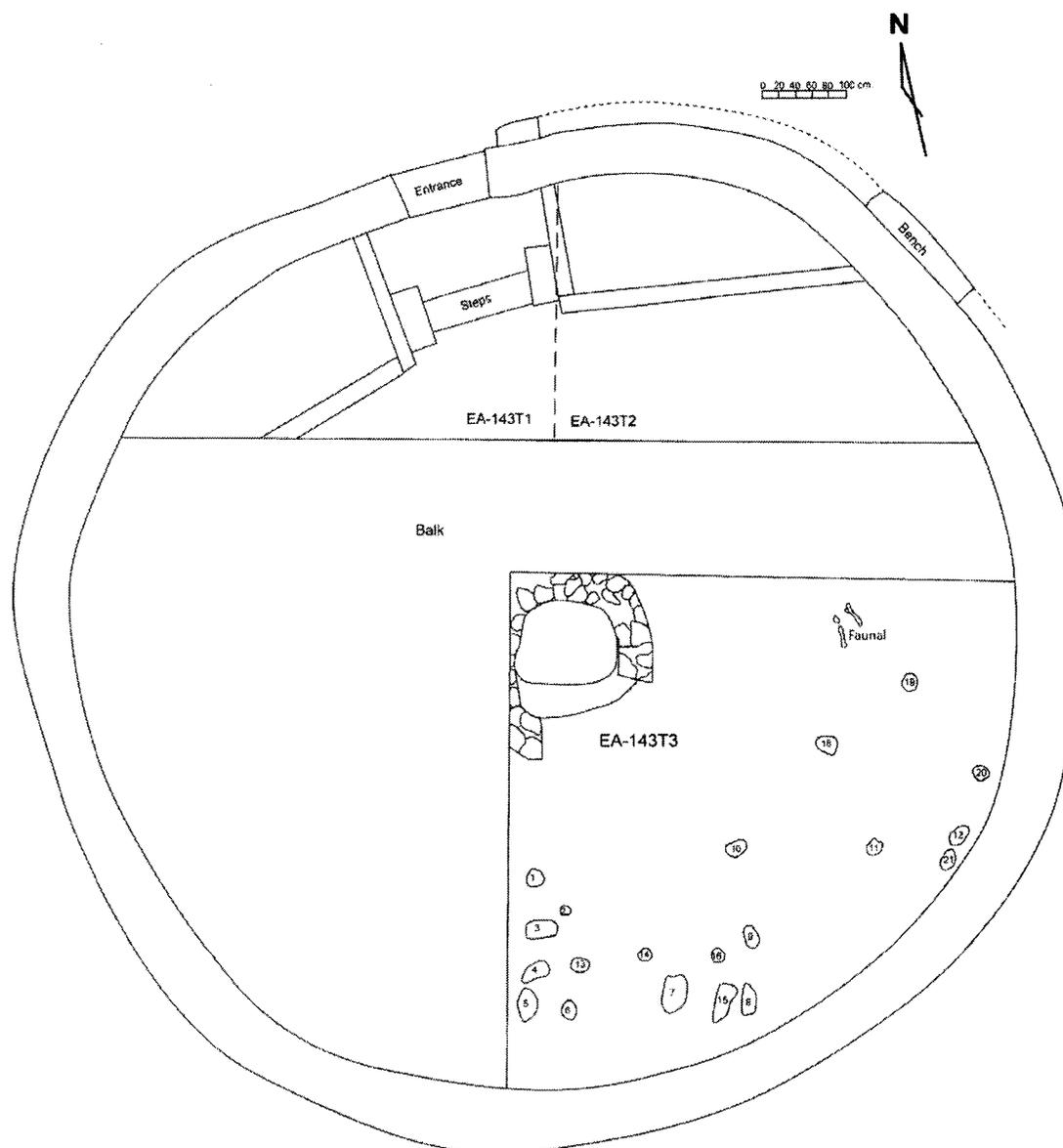
Bioarchaeological data from the trophy heads should not be combined with the rest of the mortuary sample because their unique context requires that they be described and examined as a sub-population. A total of 31 trophy heads, 84 hand phalanges, 17 foot phalanges, and two cervical vertebrae were recovered from two ritual structures: 10 heads were from the D-shaped building (Architectural Space 72), and 21 heads and all phalanges were from the circular structure (Architectural Space 143) (see Figures 5.1 and 8.1).

Jose Ochatoma and Martha Cabrera in 1998 recovered a cache of 10 commingled trophy heads from the south/south-east part of the D-shaped building, underneath a juvenile camelid offering (Ochatoma and Cabrera, 2000:463). The trophy heads were ritually burned, smashed, and deposited inside a circular group of rocks measuring 1.2 meters in diameter (Ochatoma and Cabrera, 2000:462). Three years after their discovery, with the assistance of Martha Cabrera, this author reconstructed the commingled trophy head fragments in the laboratory at the Universidad Nacional de san Cristóbal de Huamanga.⁷¹

The Conchopata Project in 2001 discovered an additional 21 trophy heads in the south-east quadrant of the circular structure (Architectural Space 143), and later excavations revealed no trophy heads under the balk depicted in Figures 8.1 and 8.2 (Isbell, Pers. Comm. 2003). All trophy heads were smashed, burned, and deposited on the floor, but in contrast to those found in Architectural Space 72, the trophy heads from Architectural Space 143 were dispersed into 21 discrete piles and sometimes mixed with phalanges. Each pile of bones sometimes included cranial fragments from as many as three individuals or as few as one

⁷¹ The archaeologists stored all of the trophy head fragments in one box and assured me that their original provenience was commingled and not in discrete piles (hence, one big box for storage). As such, they had to be treated as one group and mends were made between all fragments found in the storage box.

(Figure 8.3). Occasionally, cranial fragments from one individual were dispersed into two discrete piles.



Plan view drawing by Juan Carlos Blacker and Greg Ketteiman.

Figure 8.1. Map showing the location of the 21 trophy head clusters within Architectural Space 143 (EA 143).

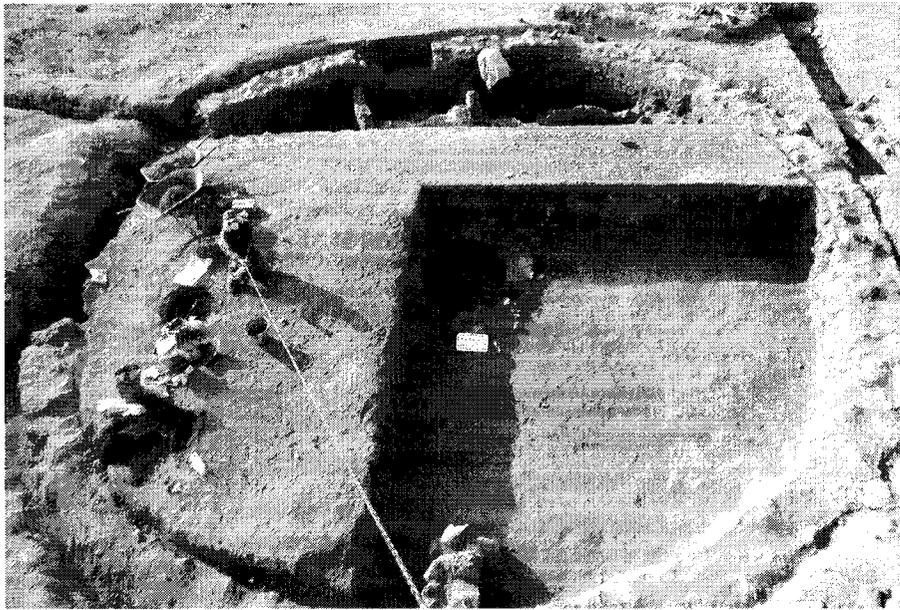


Figure 8.2. Overview of EA 143 after trophy heads were removed from the southeast quadrant (lower right corner). Photo by William Isbell.

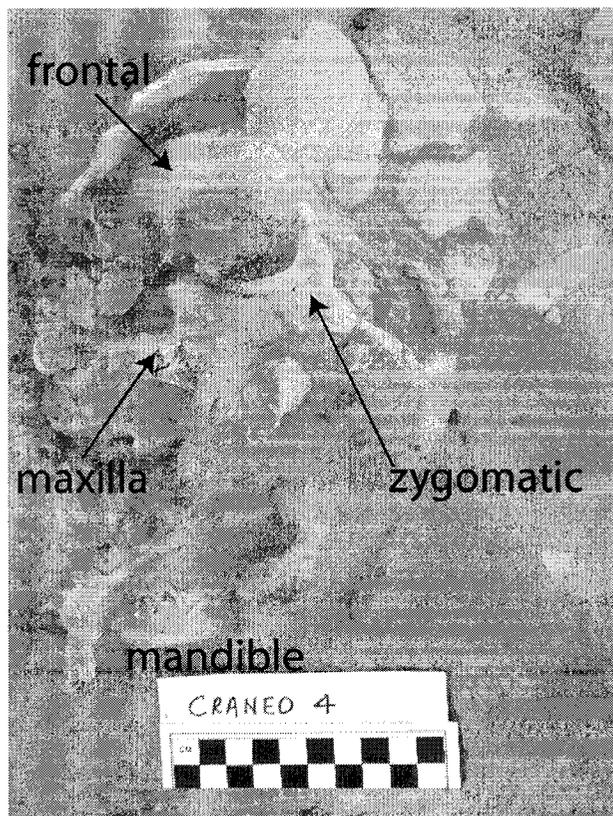


Figure 8.3. In situ trophy head from EA 143. Photo by William Isbell; labeled by this author.

8.2.1 *Age and Sex of Conchopata Trophy Heads*

Conchopata trophy heads generally derived from men over the age of 35 years, although young adults and children are also represented. Twenty-four out of 31 trophy heads are from adults (77%). Among these 24 adults, 13 are middle-aged to old (54.2%), nine are young adults (37.5%), and two are adults that could not be specifically aged (8.3%). Interestingly, the other 23 percent of the trophy head sample derive from children (7 out of 31). Six of the seven children are between the ages of three to six years-old,⁷² which is an age group that typically comprises a small portion of archaeological burial populations. The majority of the sexed trophy heads are males; seventeen trophy heads were assigned a sex, and 10 are males, four are probable males, and three are probable females. Seven adults are of indeterminable sex, as are the seven children. The age and sex profiles signal a preference for older male individuals for trophy head modification; however, young children were apparently targeted as well.

8.2.2 *Conchopata Trophy Head and Hand Modifications*

The D-shaped structure (Architectural Space 72) contained trophy heads, but no other human skeletal parts. In contrast, trophy heads, hands, toes, and cervical vertebrae were present in the circular building (Architectural Space 143). The presence of cervical vertebrae indicates that skulls were decapitated while soft tissue was still attached. Presumably, the heads were modified after being separated from the body.

All were altered in a similar manner with perforations drilled at bregma and near the nuchal crest of the occipital bone; some mandibulae exhibit drilled perforations on the ramus. Among 19 trophy heads complete enough to observe the frontal and parietal bones, 17, or

⁷² The age of the seventh child was indeterminable.

89.5 percent, display one hole at or within two centimeters of bregma (Figure 8.4). Of the remaining two, one displays a hole on the left mid-parietal, slightly lateral to the sagittal suture, and the other exhibits two holes on the superior part of the frontal bone. The maximum width of the holes at bregma show very little variation. The average maximum width is 11.48 millimeters (s.d. = 1.9mm). The shape and smooth surface of all but one hole are the same, suggesting that a drilling tool was used to uniformly shape the perforation. The occipital bone was also modified (Figure 8.5). Eighty-three percent of the observable occipital bones display at least one hole (N=6). The average minimum width is 4.75 millimeters (s.d. = 1.1mm). Among 16 mandibles with at least one side of the ramus present, four, or a quarter of the sample show a perforation on the ramus (Figure 8.6). Of those four, two mandibulae are complete and exhibit perforations on both sides.

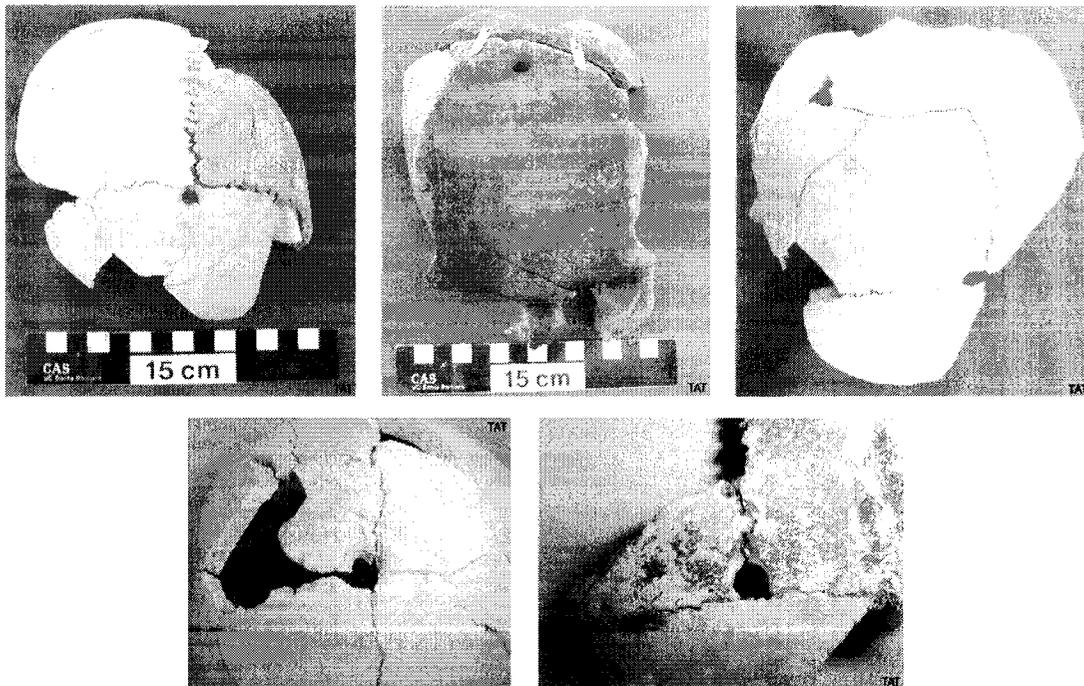


Figure 8.4. Five Conchopata trophy heads with perforations at bregma. Note the burn patterns of the middle cranium, top row (discussed below).

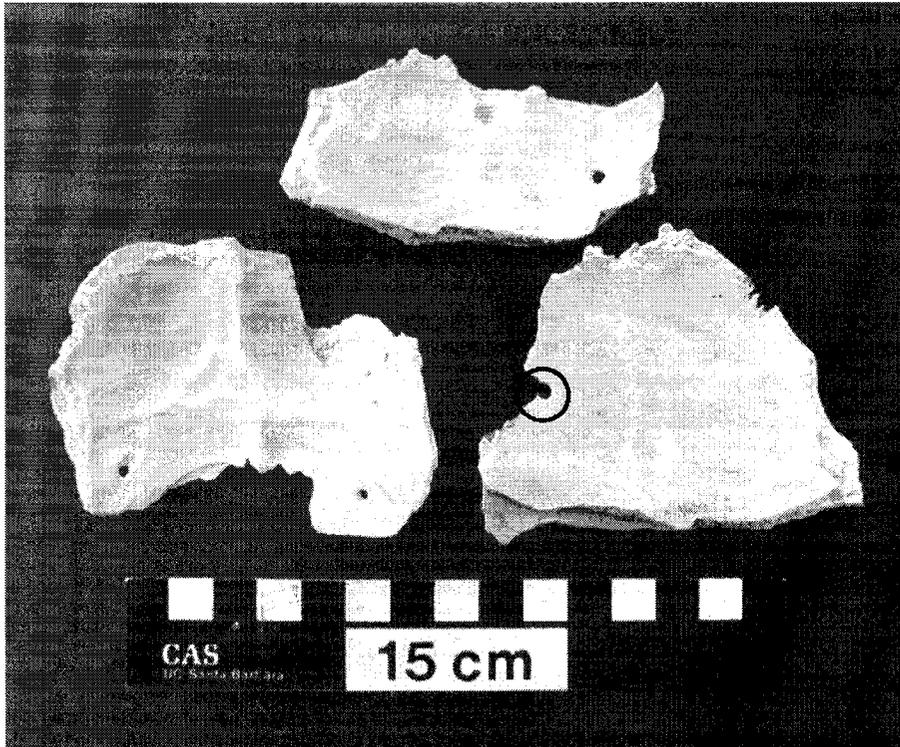


Figure 8.5. Endocranial view of occipital bones with perforations. These three occipital bones were found together, in situ, within cranial cluster #10 at Conchopata.

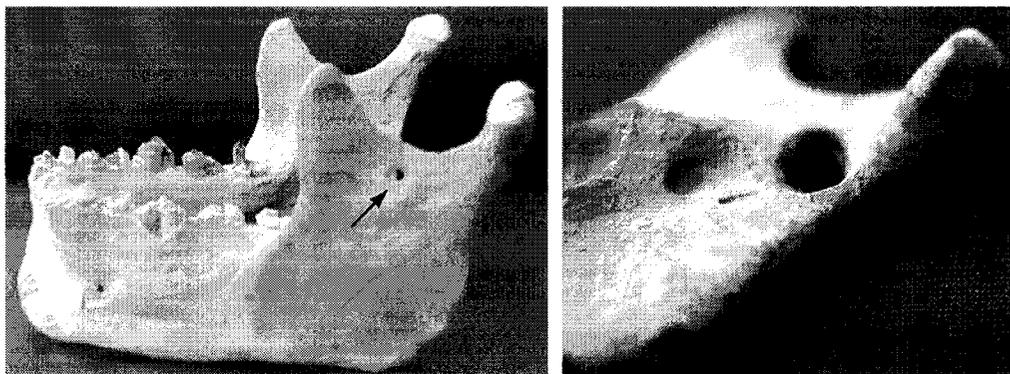


Figure 8.6. Perforation on the ramus of two trophy head mandibles from Conchopata (adult on the left, child on the right).

The occipital bones are particularly unusual in that all appeared to be intentionally separated from the rest of the cranium and may have been used as an amulet. A specific part

of the occipital bone was consistently selected, including the cruciform eminence, but excluding the inferior portion near the foramen magnum. Smooth edges and a patina along the edge of two of them suggest they were handled with some frequency. The perforations on the occipital bones were probably conduits for cords, enabling them to be dangled as amulets. It appears that occipital bones were sometimes used apart from the rest of the cranium during rituals, and the archaeological context supports this assertion. The three occipital bones shown in Figure 5.22 were found in situ and placed together with a few other cranial fragments from one skull.⁷³ That is, the three occipitals were isolated from their associated skull elements. The disassociated cranial elements that appear to join with the occipitals were recovered from other in situ cranial clusters.

Eighty-four hand phalanges and 17 foot phalanges were present in the circular structure, the majority of which were lying underneath the cranial fragments. Two adult hand phalanges display ancient post-mortem holes on their proximal and distal ends, and the entire length of the shaft is hollow, perhaps intentionally (Figure 8.7).⁷⁴ The majority of other hand phalanges are complete, and none display modifications like that just described. While the perforations are post-mortem, they seem ancient (and related to the rituals) because the discoloration is uniform around the edges of the hole. Perhaps the hand phalanges also were used as amulets. Nevertheless, due to difficulties in discerning ancient versus modern post-mortem alterations, this suggestion remains tentative.

⁷³ These skull fragments included a partial left mandible, maxilla, frontal, and temporal. None of these fragments could be joined seam to seam, but it is likely that they were from one skull, to which only one of the occipitals also belonged.

⁷⁴ There is no evidence to suggest that water seeped into the area where the trophy hands were buried and “washed” out the length of the shaft.

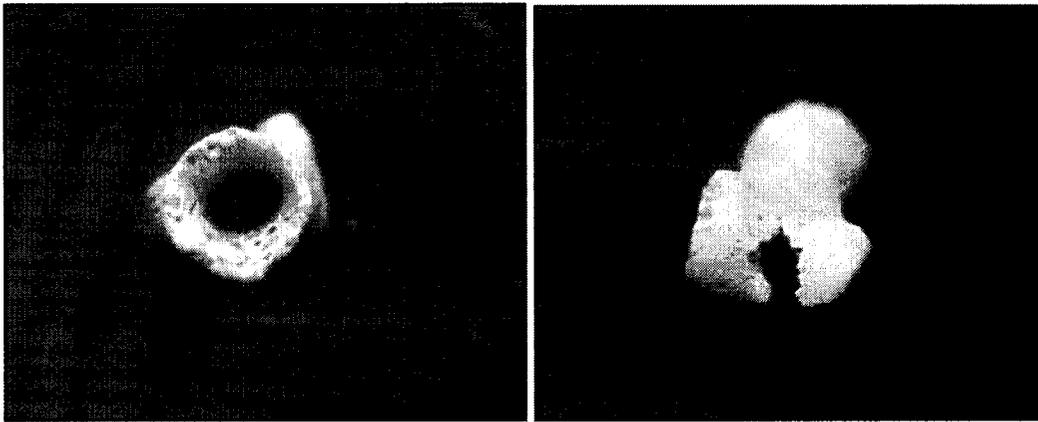


Figure 8.7. Conchopata trophy hand phalanx (distal and proximal view) with ancient post-mortem perforation along the length of the shaft. Note that the shaft is hollowed-out.

Other modifications to the trophy heads and hands included the intentional removal of soft tissue and body parts (e.g., fingers). Nearly half of the 24 mandibles display perimortem cutmarks on the posterior edge of the ramus, indicating that skin and muscle were removed in order to disarticulate the mandible from the cranium (Figure 8.8). Also, one zygomatic bone fragment exhibits cut marks on its inferior edge, indicating that the faces of skulls were sometimes flayed from the anterior-lateral side of the face, not just from the posterior aspect. Together, these data imply that trophy heads were not left to decay on their own, but were modified while the bone was still “green.”

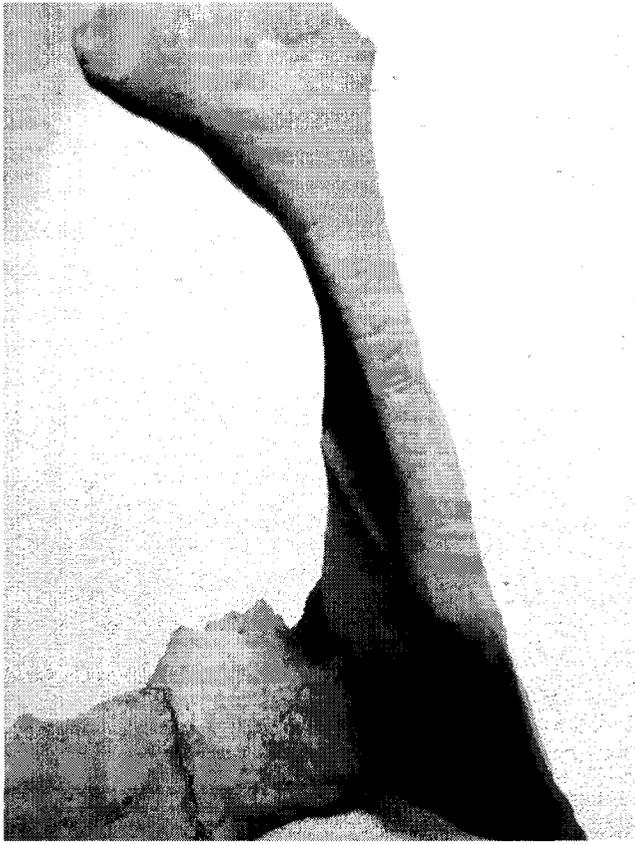


Figure 8.8. Cutmarks on the posterior edge of the right ramus of a mandible from a Conchopata trophy head.

Several hand phalanges exhibit cutmarks on the proximal ends of proximal phalanges, suggesting that fingers were cut off at the knuckles (Figure 8.9). The cutmarks are surrounded by a combination of peri- and post-mortem destruction. Some of the edges are the same color as surrounding bone and embedded with the original soil matrix (suggesting peri-mortem or ancient post-mortem damage), while other edges seem to display characteristics of modern, post-mortem damage. Nevertheless, the linear grooves (i.e., cutmarks) themselves appear peri-mortem. If this assessment is accurate, then it indicates that fingers were cut off at the knuckles, rather than waiting for soft tissue to decompose naturally.

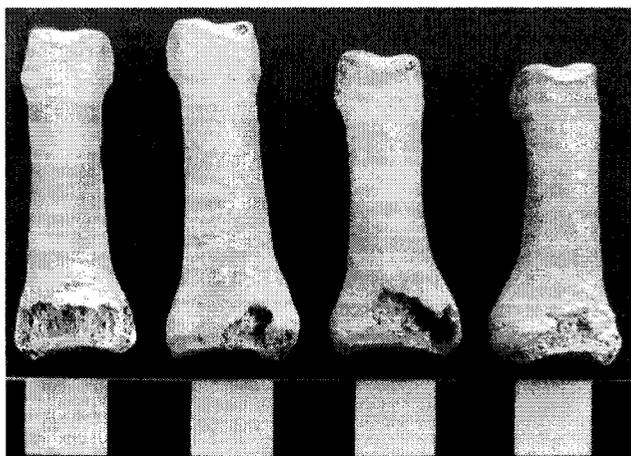


Figure 8.9. Cutmarks on the proximal ends of proximal phalanges. (Note the ancient and modern post-mortem destruction surrounding the cutmarks.)

Eventually, all trophy heads and trophy head/hand parts were destroyed via intentional incineration, the majority of which was done at a high temperature. This is evidenced by the whitish-gray color and vitrification of nearly all fragments. However, in one case, a trophy head and hand phalanges were incompletely burned at low temperature, as signaled by the black burn marks on the bone surface. Based on the burn patterns, the temporalis muscles were still attached at the time of incineration, which protected the lateral sides of the cranium (i.e., temporal bones and part of the parietal bones). As a result, the part of the cranium that the temporalis muscles once covered was not burned, while the superior part with no muscle coverage was charred black (see Figure 8.4 cranium on the top row). Because only one cranium exhibits these burn patterns, it can only be said that this particular trophy head retained its soft tissue until burning. It is unknown if the others were in the same state at the time of incineration, or if they were completely de-fleshed and then burned.

8.2.3 *Trauma among Conchopata Trophy Heads*

As the term implies, “trophy” heads are commonly thought to derive from enemy warriors whose heads were taken during battle (Proulx, 1971; Proulx, 1989; Silverman and Proulx, 2002; Verano, 1995) (also see discussion in Chapter 3). If this is the case, then these “warrior” trophy heads should display higher levels of cranial trauma—evidence of combat—relative to the regular mortuary population (i.e., individuals who were not “warriors”) (see Kellner, 2002; Verano, 1995). However, this is not the case; the frequency of trophy head cranial trauma is indistinct from that of the general burial population. One-third of observable trophy heads evince cranial wounds ($6/18 = 33\%$), which is not significantly different from the 26 percent trauma rate among the population buried in the mortuary sector at Conchopata (Fisher’s exact, $p=0.417$; $N=45$) (Table 8.1). That is, the trophy head victims are indistinguishable from the individuals buried in the Conchopata tombs in terms of cranial trauma rates. Between the sexes, five out of 10 male trophy heads (50%) and none of the three probable female trophy heads show trauma; one out of five unsexed trophy heads exhibit head injury (20%). Child trophy heads were too poorly preserved to make these observations. If only male trophy heads are considered, slightly more show cranial trauma relative to their male counterparts in the regular burial sample, but the difference is not significantly different (Fisher’s exact, $p=0.278$; $N=18$) (Table 8.2). Nevertheless, these data and the test for significance indicate that trophy head victims were not significantly different from the burial population in the formal mortuary sector, insofar as it relates to head trauma. Thus, perhaps the trophy heads do not represent the heads of warriors. Moreover, the presence of probable females and children undergird the notion that

persons selected for trophy heads were not necessarily derived from a male warrior class. Head-taking from any age and sex class represents lethal action against that person, as well as violent insult and attack against the community from which they derive. In short, the sex and age distribution and the trauma frequency suggest that trophy head victims were not warriors, but individuals of a non-warrior class. That is, these males, probable females, and children likely represent persons of commoner or high status, but not warrior status.

Table 8.1. Comparison of cranial trauma frequencies between trophy heads and normal crania. The difference is not statistically significant.

	Trophy Heads	Normal Crania	Total
Wound absent	12	20	32
Wound present	6	7	13
Total	18	27	45

Fisher's exact, $p=0.417$

Table 8.2. Comparison of cranial trauma between male trophy heads and normal male crania. The difference is not statistically significant.

	Male Trophy Heads	Normal Male Crania	Total
Wound absent	5	6	11
Wound present	5	2	7
Total	10	8	18

Fisher's exact, $p=0.278$

The preponderance of trophy heads with wounds derives from middle-aged to old adults. Among the six with cranial trauma, five were over 35 years of age, and the sixth was identified as an "adult" (i.e., no specific age group) (Figure 8.10). Specifically, within each age group, the trauma frequencies are as follows: among five young adult trophy heads, none exhibit head trauma ($0/5 = 0\%$); of the eight middle-aged trophy heads, four show head wounds ($4/8 = 50\%$); among trophy heads over 50 years-old, one shows cranial trauma ($1/4 = 25\%$); and among one adult trophy head with no specific age assignment, one shows head trauma ($1/1 = 100\%$) (Figure 8.11) (the adult of indeterminate age is not shown in the graph).

These data suggest that trophy heads from middle-aged adults were more frequently involved in physical conflicts than any other age group.

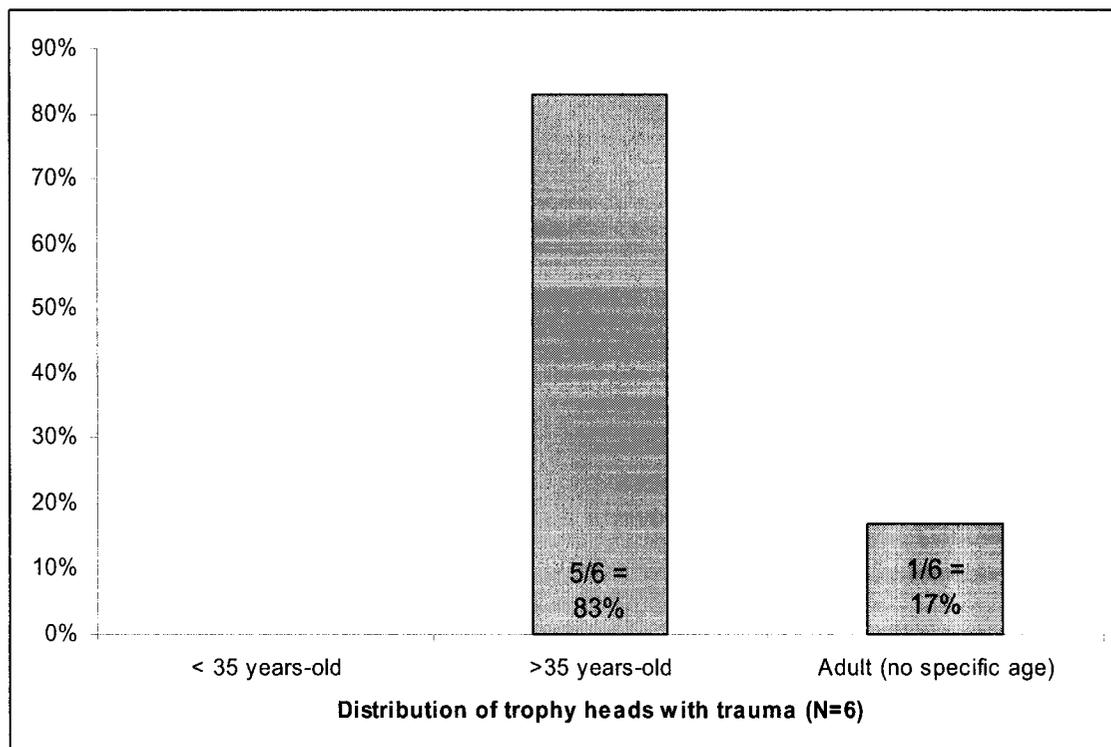


Figure 8.10. Age distribution of Conchopata trophy heads with cranial trauma. Among six trophy heads with wounds, five were over 35 years-old, and one was an adult with no specific age. (N=6)

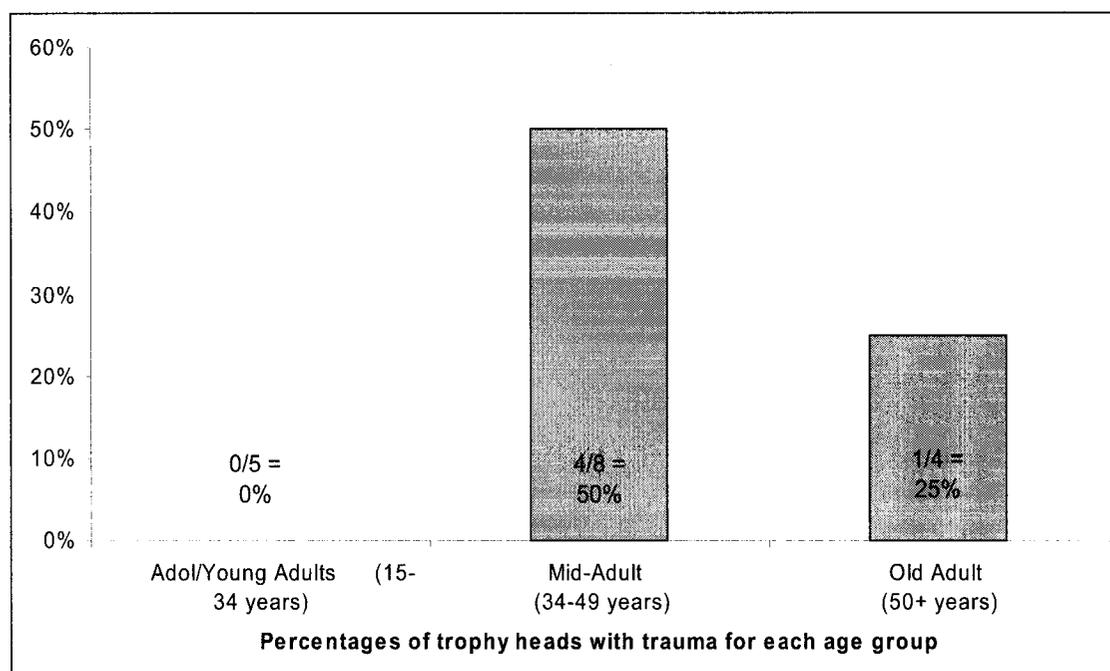


Figure 8.11. Percentage of Conchopata trophy heads with trauma for each age group (e.g., among eight middle-aged trophy heads, four show trauma).

The kind and count of head wounds suggest they were (previously) in non-lethal conflicts of singular occurrence.⁷⁵ That is, five out of the six individuals with head injuries show healed wounds, indicating that most did not receive lethal blows during earlier conflicts (Figure 8.12). Among the six wounded trophy heads, five exhibit only one wound, suggesting they were not in repeated physical fights that resulted in cranial depression fractures. The sixth person shows two wounds, but both are well-healed, so it is unknown if they were received in one or two separate incidents. (See Table 8.3 for tally of the trophy head wounds.)

⁷⁵ Most head wounds were healed, indicating that earlier fights did not lead to death. This is in contrast to the violent encounter that eventually led to the taking of their head as a trophy.

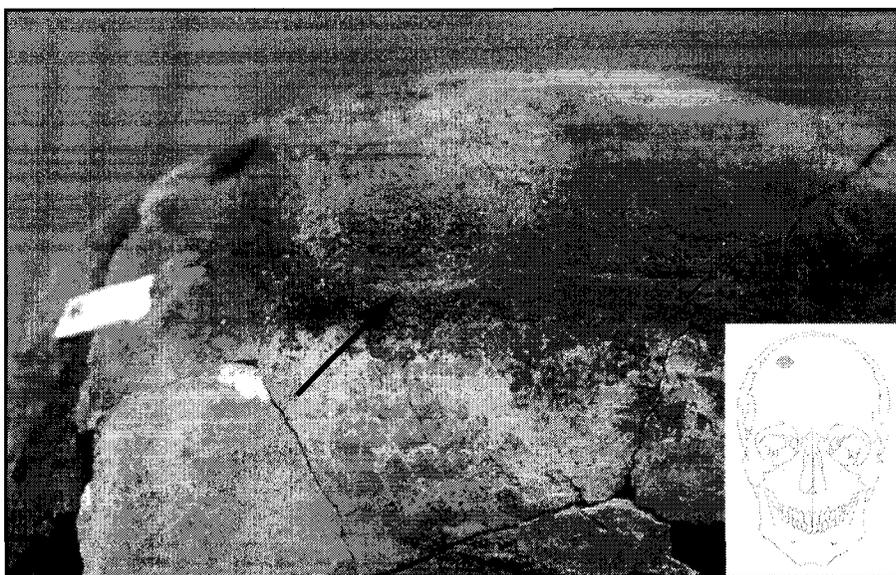


Figure 8.12. View from the right side of frontal bone showing healed wound on an adult male trophy head from Conchopata.

Table 8.3. Tally of cranial wounds from Conchopata trophy head wounds.

	1 head wound	2 head wounds	Totals
No. of trophy heads w/ wound(s)	5	1	6
Tally of all wounds in trophy head sample	5	2	7

Among the seven discrete wounds, three are on the frontal bone ($3/7 = 43\%$) and four are on the posterior (parietal bosses) ($4/7 = 57\%$) (Figures 8.13 and 8.14). Notably, among the six well-preserved occipital bones, none display any wounds. Thus, the wounds are concentrated on the parietal bosses and frontal bone, which suggests that these wounds were not randomly incurred; instead, those portions of the head may have been intentionally targeted (see Lambert, 1994; Smith, 2003; Walker, 1997) (also see discussion of cranial trauma in Chapters 3 and 7). The anterior traumata likely resulted from face-to-face conflict (see Lambert, 1994; Walker, 1997), but because the majority of wounds are located elsewhere, it appears that this form of conflict was not the most common.

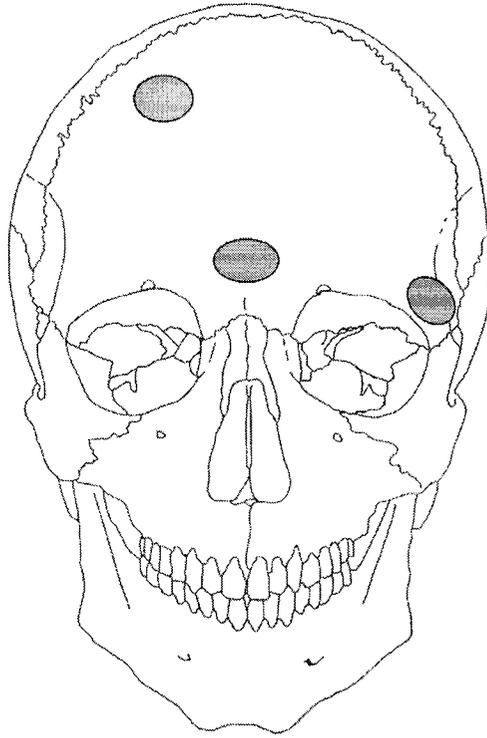


Figure 8.13. Anterior view of cranial wounds on trophy heads from Conchopata.

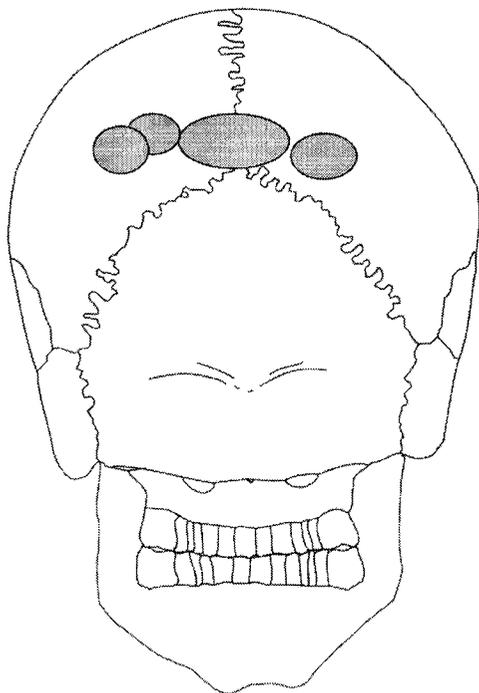


Figure 8.14. Posterior view of cranial wounds on trophy heads from Conchopata.

The only postcranial elements in the trophy head sample observable for fractures were hand and foot phalanges. One hand phalanx displays a healed fracture, which may have resulted from an accident (Galloway, 1999f); however, according to Lovell (1997) head, hand, and rib fractures likely result from interpersonal violence, rather than accidental injury. Thus, the cause of this fracture is difficult to ascertain. The foot phalanges display no fractures.

8.3 Results: Beringa Trophy Heads

Among the thousands of human skeletal remains recovered from Beringa, only one partial cranium exhibiting modifications indicative of a trophy head was recovered from a Middle Horizon component. The post-mortem modification on the trophy head included one intentionally drilled hole on the center of the frontal bone. The rest of the cranium was

absent, so the occipital bone could not be observed to determine if the foramen magnum had been enlarged in order to extract the brain (see Verano, 1995). Given that only a portion of the frontal bone was present, its age could not be determined, but it was clearly not an infant or child. Observations for cranial wounds were not possible due to the poor preservation.

The presence of only one trophy head from the village site of Beringa is consistent with the archaeological data (Tung, n.d.) that indicate this was a community of agriculturalists and fishers, not a community of ritual specialists who engaged in the decapitation and mutilation of humans and human body parts, respectively.

8.4 Results: La Real Trophy Heads

The La Real skeletal sample includes five adult trophy heads, which is not surprising given the ceremonial nature of the site. Although the Peruvian archaeologists who excavated La Real reliably described all of them in their field notes, this author personally observed only two of them.⁷⁶ One includes a carrying cord, which is threaded through the hole on the center of the frontal bone; the occipital base was intentionally destroyed to extract the brain (Figure 8.15), similar to what has been described of trophy heads from Nasca (Browne et al., 1993; Silverman and Proulx, 2002; Verano, 1995; Williams et al., 2001). The second trophy head exhibits a uniform perforation on the center of the frontal bone and the occipital base was removed similar to the other. This specimen is covered by soft tissue and hair, so physiognomic features are still very clear; however, the soft tissue prevented observations for cranial wounds.

⁷⁶ One trophy head was used in a museum display, so I had no access to the specimen, and the two others have not yet been located in the storage room at the Institute of National Culture in Arequipa.

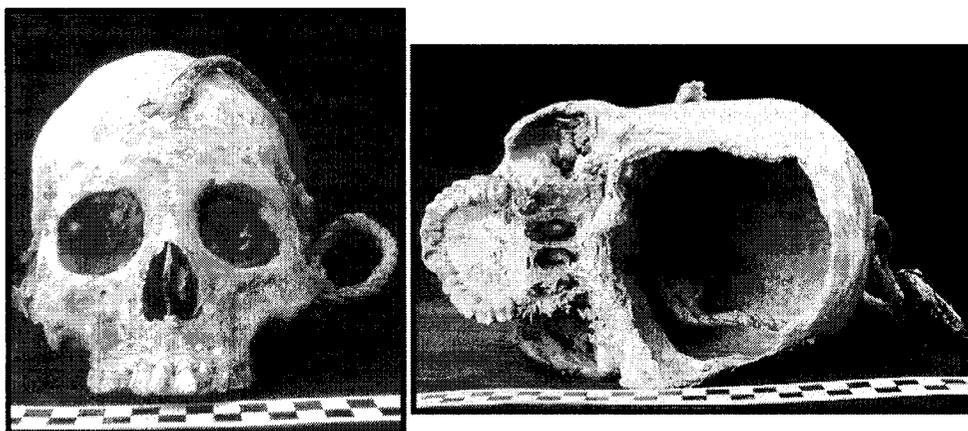


Figure 8.15. La Real trophy head showing perforation on frontal bone and the enlarged foramen magnum. (Mandible was present, but not shown here.)

8.4.1 *Age and Sex of La Real Trophy Heads*

Both trophy heads are from adults, and one is a male, while the other is unsexed. The male is an adult with no specific age designation.⁷⁷ The other, shown in the photograph, is between 19 to 25 years-old, and while its glabella and supra-orbital margin appear gracile (scores=1) (and could be interpreted as female), the nuchal crest was intermediate (score=3) and the mental eminence of the mandible was robust (score=4) (scores based on methods in Buikstra and Ubelaker, 1994). Thus, it was not assigned a sex. Nonetheless, the known age of one and the sex of the other parallels those reported for Nasca trophy heads—young adult males (Kellner, 2002; Verano, 1995; Williams et al., 2001). The age and sex of the three trophy heads described in the excavators' fieldnotes are unknown.

⁷⁷ Characteristics used for aging were not observable: soft tissue prevented observation of cranial sutures, the sphenoccipital was cut out, and the articulation of the mandible and cranium blocked observation of the dentition.

8.5 Trophy Heads from the Majes Valley Museum

Two trophy heads from the Majes valley museum in the town of Aplao were observed by this author, and given the rarity of trophy heads, particularly outside of Nasca contexts, they are presented here for comparative purposes. Their provenience is unknown, but they were certainly collected by a local individual from one of the archaeology sites in the middle Majes valley. While it is possible that the unprovenienced trophy heads derive from a pre-Middle Horizon context, this is unlikely given the dearth of early sites in the valley (de la Vera Cruz Chávez, 1989; Garcia Márquez and Bustamante Montoro, 1990). The first exhibits a hole on the center of the frontal bone, similar to those from Nasca, out from which extends a carrying cord (Figure 8.16). This trophy head victim was over 18 years-old at the time of death, as indicated by the presence of third molars.⁷⁸ Based on the robust mandible, this trophy head is a probable male. The facial skin and scalp are preserved, and the eyes are stuffed with raw cotton, a common botanical product included with mortuary remains during the Middle Horizon in the Majes valley. A red wig/headdress covers the individual's hair and the superior portion of the frontal bone and part of the parietals. The cranium has been cut slightly posterior to the coronal suture, such that the trophy head resembles a face mask. Cranial wounds were unobservable due to the preservation of soft tissue.

The second trophy head from the Majes valley museum exhibits an intentionally drilled hole slightly posterior to bregma, similar to those from Conchopata (see above), and the occipital base shows intentional destruction, indicating that the brain was removed (Verano, 1995) (Figure 8.17). A knotted carrying cord is threaded through the hole at

⁷⁸ The occlusal surface of the teeth could not be observed for wear to obtain a more specific age-at-death. Also, due to preservation of the scalp and destruction of the occipital base, the cranial sutures and sphenoccipital union could not be observed to ascertain a more specific age.

bregma. This trophy head victim is a middle-aged adult, but sex is unknown.⁷⁹ No soft tissue is preserved on this cranium, and given that no cutmarks were observed, it could have decomposed naturally. The trophy head exhibited no cranial wounds. Notably, the cranium exhibits cranial deformation in the tabular oblique style, suggesting that the person derived from the local yungas-coastal zones and not the highlands (see Blom, 1999; Kellner, 2002).⁸⁰ Thus, this last specimen exhibits the Conchopata (Wari) style of trophy head modification (see above), but a southern coastal form of cranial deformation.

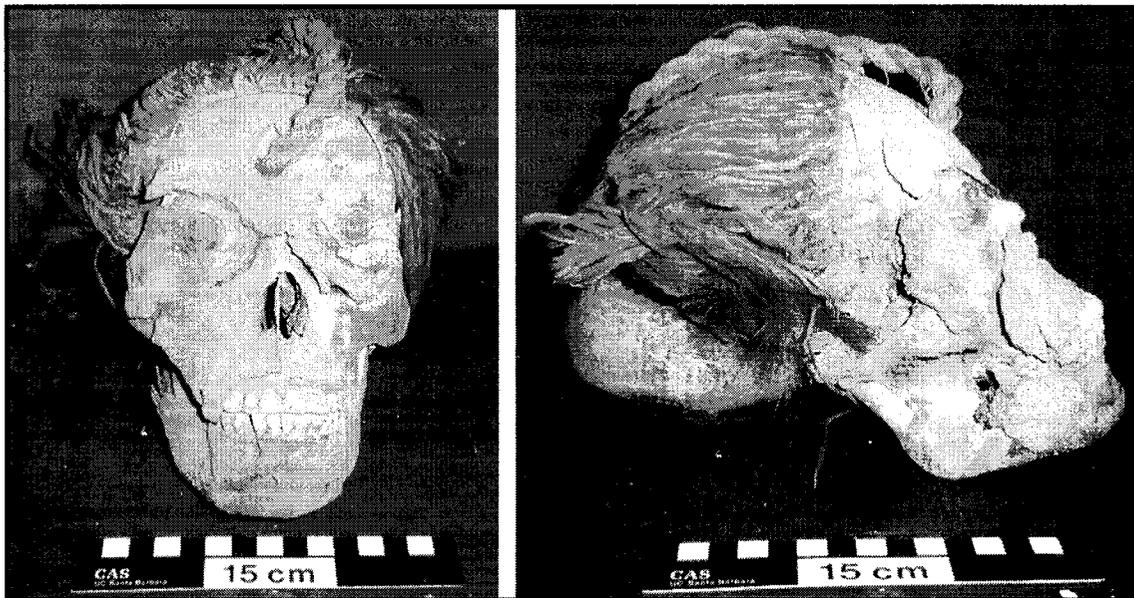


Figure 8.16. Nasca-style trophy head from the middle Majes valley, now housed at the local museum in the town of Aplao.

⁷⁹ The glabella and supra-orbital margins are gracile, suggesting that this individual is female, but the mastoid process is near-robust, and the nuchal crest morphology is obliterated by the deformation; thus, it is unsexed.

⁸⁰ In general, the yungas-coastal cranial modifications include the tabular styles, and the highland modifications include the circumferential styles; however, there are occasional exceptions.

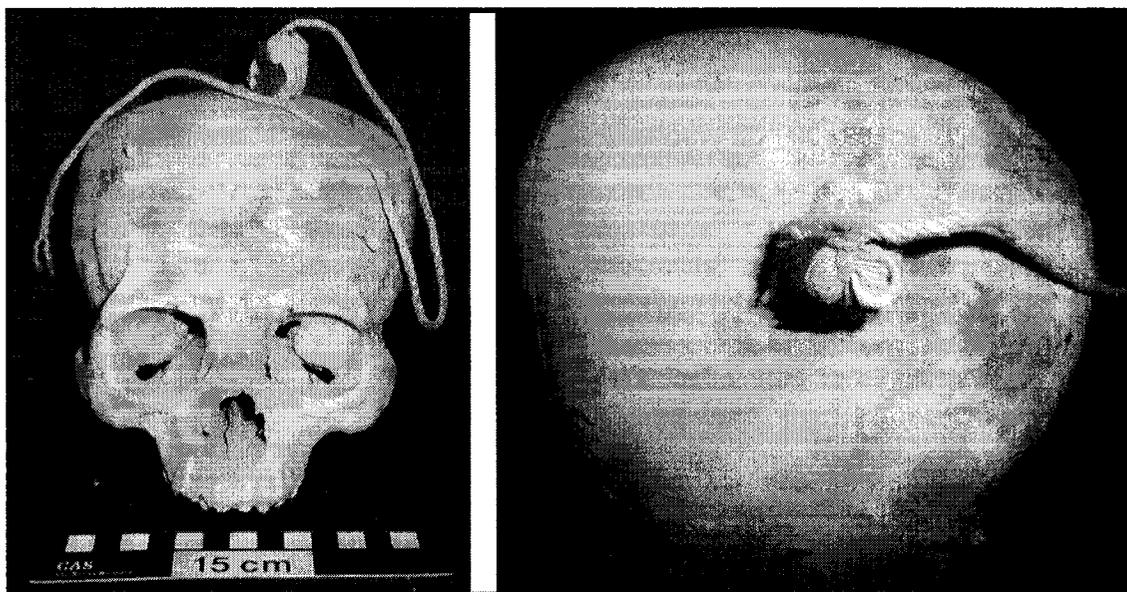


Figure 8.17. Wari-style trophy head from the middle Majes valley, now housed at the local museum in the town of Aplao.

8.6 Discussion and Comparisons

8.6.1 Discussion of Conchopata Trophy Heads

Men, children, and possibly women were transformed into trophy heads, and nearly all were modified in the same way. Cutmarks indicate that soft tissue was intentionally carved from the bone, particularly to separate the mandible and cranium, similar to what Baraybar (1987) and Drusini (1991) have noted among Nasca trophy heads. It is unknown if heads were completely flayed, though this was likely the case for the one individual who exhibited cutmarks on the zygomatic bone; this parallels what Drusini (1991) observed on the zygomatic bone of an adult female trophy head from Nasca.

Perforations were drilled on three primary skull locations: bregma, the nuchal crest, and the ramus. This is in contrast to the Nasca trophy heads that typically exhibit a hole on the center of the frontal bone (Browne et al., 1993; Verano, 1995; Williams et al., 2001).

The perforations on the occipital bone and ramus are also unique given that this has not yet

been observed among Nasca trophy heads, indicating that Wari methods of trophy head modification were distinct from those of the earlier Nasca society (AD 1 -600) from the south-central coast.⁸¹ Thus, this author argues that perforations on these skull locations are diagnostic characteristics of Wari trophy heads.

The perforations on the skulls would have been used as conduits for rope, similar to those from Nasca where the cord is often found intact (Proulx, 2001; Verano, 1995; Williams et al., 2001); the cord was apparently used to dangle trophy heads from posts (Verano, 1995), a warrior's neck (Ochatoma and Cabrera, 2002), or some other object. This author suggests that the perforation on the superior part of a Conchopata trophy head (i.e., bregma) would have served to suspend it while keeping the face upright, as depicted in a Conchopata urn fragment where a warrior wears a trophy head around his neck (Ochatoma and Cabrera, 2002) (see Figure 2.4).

The holes on the ramus of mandibles suggest they were either reattached to crania or displayed separately. There are examples of Nasca trophy heads with mandibles tied to the zygomatic arch, but they are void of holes; instead, the thick cord is wrapped around the ramus and tied onto the zygomatic bone (Verano, 1995:207). Thus, it is possible that Conchopata trophy heads were prepared in a similar manner, except that perforations were drilled on the body of the ramus in order to thread them with cord and tie them to the cranium. Conversely, the mandible could have been dangled separately, or perhaps both were done throughout the use-life of the trophy head. Similarly, the occipital bones initially may have been displayed with the entire skull, but after some unknown time, they may have been separated from the cranium and dangled solo, as the perforations on the occipital bones

⁸¹ To my knowledge, no Nasca trophy heads with perforations on the occipital or ramus have been reported in the literature.

suggest. Additionally, the patina on the edge of the occipital bones suggests they were repeatedly handled, possibly as amulets. Bone polish such as this is characteristic of trophy heads from Melanesia that are frequently manipulated (White and Toth, 1991:119). Moreover, saving body parts for trophies or utilitarian objects is not altogether uncommon, as observed among some groups in Maori society (Vayda, 1960:94). However, it is unlikely that the Conchopata trophy parts served any utilitarian function given their presence in the ritual D-shaped and circular buildings. Moreover, the trophy heads in the D-shaped structure were deposited near beautifully decorated, oversized ceramic urns that were intentionally demolished (Ochatoma and Cabrera, 2002). Rather than serving some utilitarian function, the mutilated human body parts served a ritual purpose.

While previous studies of Wari iconography had documented depictions of trophy heads in ritual contexts (Cook, 2001; Ochatoma and Cabrera, 2002), prior to this study, it was unknown if the Wari images were verisimilar works of art. With these new osteological data, the iconography and physical remains merge to elucidate information about art and ritual practice at Conchopata; the presence of trophy heads and disembodied skeletal parts indicate that Conchopata iconography entailed a component of realism. Specifically, images on ceramics depict disembodied heads and hands and these identical skeletal elements were present in ritual structures. Additionally, the data suggest that these body parts were preferred for Wari rituals.⁸²

Given that the frequency of cranial trauma among trophy heads was indistinguishable from the mortuary population, it appears that trophy head victims were not engaged in more

⁸² Foot bones and foot figurines also have been recovered from Wari sites, but not in the same context. Nonetheless, perhaps the connection between Wari iconography and ritual human remains include heads, hands, and feet.

violent conflicts than any other individuals from the community; thus, it appears that the adult trophy heads were not derived from a warrior class, at least not exclusively (see Verano, 1995). However, while they may not represent warriors per se, they may represent vanquished enemies taken from other communities during raids, similar to what Silverman and Proulx (2002:233) note regarding the source of Nasca trophy heads. The nature of these raids, however, remains to be elucidated. Silverman (1993:221-225) and Browne (1993) suggest that *tinkus* (ritual battles) (described in Chapters 3 and 7) may have been the means by which heads were acquired. In contrast, Proulx (1971; 1989) argues that heads were obtained in warfare or raids—not ritual battles—and consequently transformed into trophy heads for countless ritual purposes. Conversely, trophy heads may not represent “war trophies” or “raiding trophies,” but may represent ritual offerings (Neira and Coehlo, 1972) or, as suggested by Guillén (cited in Silverman 1993: 224), the heads of revered ancestors. Additionally, given the abundant evidence for child sacrifice within the Inka empire (Reinhard, 1996) (also see Benson and Cook, 2001), child trophy heads may represent sacrificial offerings. Based on analysis of 84 Nasca trophy heads, Verano (1995:214) shows that the majority were young adult males, an unlikely demographic group to represent revered elders, and only three percent were children, indicating that child trophy heads were quite rare in Nasca society. Thus, he concludes that Nasca trophy heads were obtained from enemy combatants (Verano, 1995).

The majority of Conchopata trophy heads are also males, but older males are more common than young males, and children constitute nearly a quarter of the Conchopata sample. Thus, while the Conchopata trophy head sample may display some characteristics suggesting they were revered ancestors and child sacrifices, the militaristic iconography

suggests otherwise (see Cook, 2001; Ochatoma and Cabrera, 2002). Moreover, ethnographic studies of the Jivaro from southern Ecuador demonstrate that raiding parties took the heads of men, women, and children even though adult warrior's heads were more valued (Harner, 1972). Thus, the diverse demographic composition of the Conchopata trophy heads suggests that, similar to the Jivaro, any individual, or any body, literally, would suffice as a trophy head victim, but adult males were clearly preferred and more frequently obtained. Based on the demographic distribution of the Conchopata trophy heads, background information on Nasca trophy heads and their hypothesized origins, and analogy with modern Andean communities (i.e., Jivaro), this author suggests that the Conchopata trophy heads represent vanquished rivals, possibly acquired during raids, as Proulx (1971; 1989) originally suggested.⁸³

The osteological data have elucidated important details regarding their demographic composition, style of modification, and use in rituals. However, it is still unknown if trophy heads derive from populations in the local and neighboring area or distant "foreign" parts of the Andes. Strontium isotope data that aid in addressing this issue are presented in the following chapter.

8.6.2 Discussion of the Majes Valley Trophy Heads

There were a total of five trophy heads from the Majes valley skeletal series observed by this author: one from Beringa, two from La Real, and two from some unspecified archaeological site in the middle Majes valley (now stored at the Aplao Museum in Majes valley). These trophy heads are significant because they provide insight regarding ritual

⁸³ Proulx (1971; 1989) also suggested that the heads may have been obtained in warfare, not just raids.

practices, as well as the origin of cultural influence on those practices among communities in the Wari hinterland.

Four of the trophy heads from the Majes valley display a perforation on the center of the frontal bone, which is a diagnostic feature of Nasca style trophy heads. One of these was altered to resemble a “face-mask” trophy head (Figure 8.16), a form which has been documented in Nasca skeletal series (Kellner, 2002). Thus, these four trophy heads indicate that Majes communities were influenced by the preceding Nasca society from the nearby Nasca valley in terms of trophy head modification styles. Given that rituals were often organized around the modification and display of trophy heads (Proulx, 2001; Silverman and Proulx, 2002), the physical remains themselves provide insight on the ritual practices. This is significant because, while so much of the ritual paraphernalia from Majes valley sites, particularly La Real, express connections with Wari (de la Vera Cruz Chávez and Yépez Alvarez, 1995; Garcia Márquez and Bustamante Montoro, 1990), the majority of trophy heads suggest that local, historically rooted ritual behaviors were maintained. Thus, it appears that even with the onset of Wari imperialism, local trophy head styles and ritual practices were retained, while fancy Wari goods were adopted.

However, this may not have been the case in all Majes valley rituals. The fifth trophy head from the Majes valley exhibits a diagnostic feature of Wari trophy heads (see above)—a perforation at bregma—suggesting that Wari influence led to changes in trophy head modification and ritual practices among some Majes communities. Perhaps Wari imperialism brought new ritual practices to subject populations, either as a means of expansion or as a byproduct of conquest. Conversely, given that this trophy head exhibits tabular oblique cranial deformation, which suggests that the person was from the coastal

Andes (see Blom, 1999), it is possible that foreign individuals from the Wari heartland decapitated a local Majes individual and transformed the head into the Wari trophy head style. However, without archaeological data indicating a Wari ritual site was present in the Majes valley, this suggestion remains highly tentative. Should future research uncover a Wari administrative/ritual site in the Majes valley, then this suggestion will be more tenable. In sum, the Majes valley trophy heads indicate that Majes communities were influenced by both local (Nasca) and foreign (Wari) traditions. This suggests there was a blending of ritual activities that reflected the indigenous community's connection to historically local practices from neighboring Nasca, as well as a newfound link to a foreign empire: the Wari.

Chapter 9 Residential Mobility and Origin of Trophy Heads from Conchopata

9.1 Introduction

In this chapter, strontium isotope ratios from individuals from the site of Conchopata are examined to test the hypothesis that individuals buried in the mortuary sector at Conchopata were from the local geological region in Ayacucho. Additionally, strontium isotope ratios from Conchopata trophy heads are assessed to test the hypothesis that at least one trophy head will exhibit a non-Ayacucho strontium isotope ratio. As outlined in Chapter 4, the strontium signature for the Ayacucho basin ranges from 0.7054 to 0.7067 based on local geology and bones from two guinea pigs (Hawkesworth et al., 1982; Migard et al., 1984)(Knudson, Pers. Comm., 2003) (see Chapter 4 for detailed discussion on the Ayacucho strontium values). Although the sample of strontium values from guinea pig bones is small, these results provide preliminary strontium signatures for the Ayacucho region that can be compared to the strontium values from the Conchopata burials and trophy heads. No enamel and bone samples from Beringa and La Real were processed to determine their strontium content. Instead, the focus of this chapter is to determine the origin and residential mobility of Conchopata burials and trophy head victims.

9.2 The Samples

Eleven individuals—six from the mortuary sector and five trophy heads from a ritual building—were selected for strontium isotope analysis. Dental enamel and bone were selected from each of the individuals.⁸⁴ Five individuals were from an undisturbed tomb in

⁸⁴ One exception is the infant; only bone was selected for strontium isotope analysis.

Architectural Space 105 (EA 105); the enamel and bone samples were from four females, ranging in age from 21 to 53 years-old and one male who was 23 to 27 years-old.⁸⁵ The sixth individual was a six to nine month-old infant from a looted tomb in Architectural Space 06 (EA 06) (see Figure 2.3 for locations of the Architectural Spaces at Conchopata) (see Table 9.1 for list of individuals used in the strontium study).⁸⁶ The remaining five samples were from trophy heads from the circular ritual structure: Architectural Space 143 (EA 143). All trophy head samples were from adults; no children have yet been examined. Given that only 24 adult Wari trophy heads have ever been recovered in the Andes, a sample of five represents slightly more than 20 percent of all known Wari trophy heads, so this should serve as an adequate sample to test the hypothesis that at least one trophy head derived from a non-Ayacucho individual. (The age group and sex of the trophy heads are listed in Table 9.1.)⁸⁷

⁸⁵ These individuals were selected because they were the best preserved and had both enamel and bone fragments that could be exported from Peru to the United States.

⁸⁶ Skeletal and dental elements from the EA 06 adults were commingled, so it could not be certain that a selected bone and tooth were from the same individual. Instead, this author selected an infant rib because it represented the infant, and perhaps the mother as well.

⁸⁷ Strontium isotope analysis of individuals from Conchopata is ongoing, so more burials and trophy heads will be added to the study.

Table 9.1. List of individual burials selected for strontium isotope analysis.

Type	EA	Locus	Individual No.	Age	Sex
Burial	105	2095	2095.01	30-39 yrs.	Female (pregnant)
Burial	105	2095	2095.02	21-24 yrs.	Female
Burial	105	2095	2095.03	47-53 yrs.	Female
Burial	105	2095	2095.04	31-37 yrs.	Female
Burial	105	2095	2095.06	23-27 yrs	Male
Burial	06	2004	2004.01	6-9 months	Indeterminate
Trophy Head	143	2907	2907.04	35-49 yrs.	Female?
Trophy Head	143	2907	2907.05	30-39 yrs.	Male?
Trophy Head	143	2985	2985.10	Adult	Unsexed
Trophy Head	143	2985	2985.11	45+ yrs.	Male?
Trophy Head	143	2985	2985.18	28-36 yrs.	Male

9.3 Strontium Results

The strontium isotope ratio for Ayacucho (i.e., Conchopata) ranges from 0.7054 to 0.7067, so individuals consuming foods from the Ayacucho geological zone should exhibit strontium values within this range. Among the five adults from Architectural Space 105, the strontium isotope ratios for enamel range from 0.7055 to 0.7057 and the bones range from 0.7057 to 0.7061, all of which are within the range for the Ayacucho strontium values (Table 9.2 and Figure 9.1). The strontium isotope ratios between the enamel and bone are not substantially different, indicating that they consumed foods from the same geological zone during childhood and adulthood. The strontium isotope ratio for the infant bone from Architectural Space 06 is 0.7067, which is higher than the others, but still within the limits of the local strontium value (Table 9.2 and Figure 9.1). These data indicate that all individuals sampled consumed foods grown in the Ayacucho geological zone during their developmental years and adult years, and probably resided in that location as well.

Table 9.2. List of enamel and bone samples and their strontium isotope ratios.

Type	EA	Locus	Individual No.	Lab Code	Element	$^{87}\text{Sr} / ^{86}\text{Sr}$
Burial	105	2095	2095.01	F1218	R fibula	0.7061
Burial	105	2095	2095.01	F1219	LM2	0.7056
Burial	105	2095	2095.02	F1220	R fibula	0.7057
Burial	105	2095	2095.02	F1221	RM2	0.7056
Burial	105	2095	2095.03	F1222	R fibula	0.7059
Burial	105	2095	2095.03	F1223	M2	0.7057
Burial	105	2095	2095.04	F1224	L fibula	0.7057
Burial	105	2095	2095.04	F1225	LM2	0.7056
Burial	105	2095	2095.06	F1227	RM2	0.7055
Burial	105	2095	2095.06	F1226	U rib	0.7057
Trophy head	143	2907	2907.04	F1784	molar enamel	0.7088
Trophy head	143	2907	2907.04	F1789	cranial fragment	0.7072
Trophy head	143	2907	2907.05	F1785	molar enamel	0.7063
Trophy head	143	2907	2907.05	F1790	cranial fragment	0.7065
Trophy head	143	2985	2985.10	F1786	RC enamel fragment	0.7064
Trophy head	143	2985	2985.11	F1787	molar enamel	0.7102
Trophy head	143	2985	2985.11	F1792	cranial fragment	0.7092
Trophy head	143	2985	2985.18	F1788	molar enamel	0.7063
Trophy head	143	2985	2985.18	F1793	cranial fragment	0.7073

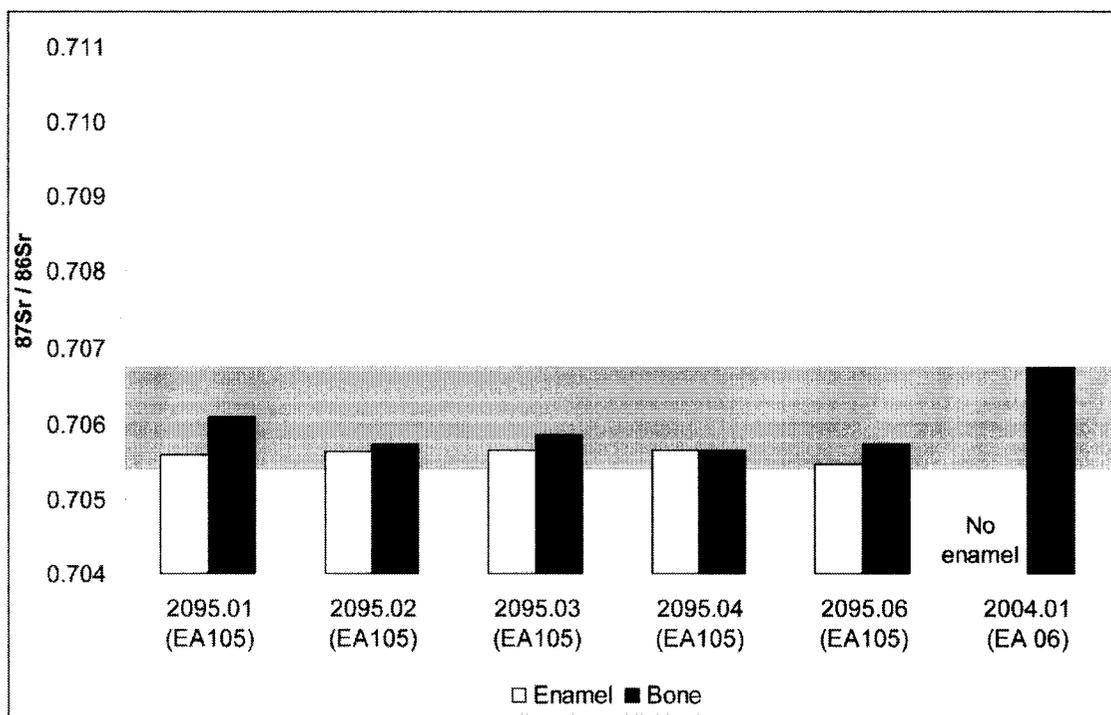


Figure 9.1. Strontium isotope ratios from five adults in EA 105. All values are within the expected range for local (Ayacucho) strontium isotope ratios. Gray represents the local signature as established by modern fauna.

Among the trophy heads, enamel from three of the five exhibit local strontium signatures, ranging from 0.7063 to 0.7064 (Table 9.2 and Figure 9.2) (local Ayacucho strontium values range from 0.7054 to 0.7067).⁸⁸ The three trophy head victims with local strontium values include a middle-aged male, an unsexed adult, and a young adult male. The bone strontium signature from the middle-aged male is 0.7065, which is basically indistinct from his enamel. There is no bone strontium data for the unsexed adult, so it is unknown if the strontium signature changed from childhood to adulthood. However, the last of these three, a young adult male (Individual 2985.18), shows a bone strontium signature that is non-

⁸⁸ Due to the fragmentary nature of the trophy heads and teeth, the enamel comes from unspecified molars (i.e., either M1, M2, or M3) and the right maxillary canine of Ind. 2985.10, so the strontium content could reflect dietary strontium from age 1 – 15 years (or 1 – 5 years in the canine sample), the time when dental enamel was still forming. Nevertheless, these data still represent childhood.

local—0.7073—indicating a marked change in his strontium isotope ratio from childhood to adulthood. That is, his enamel strontium signature matches the local value (0.7063), but his bone strontium signature is non-local (0.7073) (Table 9.2 and Figure 9.2), indicating a shift in his diet from childhood to adulthood, which suggests that he migrated to another geological zone during his adult years (see Grupe et al., 1997; Müller et al., 2003; Price et al., 1994). Notably, his disembodied head was found back in the ritual structure at Conchopata, the region of his childhood, not his adulthood.

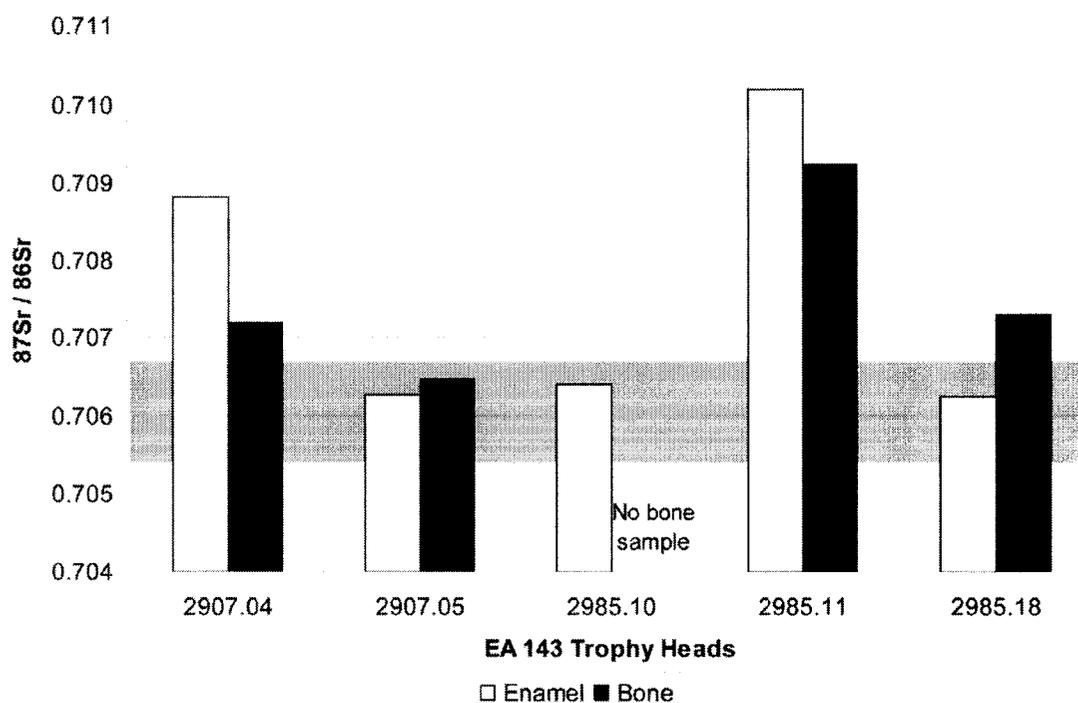


Figure 9.2. Strontium isotope ratios from trophy heads, which show local and non-local values. If local, then the value should be from 0.7054 to 0.7067. Gray represents the local signature as established by modern fauna.

The enamel from the other two trophy heads show strontium isotope ratios of 0.7088 and 0.7102, values that are non-local (Table 9.2 and Figure 9.2). They include a middle-aged probable female (Individual 2907.04) and an old male (Individual 2985.11). The bone

strontium isotope ratios from both individuals are distinct from their enamel strontium levels. Specifically, the strontium isotope ratio of the probable female shifts from 0.7088 in childhood to 0.7072 in adulthood, and for the old male, it shifts from 0.7102 to 0.7092—none of which are strontium values for the Ayacucho Basin (Table 9.2 and Figure 9.2). Instead, the strontium values from the old male are more similar to those from the Titicaca Basin of southern, highland Peru. (Titicaca strontium values = 0.7090 - 0.7104 (Knudson et al., 2004)). These data indicate that their diets shifted considerably from childhood to adulthood, and by extension, they probably migrated to a new geological zone sometime in their adult years, excluding the Ayacucho region (see Grupe et al., 1997; Müller et al., 2003; Price et al., 1994). Interestingly, their disembodied heads ended up in a ritual structure at Conchopata in Ayacucho, a region that was neither their place of childhood or adulthood.

The strontium isotope ratios from the enamel and bones of the trophy heads exhibit more variability relative to the strontium isotope ratios of individuals from the mortuary sector (Figure 9.3). The six individuals from the mortuary sector show local Ayacucho strontium signatures, both for childhood and adulthood, but the trophy heads show a mix of strontium signatures. Some of the disembodied heads that were used in rituals at Conchopata show strontium values that mirror those from the Ayacucho geological zone, while others show strontium values that mirror other geological locales. Moreover, three trophy heads exhibit strontium signatures that vary from childhood to adulthood (Figure 9.3). The strontium results from the burials and trophy heads from Conchopata parallel those reported from the skeletal series from Teotihuacan where bone samples from individuals in one sector of the site (Cueva del Pirul) exhibited very similar strontium isotope ratios that matched the local Teotihuacan strontium value, while individuals from another sector of the site (Cueva

de las Varillas) displayed a greater variety of enamel and bone strontium isotope ratios, only some of which matched the local value (Price et al., 2000). On the basis of these results, Price and colleagues (2000) concluded that the former group had been residing at Teotihuacan long enough for their bones to reflect the local geology (no enamel was sampled, so nothing can be stated regarding their place of childhood). The latter group probably included some individuals who migrated to Teotihuacan from some outside locale because their enamel strontium values did not match the local zone (Price et al., 2000). Similarly, two distinct zones at Conchopata—the mortuary sector and the ritual structure—include local individuals and a mix of locals and foreigners, respectively.

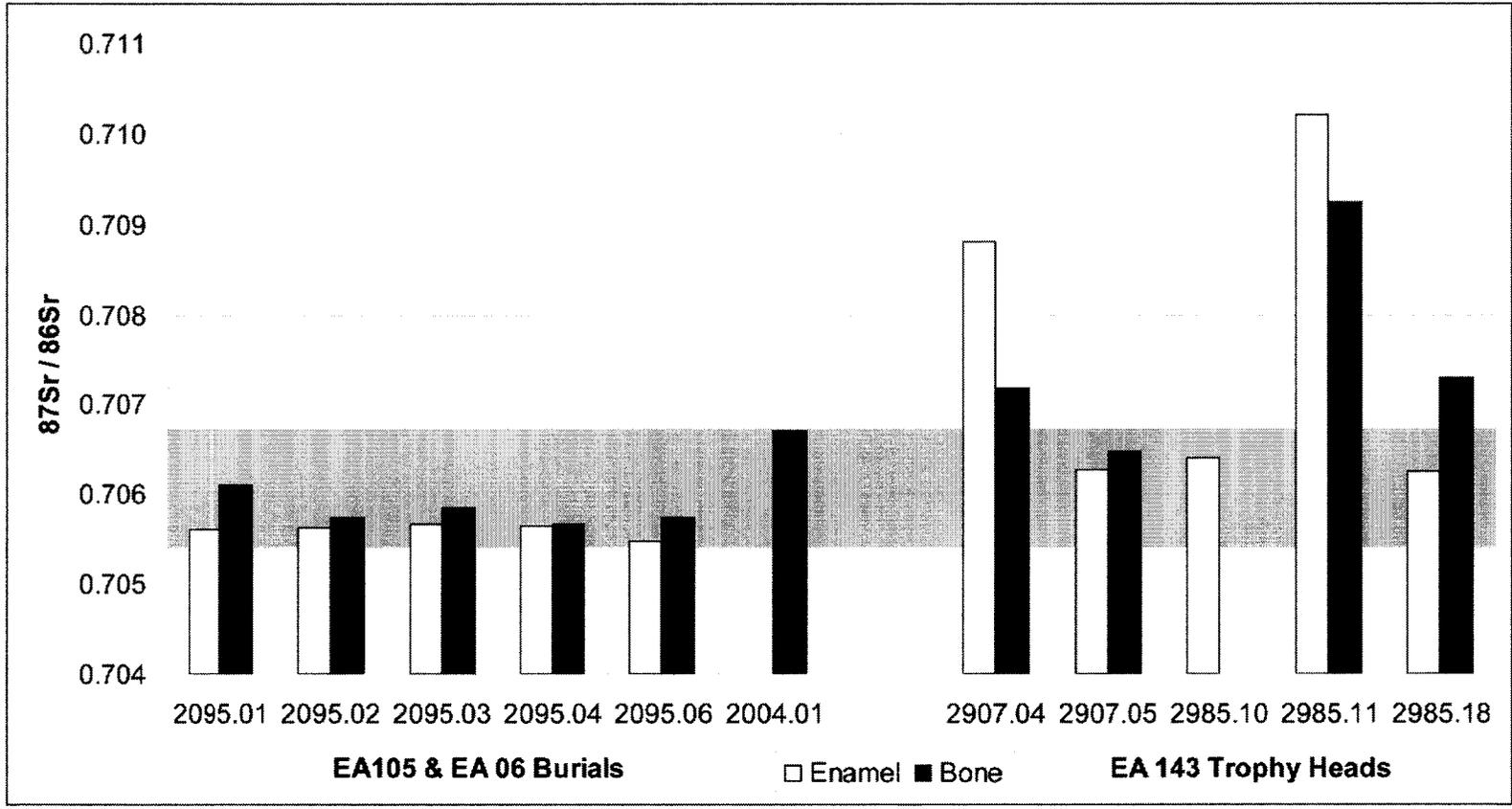


Figure 9.3. Strontium isotope ratios from burials and trophy heads. Gray represents strontium values from local fauna . Thus, local individuals should show values within the gray range.

9.4 Discussion of Strontium Isotope Analysis

The strontium isotope ratios from the five adults and one infant in the mortuary sample indicate homogeneity in terms of (geological) origin and an absence of residential mobility among those buried in at least two of the Conchopata tombs (Architectural Space 105 and 06). Both tombs are CB Type 4 tombs (Isbell and Cook, 2002; Tung and Cook, n.d.); thus, the data may be representative of other CB Type 4 tombs, but this awaits further testing. Given that the strontium values were similar between all individuals and matched the local value, it is clear that they consumed foods from the Ayacucho geological zone and probably resided in that location during childhood and adulthood; thus, they appear to have been life-long residents. This is consistent with what Price and colleagues (2000) demonstrate based on their study of bone and enamel pairs from individuals from Monte Albán in Mexico, where it was shown that four out of five individuals exhibit similar strontium isotope ratios to each other; this led the researchers to conclude that those four were “life-long local residents” at the site (Price et al., 2000:910). Similarly, the common strontium isotope signatures indicate that the Conchopata individuals in this sample were life-long local residents. This supports the hypothesis presented in Chapter 2, which, based upon their similar burial treatment and associated grave goods, posited that the individuals sampled for the strontium study would be local, not foreign.

In contrast, the individuals taken as trophy heads came from a variety of (geological) settings, suggesting that trophy head victims could be from the local region or a foreign region. Three of the five persons selected as trophy heads had spent their childhood in the Ayacucho area, while one of them appears to have migrated out of the region, only to be brought back to Conchopata as a trophy head. The other two trophy head victims lived their

childhood and adulthood outside of the Ayacucho geological zone; thus, they can be interpreted as “foreigners.” Moreover, based on substantial differences in their enamel and bone strontium values, those two trophy head victims were apparently highly migratory. Notably, each of them ended up as trophy head victims on the floor of a ritual structure at Conchopata. It is possible that they migrated to the Ayacucho Basin shortly before their death.⁸⁹ Conversely, they could have been carried back to Conchopata as disembodied heads or as captives who were later decapitated. The strontium isotope ratio from one of these foreigners (2985.11, an old male) parallels that for Paleozoic geological zones, such as the mountainous region around the Titicaca basin (Argollo et al., 2003; Knudson et al., 2004) (see Table 4.2 in Chapter 4); this was the center of the contemporaneous Tiwanaku empire. Perhaps this individual was an immigrant or captive from the Tiwanaku political sphere. While this interpretation is certainly intriguing, particularly given the somewhat enigmatic relationship between the Wari and Tiwanaku empires, it remains highly speculative because other geological zones in the Andes could exhibit signatures similar to those from Tiwanaku. This hypothesis awaits further study.

Overall, the persons selected for trophy heads came from diverse places of origin; some Wari trophy heads derive from local people, while some come from foreign individuals. These results support the hypothesis that at least one trophy head would exhibit a non-local strontium value, suggesting that the victim was a vanquished enemy and not a venerated ancestor.

⁸⁹ If they had migrated to Ayacucho and consumed local foods shortly before death, the strontium isotope ratio would not reflect this new diet because the bone would not have had time to absorb the new dietary strontium.

Chapter 10 Conclusions

10.1 Introduction

This dissertation has tested the hypothesis that Wari imperialism and conquest differentially affected the health status and lifeways of subject communities within the heartland and hinterland. This study has not only been concerned with issues of childhood health and injury morbidity, it has also addressed questions regarding distinct forms of social organization, differences in ritual practices, and the variability in residential mobility patterns among individuals and trophy head victims from Conchopata.

The following sections summarize the inter-site comparisons for each of the osteological indices examined in this study. This is followed by a synthesis of the data from each site, whereby the osteological and archaeological data are combined to reconstruct a picture of health and lifeways for each of the three populations. The final section revisits the initial hypotheses regarding imperial effects on heartland and hinterland communities.

10.2 Summary of the Inter-site Comparisons

Based on the age-at-death and sex distributions of the three populations presented in Chapter 5, it has been shown that demographic profiles were significantly different between the three communities. Specifically, the significantly higher number of infant deaths at the site of Beringa relative to Conchopata suggests a higher fertility rate among the former population (see Milner et al., 2000). Demographic profiles between La Real and other sites had not been compared to examine differences related to biological factors (e.g., fertility

rates) because, as argued earlier, La Real was organized at the supra-settlement level, indicating that individuals from numerous communities could have been buried at this high status ceremonial and funerary site. Thus, a comparison with this site's demographic composition would have led to erroneous conclusions regarding differences in age-at-death patterns and fertility rates. However, La Real can be compared to the others in terms of what it indicates regarding Majes mortuary practices (discussed below).

As presented in Chapter 6, data on cribra orbitalia and porotic hyperostosis frequencies—indicators of childhood anemia—has shown that the highland Conchopata community in the Wari heartland experienced significantly lower rates than those in the southern hinterland. Notably, other bioarchaeological studies in the Andes have shown lower rates of iron deficiency anemia among highland communities relative to those from the lowlands (Blom et al., 2004; Burgess, 1999; Hrdlicka, 1914; Ubelaker, 1992; Ubelaker and Newson, 2002). This suggests that ecological factors may have contributed to the observed differences: lowland, semi-tropical environments (*yungas* zones), particularly with dense settlements, may be more conducive to the spread of iron-depleting pathogens (Ubelaker, 1992). However, as demonstrated in Chapter 6, one-third of the adults from Conchopata were affected by childhood anemia; therefore, even in a high-altitude environment, which should be less favorable to parasitic infestation, a number of people were still affected by this ailment. This suggests that other factors, possibly related to diet and sanitary conditions (e.g., waste disposal practices), contributed to the prevalence of this disease. Ecological context was not the determining factor. Nonetheless, relative to the lowland hinterland groups, the imperial heartland community was significantly less affected. Perhaps Wari imperial policies provided relatively satisfactory sanitary conditions and access to adequate

nutritional resources for high status people at Conchopata. This suggests that both ecological context and the social conditions created by the structure of Wari imperial policies led to better childhood health among Conchopata inhabitants—insofar as iron deficiency anemia was concerned—relative to subject communities in the Majes valley. However, until additional skeletal health indices are examined to elucidate better the broader picture of developmental health, this explanation remains tentative.

Chapter 6 also demonstrated that childhood iron deficiency anemia differed between populations from separate valleys within the southern hinterland of the Wari empire. Although the Nasca and Majes valleys are both located in the southern, coastal Andes and share similar ecological contexts, the frequencies of cribra orbitalia and porotic hyperostosis significantly differed between these Wari era populations. Specifically, Nasca populations (see Kellner, 2002) showed significantly lower rates than the Majes valley populations evaluated in this study, and notably, communities from both valleys were incorporated into the Wari empire. This suggests that Wari imperial policies among southern hinterland populations may have varied, thus affecting rates of childhood anemia. Granted, it is possible that indigenous forms of social organization that affected dietary practices, population densities, and sanitary conditions in the southern hinterland communities played a role in the prevalence of anemia rates. Thus, several interrelated factors contributed to the Wari era inter-valley differences (Majes vs. Nasca) and the interregional differences (Wari heartland vs. hinterland), including ecological context and social organization, which in turn affected access to food resources, settlement patterns, and methods of waste disposal.

As shown in Chapter 7, percentages of persons affected with cranial trauma were similar between the three communities, and females from all sites showed a similar cranial

trauma pattern—wounds on the posterior of the head. Based on this pattern, it has been suggested that there may have been a, as yet poorly understood, pan-Andean concept regarding physical abuse and punishment of women. Although female patterns of trauma were similar, the patterned location of wounds among males was clearly distinct. As a result, this author has argued that males within each community were involved in distinct *kinds* of violence. Injured males from Conchopata showed a preponderance of wounds on the posterior of their heads, and unlike the other two populations, men showed fewer head wounds than women. Beringa males displayed wounds primarily on the anterior and posterior of their skulls, and among all individuals, this population showed the highest frequency of peri-mortem trauma, suggesting that more of them died from head wounds than those from the other two sites. The injured males from La Real showed the most patterned distribution of cranial wounds, whereby the vast majority were located on the frontal bone, and of those, 70 percent were located on the left side. This has been interpreted to suggest that La Real men squared off in standardized forms of violent interaction, such that the left side of the head was particularly vulnerable to a blow from a right-handed attacker (see Lambert, 1994; Walker, 1989). These wounds were well-healed, suggesting that the perpetrators attacked without fatal intent.

Data from Conchopata trophy heads, presented in Chapter 8, indicate that the Wari empire decapitated individuals and transformed their heads into trophies for use in D-shaped and circular ritual structures. Their method of modification is distinct from other Andean societies that engaged in head-taking, perhaps suggesting subtle differences regarding the way these objects were used in rituals. Human trophy heads from the Majes valley indicate that both the earlier Nasca society and the contemporaneous Wari society influenced the

preparation and style of these heads. That is, while regional trophy head styles (i.e., from Nasca) were maintained, foreign preparation methods from Wari intruded into the local ritual repertoire.

Finally, as shown in Chapter 9, strontium isotope data from individuals from the mortuary sector at Conchopata demonstrated that they were life-long local residents. In contrast, the strontium values from Conchopata trophy head victims showed that some were from the local Ayacucho area, while others were from non-local geological zones; that is, foreigners.

10.3 Summary of the Conchopata Results

Based on archaeological data, Isbell (2001; 2002) has suggested that Conchopata was “a community of palaces,” inhabited by a royal male or males and other elites. Furthermore, based on the high female to male ratio presented previously by this author (Tung, 2001), Isbell (2001; 2002) posited that Conchopata was organized around elite polygynous households. Certainly, as this study has shown, women outnumber males during both the pre-Wari and Wari time periods. During pre-Wari times, there are seven females for every male, but given the small sample size and limited sectors from which the burials derive, this unbalanced sex profile probably reflects more about mortuary practices than social organization or biological processes (e.g., higher mortality rates among females). This author suggests that females were preferentially selected for interment at Conchopata during its initial use and occupation.⁹⁰ Although it has been suggested that the adolescent females from the Huarpa temporal component (Eb-3, 1977 excavations) may represent sacrificial

⁹⁰ It is also possible that males were buried together in another Huarpa (pre-Wari) sector of the site that has yet to be excavated. If they were interred near the numerous females buried under the “Pink Sand Plaza” (EA 104), then the possibility exists that they were located in what is now a destroyed section of the site: the modern road cut.

victims (Isbell and Cook, 1987; Isbell and Cook, 2002), the skeletal remains exhibit no evidence for peri-mortem trauma that would indicate sacrifice or violent death. However, they could have been sacrificed by methods that leave no trace in the skeletal record. Thus, based solely on the absence of peri-trauma, the possibility that these five young females were sacrificed can not be ruled out, particularly given the uniqueness of their shared age and sex (see Uhle 1903).

In the subsequent Wari phase, the female to male ratio was 1.65:1. Or, compared another way, the sex distribution in the Wari period showed significantly more females than males relative to an equal sex distribution. Thus, this high female to male ratio may lend support to Isbell's hypothesis that Conchopata was organized around polygynous households. Moreover, the numerous fetus and infant interments with females indicate that they were involved in reproductive relationships, presumably with the high status males that Isbell identifies as heads of households. Conversely, this author has suggested that the unbalanced sex distribution might imply that males were sent away on state projects, thus leading to relatively lower numbers of men at the settlement. If extended family units were living at Conchopata, but men were deployed elsewhere, then the observed sex distribution of more females than males, as well as numerous infants and children would be expected. Given that Conchopata appears to have been a center for the production of elaborate ceramic urns that were later intentionally destroyed in rituals (Cook and Glowacki, 2003; Isbell and Cook, 2002; Leoni, 2001; Ochatoma and Cabrera, 2002; Pozzi-Escot B, 1991), perhaps these family groups included individuals who were producers and ritual specialists, as well as deployable personnel (e.g., males engaged in military campaigns) for the Wari state. Specifically, some Conchopata males may have been involved in raiding other settlements to obtain trophy

heads (discussed below), and some of these men may not have returned. Thus, males are underrepresented at Conchopata.

The presence of trophy heads in ritual structures at Conchopata indicates that victims were decapitated for the production of trophy heads during or for the purpose of Wari rituals. As this author has suggested, the trophy heads from males, children, and probable females appear to have been obtained during raids, not warfare. This is similar to what ethnographic studies report regarding raids and head-taking among the Jívaro of southern Ecuador. Among the Jívaro, heads of adult warriors are preferred, but the raiders willingly take the head of *any* individual (Harner, 1972). While ethnographic analogy provides a useful means for interpreting the osteological and archaeological data, the datasets of the present study, in and of themselves, provide much insight into the origin and context of the trophy head victims. For example, as this author has argued, the trophy head victims did not represent warriors captured in warfare because their cranial trauma frequencies did not significantly differ from those individuals buried in the non-ritual sector (i.e., the mortuary area). In other words, the trauma data indicate that the adult trophy head victims had lifeways similar to the adults in family groups interred in the mortuary area, insofar as exposure to violence was concerned. Thus, the trophy head victims do not appear to represent warriors. Instead, they seem to represent individuals—men, women, and children—from rival groups and were probably collected by warriors *from* Conchopata during raids in other communities. This interpretation is further supported by the militaristic iconography on an urn from the D-shaped ritual structure, which depicts a human (presumably a warrior from Conchopata) wearing a trophy head (see Figure 2.4) (Ochatoma and Cabrera, 2002). Moreover, the strontium isotope data indicate that a few trophy head victims were not from the local

geological zone, but from foreign regions. This suggests that some victims were indeed foreigners, or foreign rivals. In fact, one of these trophy heads exhibited strontium values characteristic of the Titicaca Basin—the region of the contemporaneous Tiwanaku empire (see Knudson et al., 2004). While it is tempting to suggest that Conchopata warriors conducted raids in the Tiwanaku political sphere and returned home with captives, or at least their disembodied heads, this must remain highly speculative until more strontium values are obtained for other parts of the Andes. It is possible that some of the trophy head victims came from another geological zone with Paleozoic formations similar to the Titicaca Basin.

At Conchopata, cranial trauma frequencies were slightly higher among females relative to males (31% vs. 25%), but the differences were not statistically significant. Additionally, males and females both exhibit head wounds primarily on the posterior of their skulls, and all but one wound is well-healed; thus, it appears that men and women were similarly exposed to non-fatal violence both in frequency and kind. As suggested in Chapter 7, the females could represent women who were physically abducted, and injured, from other communities many years earlier and subsequently “adopted” into the local community (see Wilkinson, 1997). However, the strontium data from the five females indicate they were not foreigners.⁹¹ Instead, all were from the local Ayacucho region, and one of these women exhibited a healed head wound. Of course, given the limits of the strontium data (the strontium signature is for the entire Ayacucho Basin), these females could have derived from some other settlement in the local area.

Conversely, the females could have been natal community members who were victims of domestic abuse from male partners (see Lambert, 1994; Walker, 1997). Or, if

⁹¹ The strontium signature from the infant is interpreted as also representing that of its mother; thus, there are strontium values for five females.

Conchopata was organized around polygynous households, then the trauma could have resulted from physical conflicts between co-wives (see Levinson, 1989:25, 32). However, given that the preponderance of female wounds were concentrated on the posterior, and not the anterior as commonly occurs among female victims of domestic violence (see Draper, 1992; Walker, 1997), it is improbable that domestic abuse explains their injuries. Moreover, because the wound locations are highly patterned, it seems unlikely that the injuries were sustained in physical scuffles between women. Instead, it appears that these non-fatal injuries were inflicted in controlled settings. Thus, it has been suggested that transgressions against the community could have resulted in culturally-sanctioned corporal punishment (see Smith, 2003), such as a solid blow to the back of the head while kneeling, akin to what was practiced by the later Inka empire (Cobo, 1892 [1653]:III, xxi, xxvii, 238, 240-241; Moore, 1958; Murúa, 1946 [1590]:III, xx, 70, 211, 213; Valera, 1945 [1585]:58).

10.4 Summary of the Beringa Results

The settlement at Beringa is comprised of equal numbers of adult males and females, and nearly half of the skeletal population is represented by infants and children. Thus, as argued in Chapter 5, the Beringa demographic profile appears to represent a single community settlement (see Howell and Kintigh, 1996; Milner et al., 2000; Paine and Harpending, 1996; Sattenspiel and Harpending, 1983), probably organized around extended family households (Tung, n.d.). This corresponds well with the archaeological data indicating Beringa was a village community that inhabited adobe and stone houses and that engaged in agricultural and textile production as well as fishing and shrimping in the Majes River (Tung, n.d.).

Childhood iron deficiency anemia, as gleaned through frequencies of *cribra orbitalia* and porotic hyperostosis, affected a large percentage of people at Beringa. Nearly half of the juveniles exhibited skeletal evidence for anemia, and three-fourths of the adults suffered from this ailment during their childhood. This author has argued that the synergistic relationship between nutritional stress and exposure to iron-depleting pathogens (see Armelagos, 1994; Huss-Ashmore et al., 1982) contributed to the high rates of anemia. The latter factor in particular probably played a significant role because the inhabitants could have ingested parasites from river resources, leading to intestinal infection, blood loss, and diarrheal disease that ultimately contributed to low iron levels (see Garn, 1992; Walker, 1985).

Trauma rates were highest among the Beringa population (36%), but they were not significantly different from the other two communities. Nevertheless, given that more than one out of three adults suffered a head injury, and one-quarter of those wounds were probably fatal (i.e., *peri-mortem* trauma), it is clear that violence, even deadly violence, was ubiquitous within this village community. Also, the patterned location of wounds on the posterior of the skull suggests they were victims of raids: even deadly raids (see Walker, 1989). Notably, half of the male wounds were located on the anterior, indicating that men did occasionally engage in face-to-face conflict, perhaps during the raiding events. Finally, given that some of the female wounds on the posterior were non-lethal, it may be that Beringa females were victims of domestic violence or community-sanctioned corporal punishment, similar to their counterparts at the site of Conchopata.

As this author has indicated in previous chapters and previous studies (Tung, n.d.), Beringa was a village within which hundreds of community members were buried over

several generations. There is some archaeological evidence indicating that ceremonies occurred at the site (Tung, n.d.), but they do not approach the ceremonial significance of the neighboring site of La Real, located eight kilometers downriver. The fact that only one trophy head was recovered from the site is consistent with the archaeological context indicating that Beringa was a village of households, not a major ritual center.

10.5 Summary of the La Real Results

Based on comparisons of the demographic composition of populations in this and other studies (see Howell and Kintigh, 1996; Milner, 1991; Milner et al., 2000), this author has argued that the demographic distribution from La Real is not representative of a single settlement community. Instead, it represents an exclusive class of people from one or more settlements (i.e., supra-settlement organization) that were selected for burial at this high status ceremonial and funerary site. Based on the demographic profile, this exclusive mortuary class includes primarily adult men; the sex distribution at La Real shows significantly more males than females relative to a symmetrical sex distribution. Also, infants and children comprise only one-quarter of the burial population, suggesting that juveniles were infrequently selected for interment at La Real.

As discussed in Chapter 6, childhood anemia rates, as determined through frequencies of cribra orbitalia and porotic hyperostosis, were highest among the hinterland groups in the Majes valley compared to the heartland group at Conchopata, but the rates were indistinguishable between Beringa and La Real. This author has argued that the similar prevalence of childhood iron deficiency anemia between these two groups suggests similar lifeways in terms of diet and exposure to pathogens; both communities likely consumed

resources from the Majes River, so parasitic infection leading to diarrheal disease and iron loss were probably common (see Garn, 1992; Walker, 1985).

The cranial trauma frequency among La Real individuals (31%) was intermediate between the Conchopata and Beringa populations, but the locational distribution of head wounds was the most patterned among this group; the majority were on the frontal bone and were non-fatal. As argued in Chapter 7, these wounds appear to reflect injuries received during formalized conflict resolutions or ritual battles (*tinku*). During modern *tinkus*, communities engage in physical conflict, either face-to-face or by using slings to throw stones from a short distance; it is possible that prehispanic ritual battles followed a similar format. While captives are sometimes taken and decapitated during *tinkus* (Orlove, 1994), most encounters are non-fatal (Allen, 1988; Bolin, 1998; Hartmann, 1972; Orlove, 1994). Given the ritualized nature of *tinku* and the fact that it is designed to maintain balance and harmony between communities (Allen, 1988; Bolin, 1998; Gifford et al., 1976; Hartmann, 1972; Orlove, 1994), *tinku* can be conceived as a form of conflict resolution, similar to that documented among modern Amazonian groups, such as the Yanomamo of Venezuela (Chagnon, 1992) and the Warí of Brazil (Conklin, 2001). Furthermore, Lambert (1994) and Walker (1989) have argued that similar cranial wounds among prehistoric Chumash males from California represent ritualized “head clubbing,” a form of conflict resolution. Thus, based on the osteological data and comparisons to other societies that practiced ritualized forms of fighting, this author has argued that the individuals from La Real were engaged in ritualized conflict resolution, similar to *tinku*, known well throughout several highland Andean communities. Furthermore, the archaeological data indicating that La Real was a ritual site are consistent with this interpretation. Therefore, this author suggests that La Real

was a ceremonial and mortuary site used primarily for the interment of high status males who had engaged in *tinku*-like battles sometime during their lives.

10.6 Revisiting the Hypotheses

As hypothesized in the beginning of this dissertation, health status and lifeways appear to have differed between communities in the Wari heartland versus those in the hinterland. The hypotheses that were evaluated in this study were situated within five main themes, including: demographic distribution, childhood anemia rates, trauma frequencies, trophy head preparation and use, and strontium isotope values. Below is a summary of each of those main topics.

1) This author hypothesized that demographic distributions among the three skeletal samples would differ from one another, as a reflection of their distinct forms of social organization. At Conchopata, the demographic profiles suggest that the community may have been organized around polygynous households, as Isbell (2002) has argued. However, other forms of social organization may have been possible. Indeed, Tung and Cook (Tung and Cook, n.d.) have suggested that Conchopata was a settlement of high status households, possibly producing ritual items for the state (see Cook and Glowacki, 2003), while male heads of households may have been deployed in raiding parties to obtain human heads for use in Wari rituals. Some of these men, serving as military conscripts of sorts, may not have returned, resulting in fewer numbers of men than women. If men were deployed, then Wari imperial policies clearly had a significant effect on the demographic composition of this community. In contrast, Beringa appears to be a village community where no particular subgroup was deployed to distant locations. Finally, given that the La Real sample

is not representative of a single settlement community, its demographic composition reveals more about mortuary practices and social perceptions regarding esteemed community members: high status males who engaged in ritual battles appear to be the valued individuals.

2) It was hypothesized that childhood anemia rates would be lower in the heartland relative to the hinterland, partly due to differences in Wari's management of resources and sanitation practices (see Walker, 1985) and differences in ecological settings (i.e., highland vs. lowland) (see Hrdlicka, 1914; Ubelaker, 1992). Indeed, childhood iron deficiency anemia was lower among the Conchopata population compared to populations from the Majes valley. Also, the Majes valley childhood anemia frequencies were significantly distinct from Wari era populations living in the similar environment of the Nasca valley (see Kellner, 2002). This suggests that while ecological context certainly played a role in the prevalence of childhood anemia, other factors related to differences in indigenous social organization and varying Wari imperial policies within each valley probably contributed to the distinct rates.

3) The hypothesis that trauma frequencies would be lower among the Conchopata community was not supported by the cranial trauma data; instead, frequencies among all three skeletal samples were indistinguishable. Female trauma was very similar among all three series, both in frequency and kind. However, the locational distribution of wounds among males indicates that males from different sites were involved in distinct kinds of violent encounters during the time of Wari imperial rule. Because there are no pre-Wari skeletal series from the Majes valley, it could not be determined if the observed rates represent a change from the preceding period. Nevertheless, cranial trauma rates were significantly higher among the Wari-era populations from Majes relative to those from

Nasca, suggesting that Wari imperial policies differentially affected subject communities in the southern reaches of the empire. Additionally, Majes valley cranial trauma rates were significantly higher than those reported for ancient Moquegua valley populations (see Blom et al., 2003; Williams, 1990).

4) Trophy heads from the site of Conchopata demonstrate that victims were primarily males, as was hypothesized based on the demographic distribution of Nasca trophy heads (see Kellner, 2002; Verano, 1995; Williams et. al., 2001). However, children and probable females were also present, suggesting that victims were taken from communities during raids, not during battles in warfare. Thus, these data support Proulx's (1971) assertion that Andean trophy heads were typically obtained in the context of raids. The hypothesis that trophy heads would resemble those from Nasca was partially supported: the majority of them were modified in the Nasca style. However, there was one trophy head prepared in the Wari style, as described in Chapter 8, which suggests that certain aspects of Wari ritual practices spread to the Majes valley.

5) Finally, the strontium isotope data support the hypothesis that the Conchopata individuals sampled were life-long local residents of the Ayacucho region. Additionally, the strontium values from the trophy heads support the hypothesis that at least one was a foreigner. Indeed, two of the victims exhibited non-local strontium signatures, while a third had lived somewhere other than Ayacucho during his adulthood. The other two trophy head victims were from the local Ayacucho area.

10.7 The Impact of Wari Imperialism

Together the biological and archaeological data suggest that Wari imperial policies may have differentially affected the health status and lifeways of subject populations. Among the three Wari period skeletal samples evaluated in this study, skeletal indices varied in either frequency or kind; demographic compositions varied, childhood anemia rates differed between the heartland and hinterland, exposure to violence was different in kind, but not in frequency, and ritual practices involving human trophy heads were distinct in the two regions, even though some aspects of Wari ritualism had partially altered the southern hinterland ritual traditions. The variability in demographic profiles suggests that Wari imperial policies influenced community organization at the heartland site of Conchopata, possibly through maintenance of producers of ritual goods and overseers of ritual activities, most of whom appear to have been adult females. Wari imperial policies also may have required that Conchopata males participate in raiding campaigns; some of these males may have never returned home, leading to fewer males than females at Conchopata. Wari influence on demographic distributions among southern hinterland populations, in contrast, appears to have been absent, or at least undetected.

While environmental context appears to have played a major role in the distinct rates of childhood anemia among highland (heartland) and lowland (hinterland) groups, smaller differences such as those observed between subject populations from the Majes and Nasca valleys suggest that Wari imperialism may have differentially affected childhood health. Perhaps imperial policies gave control to Wari elites or local leaders over access to fresh water, agricultural production, or food resources, in addition to control of settlement dispersion and sanitation practices. To be in command over any or all of these factors

probably would have affected childhood health among these subject populations. However, until pre-Wari skeletal samples from the Majes valley are studied to compare the change in childhood anemia frequency through time, these interpretations remain tentative.

Wari imperialism appears to have done little to curb violent conflicts, both in the heartland and the hinterland. Indeed, the period of Wari rule is associated with high levels of trauma among all three skeletal series, and although there are no pre-Wari skeletal samples from the hinterland to determine if cranial trauma rates changed through time, the overall frequencies are significantly higher than contemporaneous populations from the nearby Nasca and Moquegua valleys. Moreover, trauma data from Nasca skeletal populations indicate that violence did not decrease during the time of Wari conquest (see Drusini, 1991; Kellner, 2002). Together, these data suggest that Wari presence did not create a *Pax Wari* in the southern hinterland of the empire.

The Wari empire created an unusual style of trophy head modification and a unique ritual space within which to process or use them. Data from these trophy heads suggest that the Wari empire probably obtained them in raids from communities near and far to the Wari heartland. This activity would have terrorized neighboring and distant communities and impacted their quality of life probably in significant ways. Indeed, raids led by Conchopata males may have provided a source of power and prestige for this expanding empire. While the trophy heads provide insight into the ways in which Wari imperialism may have intensified its control through brutal means, they also show how Wari ritual practices may have contributed to the expansion of the Wari empire. That is, the presence of a Wari-style trophy head in the Majes valley suggests that Wari presence altered local ritual practices, insofar as rituals involving human trophy heads are concerned.

The strontium isotope data from the trophy heads suggest that the Wari empire may have obtained human trophy heads from members of distant communities; however, this remains inconclusive until more samples are processed to ascertain strontium values from additional geological zones in the Andes. Nevertheless, the presence of trophy head victims from what appear to be local and foreign geological regions in ritual structures at Conchopata suggests that Wari imperial personnel probably negatively impacted the quality of life of victim communities.

Overall, this dissertation has demonstrated that Wari imperialism differentially affected the health and lifeways of subject populations in the heartland and hinterland. While childhood health appears to have been satisfactory in the heartland, it appears that the impact of Wari imperialism was generally negative in terms of childhood health for Majes valley populations; yet this does not appear to be the case for Wari era Nasca valley populations. Wari imperial expansion also seems to have been concomitant with high levels of cranial trauma and violence, suggesting that Wari presence did not lead to a *Pax Wari* in the southern Wari hinterland.

Appendix I Contexts for the Radiocarbon Dates from Beringa

Six radiocarbon dates collected from in situ contexts confirm that Beringa was occupied in the Middle Horizon and the Late Intermediate Period. The calibrated radiocarbon dates are presented in Table 1, below. The contexts from which each sample derived are discussed in this appendix.

Table 1. Radiocarbon measurements from Sector A, Beringa.

Site Sample	Lab Code	Unit & Locus	Material	¹⁴ C Age (Years BP)	1 sigma range (AD)	2 sigma range (AD)
015	AA45791	U14L1050	wood	1406 +- 53	600 - 674	540 - 762
013	AA45790	U14L1095	wood	1353 +- 32	651 - 688	622 - 767
007	AA45789	U21L1075	carbon	1330 +- 31	659 - 711	651 - 771
021	AA45793	U01L1001	textile	1243 +- 33	692 - 858	689 - 879
023	AA45794	U11L1011	textile	930 +- 32	1037 - 1158	1024 - 1187
020	AA45792	U16L1025	vegetal cord	840 +- 42	1163 - 1256	1044 - 1278

The first radiocarbon sample (AA45791) yields the earliest date at the site: cal AD 540 – 762 calibrated 2 sigma. The sample derives from Unit 14 and dates the initial construction of the quadrangular structure (see Figure 6.2 for location of Unit 14). Twenty wood sticks had been inserted vertically into the north wall's fill during the building's construction, and one of them was selected for a radiocarbon measurement (Figure 6.10). Because the wood sticks are quite small, there should not be an "old wood" problem; the radiocarbon date reflects the actual construction event.



Figure 1. Row of wood sticks from Unit 14, one of which was used to determine a radiocarbon date.

The second radiocarbon sample (AA45790) also came from Unit 14 (Locus 1095), and it produces a date ranging from cal AD 622 – 767 calibrated 2 sigma. It is from an in situ wood post that was inserted into the floor of an interior space, located near an internal wall. The post may have been used as a roof support that would have been added after the original construction of the room. Therefore, the sample does not date the original construction, but rather, it dates a remodeling event during the life of the structure.

The third sample (AA45789) yields a date that clusters with the first two: cal AD 651 – 771 calibrated 2 sigma. The sample was a large carbon flake removed from the outer layer of a ceramic utilitarian vessel (HE# 197) found in situ under a rock dividing wall in Unit 21 (Locus 1075). The short wall was cut through the eastern third of the structure, near a tomb. This radiocarbon assay likely dates the earliest use of the room, since the sample was taken from a vessel that predates the construction of the interior walls.

The fourth radiocarbon assay (AA45793) is slightly later than the previous samples, but it still dates to the Middle Horizon: cal AD 689 – 879 calibrated 2 sigma. The sample is from Unit 1, the oversized, multi-occupant tomb on the northern end of Sector A. Specifically, the sample derives from a wool textile wrapped around a mummy bundle (Burial #44). Thus, this sample dates the use of the large, circular tomb to the first half of the Middle Horizon.

Beringa was also occupied during the Late Intermediate Period. The fifth radiocarbon sample yields a date of cal AD 1024 – 1187 calibrated 2 sigma (AA45794). The sample is from a wool textile that was wrapped around a mummy bundle (Burial #58) from the southwest corner of Unit 11, Locus 1011. This mortuary area was badly looted; however, the radiocarbon date still documents the late use of this general mortuary space.

The last radiocarbon sample (AA45792) also produces an LIP date: cal AD 1044 – 1278 calibrated 2 sigma. It is from a vegetal cord that was used to wrap a mummy bundle (Burial #59) from Unit 16, Locus 1025. The in situ mummy was interred with a ceramic vessel that depicted a local motif (an eight-pointed star) that was immediately identified as corresponding to the Late Intermediate Period, so the radiocarbon assay confirmed the late date for this funerary area.

The two phases of occupation—MH and LIP—were confirmed through two independent means: 1) the cluster of radiocarbon dates, which suggests they are reliable and uncontaminated; and 2) prior to receiving the radiocarbon results, the project ceramicist had concluded that Beringa had early Middle Horizon and Late Intermediate Period components (Owen 2004), just as the ¹⁴C measurements revealed.

Appendix II Excavation Methods

Appendix II describes the excavation methods employed at each of the three sites from which skeletal samples derived. This researcher directed all excavations at the site of Beringa and also excavated human burials at Conchopata; therefore, a more detailed account of field methods at those two sites is provided. The third site, La Real, was excavated by the Peruvian National Institute of Culture as a salvage mission, and based on conversations with the field archaeologists and a review of their field notes, an overview of their excavation methods is presented.

Conchopata Excavation Methods

The Conchopata human burials are derived from three separate excavation projects from the years 1977, 1997 – 1998, and 1999 – 2002. There are nine burials from the 1977 salvage operation conducted by William Isbell, Anita Cook, and Patricia Knobloch, as well as two burials and ten trophy heads recovered by Jose Ochatoma and Martha Cabrera in 1997-1998. The majority of the human remains derive from excavations by The Conchopata Project, directed by William Isbell and Anita Cook from 1999 – 2002. Therefore, the excavation methods described are from the latter project.

Provenience of archaeological and skeletal material from Conchopata is based on a hierarchy of locational codes (in descending order of specificity): site sector, architectural space, level, locus number, tomb number, and special find number (for objects), carbon number (for in situ radiocarbon samples), and burial number (for skeletons). Conchopata is divided into Sectors A and B by a modern road that runs north to the Ayacucho airport; all human burials analyzed in this study are from Sector B (see Figure 3.3 in Chapter 3). In this sector, all visible structures were numbered and excavation areas were based on these well-

defined architectural spaces, each of which is identified as an *Espacio Arquitectónico* (Architectural Space), or EA. Within an EA, specific stratigraphic levels were assigned, and for more detailed provenience, smaller areas, such as features or a change in soil were assigned Locus Numbers. For example, a stone bench feature was assigned a different locus from its surrounding soil. Tomb features were assigned a Tomb Number, and burials were assigned a Burial Number. There was some variation in how excavators recorded burial numbers in the field; some archaeologists assigned one Burial Number for a group of burials, while others assigned a Burial Number for each individual burial. As a result, the burial numbers assigned in the field can not be used to calculate the minimum number of individuals (MNI), but they can locate areas where human burials were interred or where groups of commingled bones were recovered. Finally, artifacts deemed special finds were assigned a code, referred to as a *Hallazgo Especial* (special find), or HE. This coding system ensured that every bone and artifact could be traced to its original location and associated with other items.

Conchopata has been badly looted, so thousands of disturbed, commingled skeletal elements are no longer in situ. However, because individual bones were typically next to their original tomb, burial location and association with artifacts and other individuals could sometimes be determined. In addition to looting, moist soil led to the degradation of human bones, which often crumbled as they were extracted from the ground. Therefore, skeletal and dental data were sometimes collected in the field prior to removal of the burials to increase the quantity and quality of bioarchaeological data.

All human bones were carefully excavated for transport to the laboratory. When damp bones were encountered, each was extracted and placed in the shade to dry naturally

whenever possible. Fragmented bones were stabilized in the field with a solution of 50% acetone and 50% acryloid B-72, a methyl acrylate/ethyl methacrylate copolymer. All bones were then packaged for transport to the laboratory. The bones were packed in cotton bags or wrapped in acid-free paper, set in plastic trays, and placed in cardboard boxes. Occasionally, acid-free paper was wrapped around skeletal elements, followed by a wrapping of aluminum foil to help maintain structural integrity of the bone. In nearly all cases, the field packaging was secure and protected the osteological samples during transport and while in storage. Skeletal elements were tagged with provenience information, such as EA (*Espacio Arquitectónico*, or Architectural Space), level, locus, date, and excavator and then grouped by locus number in the lab.

Intact burials and associated artifacts were well documented and cautiously excavated. They were photographed and mapped before removing the burial. Given that Conchopata burials were usually interred in a seated, flexed position, not as extended burials, it was quite difficult to remove the soil around the individual without bones falling downward. Therefore, skeletal elements from upright burials were removed piece by piece starting from the superior portion of the body and moving inferiorly. They were then tagged and packaged together to keep bones properly associated for the next phase of bioarchaeological data collection.

Beringa Excavation Methods

The Beringa Bioarchaeology and Archaeology Project, directed by this author, employed similar excavation strategies as those used at Conchopata, with minor adjustments to account for differences between the sites. Beringa was divided into three discrete sectors, denominated A, B, and C. Each sector is situated on top of an alluvial terrace and separated

by *quebradas* (ravines). All sectors were mapped, but surface collections and excavations focused on Sector A because it included the tombs and was the largest and most densely occupied sector at Beringa (see Figures 6.1 and 6.2 in Chapter 6). Within Sector A, all surface collection areas and excavation units were assigned a Unit Number, similar to the EA designation used at Conchopata. Within a unit, a Locus Number or multiple Locus Numbers were assigned. Also, similar to the Conchopata coding system, Tomb Numbers, Burial Numbers, and Special Find Numbers were assigned. Finally, the same Conchopata bone coding method was employed at Beringa: the locus number was used for grouping and inventorying bones together.

The primary goal of the Beringa excavations was to recover human skeletal remains, so the majority of units were placed in areas with the greatest concentration of human bone.⁹² Also, each Unit Crew had at least one person with knowledge in human osteology (i.e., at least one university course), which enabled them to identify bones and their position in the dirt. Burials and clusters of bones were photographed in three formats—slide, print, and digital—and even though numerous skeletal elements were not in situ, photographs were taken of looted mummy bundles with associated textiles and artifacts. Finally, the project videographer, Arnaldo Ramos Cuba, video recorded the excavations of human burials and other features.

In addition to human burials and bones, other items and site features were well documented. For example, photographs and videos were taken at the opening and closing of a unit and throughout the process of surface collection and excavation. Maps were sketched

⁹² Units were also placed in non-mortuary areas. However, these are not discussed here. Instead, see Tung (Tung, n.d.) for a detailed discussion of the archaeological context at Beringa.

of the site and excavation units, and Locus Forms and Special Find Forms were filled out by the excavation teams to record more detailed information about context.

La Real Excavation Methods

Peruvian archaeologists from the National Institute of Culture recovered human remains and artifacts from La Real as a salvage operation before a soccer field was constructed on top of the site. There were two components to the site: 1) a semi-subterranean structure with commingled human remains and 2) a cave with burned human burials and commingled bones. The structure was completely excavated, but the cave was only partially cleared because its depth and narrowness posed a danger to excavators. Given extensive looting at the site, all of the human remains were commingled except for a few cases of mummified individuals in *fardos* (large bags constructed of vegetal reeds). After the archaeologists carefully extracted the bones from the semi-subterranean structure or cave, they were placed in plastic bags and stored in oversized durable plastic bags.

The archaeologists documented provenience by noting the following locational information (in descending order of specificity): Structure, Unit, Level, and Lot. The surface areas around the semi-subterranean structure were designated as Structures 1, 2, and 3, and the structure itself, which contained two spaces were designated as Structures 4 and 5. The cave was denoted as Structure C-1. Within the “structures,” archaeologists assigned Unit Numbers, and within the unit, Level Numbers were arbitrarily assigned as they descended through the stratigraphy. Finally, Lot Numbers were assigned to artifacts, burials, or groups of human remains. Thus, all human bone was grouped and coded based on Lot Number, similar to how Conchopata and Beringa bones were grouped and coded by Locus Number.

Appendix IIIa: MNI Summary for Conchopata Architectural Spaces (Huarpa Temporal Component)

EA	Locus	MNI	Male	Male?	Female	Female?	Unknown	Fetus	NB-3mnths	Infant	Child	Adolescent
104T5	2055, 2071, 2081	8	0	1	1	0	6		2	2	2	
104T5	2099, Ent 16	1	1	0	0	0	0					
104T5	2100, Ent 15	1	0	0	0	1	0					1
104T5	2101, Ent 14	1	0	0	0	0	1					
104T5	2107, Ent 17	1	0	0	1	0	0					
104T5	2114, Ent 20	3	0	0	0	0	3			1	1	1
100	1288	1	0	0	1	0	0					
100	1319	1	0	0	1	0	0					
100	1334	1	0	0	0	0	1				1	
Eb3 (1977)	Tomb4 & 5	1	0	0	0	1	0					1
Eb3 (1977)	Tomb5	5	0	0	5	0	0					3
Eb3 (1977)	Tomb1&2&3	1	0	0	0	1	0					
Eb3-II (1977)	Tomb1	2	0	0	2	0	0					
Totals	Totals	27	1	1	11	3	11		2	3	4	6

Appendix IIIa: MNI Summary for Conchopata Architectural Spaces (Huarpa Temporal Component)

EA	Locus	Young Ad.	Mid Ad.	Old Ad.
104T5	2055, 2071, 2081	1	1	
104T5	2099, Ent 16			1
104T5	2100, Ent 15			
104T5	2101, Ent 14		1	
104T5	2107, Ent 17			1
104T5	2114, Ent 20			
100	1288			1
100	1319			1
100	1334			
Eb3 (1977)	Tomb4 & 5			
Eb3 (1977)	Tomb5	2		
Eb3 (1977)	Tomb1&2&3	1		
Eb3-II (1977)	Tomb1		1	1
Totals	Totals	4	3	5

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	MNI	Male	Male?	Female	Female?	Unknown	Fetus	NB-3mnths	Infant	Child	Adolescent
N/A	Excavated by Ochatoma	1	0	0	1	0	0					
N/A	Excavated by Ochatoma	1	1	0	0	0	0					
6	2004	7	1	0	0	0	8			2	1	1
9	958	7	1	0	1	0	5		1	3	1	
31	1336	5	1	0	0	1	3		1			
31	1369	3	0	0	1		2					2
31	1409	2	0	0	0	0	2			2		
31	1299	6	1	0	0	2	3			1	1	1
34	1740	1	0	0	1	0	0					
39_39A_C	1434, 1644, 1686, 1699, 1728, 1735, 1743, 1700, 1723, 1818, 1822, 1832, 2026, 2027, 2040, 2045, 2069	30	4	0	9	0	17	1	2	9	4	2
64	1152, 1255	9	1	0	1	0	7	1		3	2	0
65	2698	1	0	0	0	0	1	1				
81	1796	1	0	0	0	0	1			1		
81	1807	1	0	0	0	0	1			1		
83	1611	0	0	0	0	0	0					
84	1740	1	0	0	0	1	0					
87	1692	3	0	0	0	0	3				1	
88	3057 (Tomb 1)	1	0	0	0	0	1				1	
88	2861, 2905, 3023, 3032 (Tomb 2)	4	0	0	0	0	4			2	1	1
88	3040 (Tomb 3)	3	0	0	0	0	3		1	2		

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	Young Ad.	Mid Ad.	Old Ad.	Adult (YA-OA)
N/A	Excavated by Ochatoma			1	
N/A	Excavated by Ochatoma			1	
6	2004	2			1
9	958				2
31	1336	1			3
31	1369		1		
31	1409				
31	1299				3
34	1740	1			
39_39A_C	1434, 1644, 1686, 1699, 1728, 1735, 1743, 1700, 1723, 1818, 1822, 1832, 2026, 2027, 2040, 2045, 2069	7	3	2	
64	1152, 1255		1	1	1
65	2698				
81	1796				
81	1807				
83	1611				
84	1740	1			
87	1692	1	1		
88	3057 (Tomb 1)				
88	2861, 2905, 3023, 3032 (Tomb 2)				
88	3040 (Tomb 3)				

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	MNI	Male	Male?	Female	Female?	Unknown	Fetus	NB-3mnths	Infant	Child	Adolescent
88	3103 (Tomb 4)	3	0	0	0	0	0	3			3	
88	3113 (Tomb 5)	1	0	0	0	0	0	1		1		
90	1739	1	0	0	0	0	0	1				
105	2095	14	1	0	5	0	8	2	2	1	1	1
110	1975, 1992, 1993, 2007, 2112, 2014	16	0	2	0	1	13	1	2	5	1	2
147	2860	1	0	0	0	0	1		1			
147	2884	2	0	0	0	0	2			1	1	
147	2897	1	0	0	0	0	1			1		
147	2906	1	0	0	0	0	1			1		
147	2911	1	0	0	0	0	1			1		
150	2981, 3067	5	0	0	3	0	2				2	1
151	2771	1	0	0	0	0	1				1	
151	2856	3	0	0	0	0	3	1		2		
151	2858	1	0	0	0	0	1				1	
151	2858	1	0	0	1	0	0					
151	2858	1	1	0	0	0	0					
151	2858	1	0	0	1	0	0					
151	2858	1	0	0	0	0	1				1	
151	2858	1	0	0	1	0	0					
151	2858	1	0	0	1	0	0					
154	2830	1	0	0	0	0	1				1	
168	3085	1	0	0	0	0	1				1	
23W	1446	2	0	0	0	0	2		1		1	
23W	1453	1	0	0	0	0	1				1	
44A	950	3	3	0	0	0	0					
65T2	3038	2	0	0	0	0	2				2	0
89A	1819, 1839	1	1	0	0	0	0					
89A	2052	18	3	0	4	0	11			3	3	

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	Young Ad.	Mid Ad.	Old Ad.	Adult (YA-OA)
88	3103 (Tomb 4)				
88	3113 (Tomb 5)				
90	1739	1			
105	2095	5	1	1	0
110	1975, 1992, 1993, 2007, 2112, 2014	3	2		
147	2860				
147	2884				
147	2897				
147	2906				
147	2911				
150	2981, 3067	1		1	
151	2771				
151	2856				
151	2858				
151	2858	1			
151	2858	1			
151	2858		1		
151	2858				
151	2858			1	
151	2858		1		
154	2830				
168	3085				
23W	1446				
23W	1453				
44A	950	1	2		
65T2	3038				
89A	1819, 1839	1			
89A	2052	6	5	1	

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	MNI	Male	Male?	Female	Female?	Unknown	Fetus	NB-3mnths	Infant	Child	Adolescent
153	3212	2	0	0	0	0	2					
153	3214	2	0	0	0	0	2				1	
178	3148	9	2	2	2	0	3				1	1
178	3182	1	0	0	0	0	1					
178	3183	1	0	0	1	0	0					
178	3187	2	0	0	0	0	2				1	
178	3191	2	0	0	0	0	2				1	
179	3164	1	0	0	0	0	1					
179	3178	1	0	0	0	0	1				1	
179	3185	2	0	0	0	0	2				1	
179	3188	1	0	0	0	0	1				1	
179	3203	2	0	0	0	0	2				1	
179	3207	9	2	0	2	0	5			1	3	1
179	3224	12	1	0	3	2	6				4	
179	3249	2	0	0	1	0	1				1	
179	3250	3	0	1	0	0	2				1	
186	3205	1	0	0	0	0	1					
187	3335	6	0	0	1	0	5				5	
187	3374	3	0	1	0	0	2				2	
187	3388	3	0	1	0	1	1				1	
191	3402	1	0	0	0	0	1					
191	3409	1	0	0	1	0	0					
143T5	4500	1	0	0	0	1	0					
15/16	Sector B y D	1	0	0	0	0	1					
Total		242	24	7	41	9	163	7	11	43	57	13
Wari Trophy heads		31	10	4	0	3	14	0	0	0	7	2
Total w/ trophy heads (Wari period only)		273	34	11	41	12	177	7	11	43	64	15

Appendix IIIb: MNI Summary for Conchopata Architectural Spaces (Wari Temporal Component)

EA	Locus	Young Ad.	Mid Ad.	Old Ad.	Adult (YA-OA)
153	3212				2
153	3214				1
178	3148	1	2	1	3
178	3182				1
178	3183		1		
178	3187				1
178	3191				1
179	3164				1
179	3178				
179	3185				1
179	3188				
179	3203		1		
179	3207		3	1	
179	3224	1	3	1	3
179	3249	1			
179	3250		1		1
186	3205				1
187	3335	1			
187	3374				1
187	3388	1	1		
191	3402				1
191	3409	1			
143T5	4500				1
15/16	Sector B y D		1		
Total		39	31	12	29
Wari Trophy heads		4	5	4	8
Total w/ trophy heads (Wari period only)		43	36	16	37

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