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Ritual Violence and Times of Transition: A Bioarchaeological Analysis of Burials from Huaca Santa Clara and Huaca Gallinazo in the Virú Valley, Peru

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A thesis submitted in partial fulfillment of the requirements for the degree in Master of Arts

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RITUAL VIOLENCE AND TIMES OF TRANSITION: A BIOARCHAEOLOGICAL ANALYSIS OF BURIALS FROM HUACA SANTA CLARA AND HUACA GALLINAZO IN THE VIRÚ VALLEY, PERU

Monograph

by
Rebecca A. Dillon

Graduate Program in Anthropology

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Arts

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ABSTRACT

This thesis is a bioarchaeological analysis of ritual violence in the Virú Valley, Peru in two periods: the Virú Period and the Tomaval Period, with a focus on examining the effects of socio-political times of transition on patterns of ritual violence. In the pre-Columbian Andes, there were several periods of socio-political transition that greatly affected the populations living on the north coast of Peru. One such period was the Middle Horizon (A.D. 800 – 1,100), with the increasing influence of Huari and Tiwanaku, and with the later rise of Chimor (A.D. 1,100 – 1,550) and Sicán (A.D. 800 – 1,350) on the north coast after the collapse of the Moche (A.D. 100 – 800). During this time of transition (which was possibly largely brought on by drought and famine along the coast), great influence was felt in the region from these powerful groups, especially by the local elite who would have had to learn to adapt to their changing socio-political environment.

Through the investigation of a series of interments from Huaca Gallinazo and Huaca Santa Clara, this thesis will compare three contexts of ritual violence: one being a series of dedicatory offerings, another being principal-individual-with-retainer interments, and the third being another form of principal-individual-with-retainer interment with associated camelid sacrifices. This analysis ultimately revealed a new form of ritual violence which emerged during the Middle Horizon on the north coast of Peru and which was likely introduced as a reaction of the local elite to a time of great socio-political change.

KEYWORDS

Andes, North Coast Peru, Virú Valley, Early Intermediate Period, Middle Horizon, Burials, Bioarchaeology, Paleopathology, Ritual Violence
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1 INTRODUCTION

The study of periods of socio-political transition has had a long and productive history in archaeology. By making use of a bioarchaeological perspective we can add to our understanding of these times by attempting to determine how the lives of individuals were directly impacted by changing socio-political structures. This can be accomplished through an examination of their physical remains and burials. However, in making use of this type of analysis it is also important to keep in mind that individuals are active agents exerting their own influence on these structures (Glencross 2011).

In the pre-Columbian Andes, two important periods of socio-political transition included: the Middle Horizon (A.D. 800 – 1,100), when the Moche (A.D. 100 – 800) culture on the north coast of Peru collapsed and when the Huari (A.D. 600 – 1,000) and Tiwanaku (A.D. 1 – 1,000) cultures developed intrusive regional traditions throughout the Andean region; and the Late Intermediate Period (A.D. 1,100 – 1,470) which was characterised by a general return to regional developments, as well as the rise of the Lambayeque (Sicán) (A.D. 800 – 1,350) and Chimú (A.D. 1,100 – 1,550) polities on the Peruvian north coast. Interaction between the highlands and the coast increased during this time, as seen in the larger long-distance trade networks and the stylistic influence visible in material remains such as pottery, textiles and architecture (Benson and Cook 2001; Millaire 2015a; Moseley 2001; Vogel 2012).

In the Virú Valley, both of these times of transition fall during the Tomaval Period (A.D. 750-1,150), when administrative centers took the form of the large rectangular Chimú compounds and the region was integrated into the Chimú polity (during the 12th century). Despite the eventual integration of Virú into Chimor, strong influences were felt from the central coast of Peru and the highlands (connections that had been established during the earlier Virú Period (200 B.C.-A.D. 600)), complicating the socio-political picture. What seems clear, however, is that these socio-political changes would have meant a change in the lives of the people living in the Virú Valley, at least in terms of civic-ceremonial life (Millaire 2015a).

In order to better understand this time of socio-political change on the north coast of Peru, a bioarchaeological approach will be used in the study of human remains in the
Virú Valley from the Virú and Tomaval Periods at Huaca Santa Clara and the Virú Period at Huaca Gallinazo. Sample sizes for both sites are small, and most of the individuals in these samples have been taken from “atypical” burial contexts (the ceremonial spaces atop *huacas*¹), where there is evidence of ritual violence². Thus, it must be stated that these samples of individuals are likely not representative of the overall population. As a result, this study is not a consideration of the overall population response, in terms of overall health, to these times of change in the Virú Valley. Rather, it is a study of patterns of ritual violence in the Virú and Tomaval Periods in the Virú Valley, and how the Tomaval Period transition may have affected the expression of ritual violence in this valley. This study of ritual violence may ultimately lead to broader conclusions about changes to the civic-ceremonial structure in the valley, as informed by elite motivations behind performances of ritual violence, and perhaps may even indicate how these changes affected the lives of specific individuals. In order to identify broader socio-political changes in these periods, the study of patterns of ritual violence was chosen to be analyzed, as ritual violence was often used in the Andean region for social manipulation drawing upon Andean cosmology and religion for legitimization (Swenson 2003). Thus, through a better understanding of patterns of ritual violence, we can perhaps come closer to understanding the intent behind the practices.

This will be accomplished by investigating these atypical³ burials from a bioarchaeological perspective which recognizes that social, physical, cultural and environmental forces all work in synergy to shape the skeleton (Agarwal and Glencross 2011), and by approaching the identities of these individuals through a paleopathological and contextual analysis of their human remains. By recognizing the presence of social personae which were categorized by this society as being atypical (whether this status was applied before death, or through a different set of burial practices), which, “mark out

---

¹ *Huacas* are ceremonial structures in the Andean region.
² Ritual violence was indicated by the presence of intentionally inflicted perimortem trauma and burial contexts suggestive of violence (Besom 2000; Buzon and Judd 2008; Eeckhout and Owens 2008; Hamilton 2005; Toyne 2008, 2011).
³ Atypical burials have, in some literature, been called “deviant” burials, referring to deviancy in burial treatment which may have been a status ascribed to that individual during their life, at the time of their death, or after specific burial rites transformed their social persona(e) (Shay 1985).
the boundaries of group experience by providing the group with a contrast to the accepted norms of conduct” (Shay 1985:223), an attempt can be made to understand the creation, maintenance and the nature of social boundaries, and thus of the society itself. These atypical burials from the Virú and the Tomaval Periods will be compared to each other and to the more “typical” burials in the Virú Valley from pre-Columbian times. These burials will also be compared to burials from other Andean regions influenced by the same periods of transition, including burials where there is evidence of ritual violence.

I propose that the Tomaval Period context in particular will show an influence from the highlands and the north and central coasts, given the increasing connections with these regions during this period (Millaire 2015a). Moreover, I propose that while both subadult burial contexts from Huaca Gallianzzo and Huaca Santa Clara share similarities on the surface, they both are illustrative of different forms of ritual violence, each with a very different intent and performed for very different purposes, which will be illustrative of the changes occurring at these times in the Andean region. Thus, the null hypothesis tested herein is that there is no difference in the patterns of ritual violence over this period of time. As a corollary, the skeletal data do not show any changes in the pattern of ritual violence as interpreted by skeletal disease, particularly trauma. As an interpretive caveat, the testing of this hypothesis will be based on the associations archaeological, bioarchaeological and iconographic, as the sample size is too small to warrant statistical testing.

The structure of this thesis is as follows. Chapter two provides an overview of archaeological work done in the Virú Valley and of pre-Columbian burial patterns in this valley. The third chapter discusses the bioarchaeological theory drawn upon in this thesis and gives a background on different aspects of bioarchaeological analysis employed here. The fourth chapter details the materials and methods, including descriptions of the sites and burial contexts for each individual that was analyzed as a part of this study. The fifth chapter presents the results from this bioarchaeological analysis, including details on age and sex, stature, artificial cranial modification, trauma, non-specific indicators of stress, dental pathology, and other pathology. The sixth chapter includes a discussion and comparison of the contexts that were analyzed in this thesis, placing them into the context of broader socio-political changes at the time. The seventh chapter is the conclusion.
2 VIRÚ ARCHAEOLOGY

This section presents a discussion of the archaeological work that has been done to date in the Virú Valley and gives a background to its environment, as well as to its occupational history. The chapter ends with an analysis of burial patterns in the Virú Valley over the Puerto Moorin, Virú, Huancaco and Tomaval Periods, based on previously excavated burials from the Virú Valley Project (Bennett 1939; Collier 1955; Strong and Evans 1952). This analysis will thus put the focus of this thesis (a selection of burials from Huaca Gallinazo and Huaca Santa Clara from the Virú and Tomaval Periods) in the context of broader trends in the valley.

2.1 An Overview of Archaeological Work in the Virú Valley

Archaeological research in the Virú Valley began in the early 20th century with survey work and minor excavations. Kroeber (1930) made a one-day visit to the valley and described and tentatively dated seven sites. Bennett (1939) subsequently conducted survey work and did minor excavations on Queneto Temple, El Castillo (Castillo de Tomaval), San Francisco, and Huaca de la Cruz. A few years later Larco Hoyle (1945) excavated burials at Castillo de Tomaval. It was not, however, until the Virú Valley Project began in the mid-20th century that a full picture of the settlement and cultural history of the valley started to take form (Willey 1953).

The Virú Valley Project was undertaken by Wendell Bennett, William Strong, Julian Steward, Gordon Willey, Webster McBryde, Allan Holmberg, Jorge Muelle, Junius Bird, James Ford, Donald Collier and Clifford Evans in 1946 in order to better understand the occupational history of the valley and as a study of cultural adaptation to the environment along the north coast of Peru. The project incorporated archaeological, as well as geographical and ethnological lines of evidence in order to achieve these goals. The relative chronology and the distribution of archaeological sites by cultural period were of primary importance.

Decades later, excavations were conducted at Huancaco by Steve Bourget and at Huaca Santa Clara by Jean-François Millaire in collaboration with Estuardo LaTorre Calvera and Jeisen Navarro Vega (Millaire 2009b). In 2008, under the direction of Millaire, the Virú Polity Project was established in order to get a better understanding of
the nature early state society and urban life in the Virú Valley, with excavations at the Gallinazo Group, the capital of this early state society in the Virú Period (Millaire and La Torre Calvera 2008; Millaire and Eastaugh 2011).

2.2 Virú Environment and Physical Setting

On the north coast of Peru, south of the Moche Valley and north of the Chao Valley lies the Virú River drainage (Figure 2.1). It is one of the smallest valleys on the north coast (with a valley floor of 140 square kilometers) and has a low annual average river discharge (4 cu m/sec) in comparison to other rivers on the north coast. Despite this, it has supported fairly large populations since the first century B.C. (Millaire and Eastaugh 2011).

The Virú River is formed by two tributaries; the Huacapongo and the Upper Virú. Bordering the valleys along the northern coast of Peru are high and sandy coastal plains with low hills on the border. In the upper portion of the valley are a number of quebradas, which are mostly filled with rocks from the hills. To the east (inland) are the Andes, and to the west, along the ocean, is a sandy beach with some swampy grassland portions. Within the valley, a sandy pampa extends from the bordering hills to the cultivated area of the valley, along the Virú River. Isolated hills and stabilized sand dunes are interspersed throughout the sandy pampa and on its borders, serving as the bases for the construction of mounds, residential areas and fortifications (Downey 2015; Willey 1953).

The land was fairly productive in ancient times, with a large portion of irrigated land. There are archaeological traces of old canals and garden areas that suggest a cultivated area in the Lower Virú Valley of six to nine kilometers wide in the Virú and Huancaco Periods. The problem, however, has always been a lack of water in Virú, with rain from the highlands abundantly supplying the river only in the rainy season from January to March (Bennett 1939; Downey 2015; Willey 1953). The Humboldt Current runs along the coast of Peru, providing rich fisheries, however, it also creates extremely arid conditions (Downey 2015; Moseley 2001; Quilter 2014).
The analysis of midden deposits from Huaca Gallinazo and Huaca Santa Clara revealed that camelids, sea lions, boobys, cormorants, gulls, penguins and many species of fish and molluscs were among the types of meats consumed by these archaeological populations. Maize, guava, beans, lucuma, avocado, peanuts, chilli peppers, squash and gourds were also identified as dietary staples (Masur 2012; Venet-Rogers 2014).

Figure 2.1: Map of the North Coast of Peru. Image courtesy of Jean-François Millaire.
2.3 Virú Valley Chronology

Early excavations by Max Uhle in 1913 established a cultural sequence for the Moche Valley (later confirmed by Kroeber for the rest of the north coast), which was adopted for the Virú Valley (Kroeber 1930). This sequence has gone through a number of modifications and additions since then (Bennett 1939; Bennett 1950; Ford and Willey 1949; Larco Hoyle 1948; Willey 1953) on the basis of excavations and survey work in the Virú Valley. Mostly, this work was conducted as a part of the Virú Valley Project, which sought to get a better understanding of the cultural chronology for the Virú Valley, and the rest of the north coast.

Recent work in the Virú Valley conducted by Millaire and colleagues has entirely revised this chronology on the basis of a radiocarbon dating program. The result of this is the chronology in Table 2.1, which will be followed in this thesis (Millaire 2015a). The Virú Period (200 B.C. – A.D. 600) and the Tomaval Period (A.D. 750 – 1,150) are the focus of this thesis, although some of the changes occurring during the intervening Huancaco Period (A.D. 600 – 750) will be discussed, as they pertain to the burials under study (see Figure 2.2 and Table 2.2 for corresponding periods from north coast chronology).

Table 2.1: Chronology for the Virú Valley from Millaire (2015a).

<table>
<thead>
<tr>
<th>Virú Valley Sequence</th>
<th>Approx. Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomaval Period</td>
<td>c. A.D. 750 – 1,150</td>
</tr>
<tr>
<td>Huancaco Period</td>
<td>c. A.D. 600 – 750</td>
</tr>
<tr>
<td>Virú Period</td>
<td>c. 200 B.C. – 600</td>
</tr>
<tr>
<td>Puerto Moorin Period</td>
<td>c. ? – 200 B.C.</td>
</tr>
</tbody>
</table>

4 This sequence was established by Millaire (2015a) based on a radiocarbon dating program for the Virú Valley. It makes use of some of the titles for the periods as laid out in Willey’s (1953) chronology for the Virú Valley, however it should be noted that the dates for Willey’s chronology are outdated and were entirely revised with this chronology. Downey (2015) also uses the dates established by Millaire, however uses different labels when referring to the periods.

<table>
<thead>
<tr>
<th>Period</th>
<th>Dates</th>
<th>North Coast Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Horizon</td>
<td>A.D. 1,470 – 1,532</td>
<td>Chimú-Inca</td>
</tr>
<tr>
<td>Late Intermediate Period</td>
<td>A.D. 1,100 – 1,470</td>
<td>Chimú</td>
</tr>
<tr>
<td>Middle Horizon</td>
<td>A.D. 800 – 1,100</td>
<td>Lambayeque</td>
</tr>
<tr>
<td>Early Intermediate Period</td>
<td>A.D. 100 – 800</td>
<td>Moche</td>
</tr>
<tr>
<td></td>
<td>200 B.C. – A.D. 600</td>
<td>Virú</td>
</tr>
<tr>
<td></td>
<td>400 – 200 B.C.</td>
<td>Salinar</td>
</tr>
<tr>
<td>Early Horizon</td>
<td>900 – 400 B.C.</td>
<td>Cupisnique</td>
</tr>
<tr>
<td>Initial Period</td>
<td>1,800 – 900 B.C.</td>
<td>Initial Period</td>
</tr>
<tr>
<td>Late Preclassic</td>
<td>3,000 – 1,800 B.C.</td>
<td>Late Preclassic</td>
</tr>
<tr>
<td>Preclassic</td>
<td>14,000? – 3,000 B.C.</td>
<td>Preclassic</td>
</tr>
</tbody>
</table>

Figure 2.2: Diagram of the Chronology for the Virú Valley from Downey (2015), Haas and Creamer (2006), Millaire (2015a), Quilter (2014), Rowe (1962).
2.3.1 The Virú Period (200 B.C. – A.D. 600)

Towards the end of the Puerto Moorin Period, the population in the Virú Valley greatly increased and the first pyramid mounds were built, along with fortified hilltop keeps. It was with this increase in population that the Virú Period began and, as early as the 1st century B.C., a valley-wide polity with a four-tiered administrative network was in place, consisting of a capital (the Gallinazo Group), administrative and defensive sites (e.g. Huaca Santa Clara), villages, and hamlets. Along with the increase in population, there was an increase in monumental and irrigation construction. Clustered villages expanded from their size during the Puerto Moorin Period and, with the Gallinazo Group as the capital of the valley, the occupation shifted more into the lower valley (Bennett 1950; Ford and Willey 1949; Millaire 2010b; Millaire and Eastaugh 2011; Strong and Evans 1952; Willey 1953).

The presence of Callejón-type ceramics (often made with kaolin clay, which would have been imported from the highlands), foreign textiles, and local textiles produced with highland fibres at Virú sites indicate that interactions between the Recuay and Virú societies occurred during this time period (Millaire 2015a), likely as a result of mutual trade interests (Lau 2011). There were also Virú outposts in the Moche and Chicama Valleys, indicating interactions with other valleys along the coast as well (Millaire 2015a).

2.3.2 The Huancaco Period (A.D. 600 – 750)

Towards the end of the Virú Period, Moche influence began to be seen in the valley in both architecture and ceramic style, as well as by the presence of Moche-style burials. This is when the Virú Period transitions into the Huancaco Period (Millaire 2015a; Willey 1953). It should be noted, however, that Moche-style artifacts were also present in Virú Period deposits (alongside Virú Negative ceramics – a hallmark style of Virú society), indicating that the interactions between the Virú and Moche Valleys existed prior to the Huancaco Period (Millaire 2015a).

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5 This was determined by way of a stable isotope study of camelid wool fibres conducted by Paul Szpak and colleagues (Millaire 2015a).

6 Moche-style burials are present, for instance, at Huaca de la Cruz (Millaire 2015a).
It is during this period that the site of Huancaco became the main administrative center of the Virú Valley, as well as a palace for local elites who were politically aligned with Huacas de Moche, thus shifting the base of power away from the Gallinazo Group (Bourget 2010; Millaire 2015a; Willey 1953). Despite the strong connection between the Virú elite and the Moche, however, connections with the highlands were maintained in this period, as evidenced by the presence of Recuay ceramics at Huaca Santa Clara, Huancaco and other sites in the valley (Millaire 2015a).

Due to the sudden increase of fully developed Moche material culture at administrative sites in the Virú Valley (and the rest of the north coast), it was originally suggested that there may have been a conquest of the Virú Valley and other neighbouring valleys by the Moche (Bennett 1950; Strong and Evans 1952; Willey 1953). This conquest hypothesis remained popular until recently, when attention was drawn to the lack of archaeological evidence of warfare (Millaire and Morlion 2009). As an alternative to the conquest hypothesis, Millaire has suggested that the Moche may have exerted their influence on a series of city-states along the north coast (the Virú Valley being the locus of one of these) thus creating a confederation. In this confederation, however, the local leaders of each valley/city-state remained in place (Millaire 2009b).

Due to population expansion along the north coast, there was a need for new agricultural techniques which the Moche provided; this may have left them with political influence that would have been maintained with a new ideological framework, thus encouraging the spread of Moche material culture (Castillo Butters 2009). However, despite the advent of Moche material culture in the Virú Valley there is evidence of the persistence of Virú material culture even into the Tomaval Period, which was noted even by those who supported the conquest hypothesis (Strong and Evans 1952). At the end of the Huanaco Period, Moche influenced material culture was subsequently replaced by “Tiahuanacoid” or Huari influenced material culture, beginning the Tomaval Period in the Virú Valley (Willey 1953).

2.3.3 The Tomaval Period (A.D. 750 – 1,150)

The Tomaval Period in Virú coincided with the “Tiahuanaco Horizon” throughout the Andean region. A new site type (large rectangular compounds) appears during the Tomaval Period, which later became associated with Chimú administration (Millaire
As of yet, it is not clear where the administrative center moved during this period, before the integration of the Virú Valley into the Chimú empire in the 12th century A.D. (Millaire 2015a). The majority of sites are in the upper valley during this period, continuing a shift begun during the Huancaco Period. This shift resulted in less of an emphasis on pyramid mounds as the center of the community and castillo fortifications were subsequently abandoned. As a replacement, high-walled compounds were built in the lower valley, indicating a shift in defensive strategy and political organization (Willey 1953).

2.4 Virú Valley Burials

Rafael Larco Hoyle was the first to systematically investigate burials in the Virú Valley with his investigation of several cemeteries (1945). Exploration and excavation on the north coast of Peru continued with the work of Bennett in 1936, who uncovered 114 graves at seven sites in the Virú Valley from different cultural and time periods (Bennett 1939). Further excavation in 1946 by the Virú Valley Project revealed a number of graves in the valley, contributing to our knowledge on burial practices in this valley (Bennett 1950; Collier 1955; Strong and Evans 1952; Willey 1953). The analysis of these burials, however, was restricted to mostly an analysis of grave ceramics, with some discussion of other artifacts and only brief descriptions of burial location, context, type and details on the individual interred.

The excavations of burials in the Virú Valley revealed that single individual burials in unmarked graves were the norm throughout all cultural periods. Over time there was also a greater energy investment in graves continuing and reaching a maximum in the Huancaco Period, followed by a decrease in energy investment during the Tomaval Period (Willey 1953).

2.4.1 Puerto Moorin Period Burials

Little is known of Puerto Moorin Period mortuary practices, or those of earlier periods. It seems as though they may not be located in proximity to any important sites or features associated with these periods. Burials during the Puerto Moorin Period were simple inhumations in middens or sandy soil. The depth of the burials ranged from 1 to
2.5 m and contained few ceramic vessel and other offerings (Strong and Evans 1952; Willey 1953).

### 2.4.2 Virú Period Burials

Bennett’s (1950) analysis of grave ceramics and other grave contents, which had been the only analysis done on grave goods in the Virú Valley up until that point, was based on Virú Period material uncovered by Strong and Evans at V-163 and V-59, by Willey at V-252, and by Bennett in his 1936 and 1946 excavations. The sites included in Bennett’s analysis thus consisted of V-154, V-265, V-164, V-252, V-163, Ca 10c, V-157, V-59. None of these sites served primarily as cemeteries; and the majority of the mounds (being rather small) did not appear to have been used for burials for a long period of time, which may mean that the analysis was not entirely representative of the whole Virú Period. Collier (1955) subsequently confirmed much of Bennett’s analysis of grave ceramics with 18 Virú Period burials from V-154, V-252, V-303, V-272 and V-309. He also confirmed Bennett’s assertion that the ceramics from the end of the Virú Period were heavily influenced by Recuay- and Moche-style ceramics.

Virú Period burials were simple and often nothing more than shallow pits dug into the so-called “dwelling-construction” and “earth-refuse” mounds. There were also cemeteries on the flat portions at the margins of valleys, some of which contained stone-lined tombs.

Burials at the zenith of the Virú Period were found to have been placed in an extended and supine position or resting on either the right or left side. The head was often bent forward with the chin on the chest, or may have been bent to either side. The arms were either placed by the sides, or one or both would be crossed over the pelvis. The legs were either laid out with a slight separation, or one or both were flexed.

Burials in most cases contained very few grave goods. For example, Bennett (1950) documented an average of 2.7 ceramic vessels per grave. Burials in some cases contained charred textiles that may have been wrapped around the deceased or been placed in the grave as an offering and many individuals were also covered by reed mats. Some (although few) graves contained jewellery and some contained implements of war. Many individuals had red paint applied on the head or the chest. There were also offerings of food such as maize, nuts, beans, fruit, squash and seeds (Larco Hoyle 1945).
What is evident is that there was a great variety in grave goods, which Larco Hoyle saw as evidence of a lack of religious motivation in the burial process (Larco Hoyle 1945), which would have likely meant a greater uniformity either in the type of grave goods or in the iconography. Bennett also noted that there is no clear evidence of social differentiation at the Gallinazo Group, both in terms of the habitations and the graves (1950). This assertion does not seem to hold completely true when considering certain more elaborate burials, for instance, the “Warrior” burials excavated by Bennett (1939) and Strong and Evans (Strong and Evans 1952). However, it is true that for the most part graves are pretty consistent in the Virú Valley in their context and grave goods (Bennett 1939; Bennett 1950; Strong and Evans 1952; Willey 1953).

2.4.3 Huancaco Period Burials

During the Huancaco Period individuals tended to be wrapped in cane and placed in relatively shallow tombs (Strong and Evans 1952). Tombs were often lined with adobe bricks and placed near sites of primary importance (castillos, pyramids and “pyramid-dwelling-construction complexes”). This pattern continued into the Tomaval Period and later, although the graves here are less elaborate than those during the Huancaco Period (Larco Hoyle 1945; Willey 1953).

2.4.4 Tomaval Period Burials

Burials in the Tomaval Period usually consisted of individuals placed in seated positions in irregular, semi-circular pits. In a few cases, the walls of the graves were lined with cane. More than 50% of the burials were without grave goods. Burials placed in flexed positions were found associated with fine “Tiahuanaco” ceramics (Larco Hoyle 1945).

2.4.5 Burial Pattern Analysis

Burial descriptions from various archaeological sources were examined in order to determine any trends in burials over multiple pre-Columbian time periods and sites in the Virú Valley. A total of 17 burials from the Puerto Moorin Period, 62 burials from the Virú Period, 75 burials from the Huancaco Period, and 20 burials in the Tomaval Period were used in this analysis (Table 2.3). It should be noted at the outset that the focus of these researchers was not typically the burials themselves, but the ceramics (and
occasionally other artifacts) interred in the burials, thus the information was not always complete (for instance, sometimes the burial position or context was not recorded, individuals were not all provided with an age and sex estimate, and sometimes only the number of ceramics were recorded, with no other details).

Table 2.3: Burials used in the burial pattern analysis for the Virú Valley.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Site</th>
<th>Number of Burials</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomaval</td>
<td>Cemetery V-66</td>
<td>1</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Tomaval</td>
<td>V-302</td>
<td>18</td>
<td>Collier 1955</td>
</tr>
<tr>
<td>Tomaval</td>
<td>Castillo de Tomaval</td>
<td>1</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Huancaco</td>
<td>San Francisco</td>
<td>3</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Huancaco</td>
<td>Huaca de la Cruz</td>
<td>45</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Huancaco</td>
<td>Huaca de la Cruz</td>
<td>15</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Huancaco</td>
<td>Taitacantin/Huaca Larga</td>
<td>9</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Huancaco</td>
<td>Gallinazo Group: V-163 (Burial Mound 2)</td>
<td>1</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Huancaco</td>
<td>Castillo de Tomaval</td>
<td>2</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: Huaca Gallinazo (V-59)</td>
<td>3</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: Huaca Gallinazo (V-59)</td>
<td>3</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: Burial Mound 1</td>
<td>6</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: V-163 (Burial Mound 2)</td>
<td>4</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: V-163 (Burial Mound 2)</td>
<td>29</td>
<td>Bennett 1939</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: V-154</td>
<td>2</td>
<td>Collier 1955</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: V-252</td>
<td>6</td>
<td>Collier 1955</td>
</tr>
<tr>
<td>Virú</td>
<td>Gallinazo Group: V-303</td>
<td>4</td>
<td>Collier 1955</td>
</tr>
<tr>
<td>Virú</td>
<td>Castillo de Tomaval</td>
<td>1</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Virú</td>
<td>V-309</td>
<td>4</td>
<td>Collier 1955</td>
</tr>
<tr>
<td>Puerto Moorin</td>
<td>Huaca Negra</td>
<td>4</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Puerto Moorin</td>
<td>Cemetery V-66</td>
<td>9</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Puerto Moorin</td>
<td>Gallinazo Group: V-163 (Burial Mound 2)</td>
<td>1</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Puerto Moorin</td>
<td>Castillo de Tomaval</td>
<td>3</td>
<td>Strong and Evans 1952</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>174</td>
<td></td>
</tr>
</tbody>
</table>

2.4.5.1 Burial Position

During the Puerto Moorin (Table 2.4) and Virú (Table 2.5) Periods, the most common burial position was an extended position, consisting of 69% and 33% of the samples, respectively. Beginning with the Huancaco Period (Table 2.6), and following into the Tomaval Period (Table 2.7), the majority of burials were placed in a flexed
position, consisting of 62% and 90% of the samples, respectively. During the Virú Period and the subsequent Huancaco Period, jumbled bones\(^7\) became a new category of burial position (10% and 8% of the samples, respectively).

Most individuals were buried in simple pits. Some individuals, however, were buried in cane coffins or cane bundles beginning in the Huancaco Period (9%), and continuing into the Tomaval Period (5%). One recorded individual (a subadult) was buried in a ceramic vessel in the Huancaco Period.

Notable differences in burial position between different sex and age categories were also found. Adult males accounted for all the flexed burials in the Puerto Moorin Period sample (29% of adult males) and during the Huancaco Period no adult females were buried in extended position, whereas 13% of adult males and 11% of subadults were buried in this position.

Finally, some individuals were interred together in the same burial pit. One of these multiple individual burials dates to the Virú Period and consists of a subadult together with an individual of unidentified sex and age (Bennett 1939). Another three multiple individual burials date to the Huancaco Period, one consisting of two adults (Bennett 1939), another of two subadults (Bennett 1939), and the last titled the “Burial of the Warrior Priest” (Strong and Evans 1952) consisting of an adult male (the “Warrior Priest”), another adult male, a subadult and two adult females.

\(^7\) Jumbled bones placed in a burial pit means the human remains were sufficiently decomposed that the anatomical position of the bones was not maintained. Thus, the individual had either been laid out somewhere for a long enough period for advanced decomposition to occur, or, more likely (the powerful smell of a decomposing body would likely deter individuals from being laid out above ground), were buried in a primary location and then dug up and reinterred in a secondary location. This process could occur over several years given the dry conditions on the north coast of Peru being ideal for the preservation of organic materials (Nelson 1998; Verano 1997b).
### Table 2.4: Puerto Moorin Period burial positions.

<table>
<thead>
<tr>
<th>Burial Position</th>
<th>Subadult</th>
<th>Adult***</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Unidentified Age and Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Flexed and on side</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>29%</td>
</tr>
<tr>
<td>Seated and flexed</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Flexed</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Flexed</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>29%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Extended and supine</td>
<td>0</td>
<td>0%</td>
<td>4</td>
<td>57%</td>
<td>3</td>
<td>75%</td>
</tr>
<tr>
<td>Extended and on side</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>25%</td>
</tr>
<tr>
<td>Extended*</td>
<td>1</td>
<td>50%</td>
<td>1</td>
<td>14%</td>
<td>1</td>
<td>50%</td>
</tr>
<tr>
<td>Total Extended</td>
<td>1</td>
<td>50%</td>
<td>5</td>
<td>71%</td>
<td>4</td>
<td>100%</td>
</tr>
<tr>
<td>Jumbled Bones**</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Unidentified Position***</td>
<td>1</td>
<td>50%</td>
<td>1</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>16</td>
</tr>
</tbody>
</table>

Note: Percentages have been rounded and thus may not add to exactly 100%.

*Burials were identified solely as “flexed” or “extended” if no other element of the position was specified (i.e. burials had not been additionally identified as being on their side, supine or seated).

**Also called secondary burials (Millaire 2002; Nelson 1998; Verano 1997b).

***The authors did not identify the position of the burial.

****Individuals were categorized as “adults” when no information regarding the sex of the individual was recorded by the authors.

### Table 2.5: Virú Period burial positions.

<table>
<thead>
<tr>
<th>Burial Position</th>
<th>Subadult</th>
<th>Adult</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Unidentified Age and Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Flexed and on side</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Seated and flexed</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Flexed</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Flexed</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Extended and supine</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>60%</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Extended and on side</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Extended</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>20%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Extended</td>
<td>0</td>
<td>0%</td>
<td>4</td>
<td>80%</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Jumbled Bones</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Unidentified Position</td>
<td>4</td>
<td>100%</td>
<td>1</td>
<td>20%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>100%</td>
<td>1</td>
<td>20%</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: Percentages have been rounded and thus may not add to exactly 100%.

*Burials were identified solely as “flexed” or “extended” if no other element of the position was specified (i.e. burials had not been additionally identified as being on their side, supine or seated).

**Also called secondary burials (Millaire 2002; Nelson 1998; Verano 1997b).

This table shows the distribution of burial positions in the Puerto Moorin and Virú periods, with a focus on identifying the position of individuals in the burial context, including whether they were flexed, seated, or extended. The data includes both subadult and adult individuals, with additional notes on the methodology of data collection and the criteria for categorizing positions. The table highlights the importance of understanding burial practices and the implications for interpreting archaeological data.
Table 2.6: Huancaco Period burial positions.

<table>
<thead>
<tr>
<th>Burial Position</th>
<th>Subadult</th>
<th>Adult</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Unidentified Age and Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>Flexed and on side</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Seated and flexed</td>
<td>14 52%</td>
<td>2 22%</td>
<td>1 13%</td>
<td>6 55%</td>
<td>11 43%</td>
<td>29 38%</td>
</tr>
<tr>
<td>Total Flexed</td>
<td>14 52%</td>
<td>2 22%</td>
<td>1 13%</td>
<td>6 55%</td>
<td>11 43%</td>
<td>29 38%</td>
</tr>
<tr>
<td>Extended and supine</td>
<td>7 27%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>7 27%</td>
</tr>
<tr>
<td>Extended and on side</td>
<td>2 7%</td>
<td>0 0%</td>
<td>1 13%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>3 4%</td>
</tr>
<tr>
<td>Total Extended</td>
<td>9 33%</td>
<td>0 0%</td>
<td>1 13%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>11 33%</td>
</tr>
<tr>
<td>Jumbled Bones</td>
<td>4 15%</td>
<td>0 0%</td>
<td>1 13%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>5 21%</td>
</tr>
<tr>
<td>Unidentified Position</td>
<td>4 15%</td>
<td>2 22%</td>
<td>0 0%</td>
<td>1 9%</td>
<td>5 24%</td>
<td>12 41%</td>
</tr>
<tr>
<td>Total</td>
<td>27 100%</td>
<td>9 33%</td>
<td>8 29%</td>
<td>11 40%</td>
<td>21 76%</td>
<td>70 100%</td>
</tr>
</tbody>
</table>

Table 2.7: Tomaval Period burial positions.

<table>
<thead>
<tr>
<th>Burial Position</th>
<th>Subadult</th>
<th>Adult</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Unidentified Age and Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>Flexed and on side</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Seated and flexed</td>
<td>14 52%</td>
<td>16 100%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>18 90%</td>
</tr>
<tr>
<td>Flexed</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Total Flexed</td>
<td>2 7%</td>
<td>16 100%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>18 90%</td>
</tr>
<tr>
<td>Extended and supine</td>
<td>1 33%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>1 33%</td>
</tr>
<tr>
<td>Extended and on side</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Total Extended</td>
<td>1 33%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>1 33%</td>
</tr>
<tr>
<td>Jumbled Bones</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Unidentified Position</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
</tr>
<tr>
<td>Total</td>
<td>1 33%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>0 0%</td>
<td>1 33%</td>
</tr>
</tbody>
</table>

2.4.5.2 Grave Goods

There is a definite trend in terms of an increasing variety and number of grave goods, reaching its peak in the Huancaco Period, and diminishing significantly in the Tomaval Period. Some individuals from each period, however, have no grave goods. Forty-three percent of individuals from the Puerto Moorin Period have no grave goods, followed by 11% and 10% for the Virú and Huancaco Periods, respectively. The only two

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8 For a more detailed breakdown on grave goods, see Appendix A.
subadults in the Puerto Moorin Period sample lacked grave goods. However, all individuals from the Tomaval Period had grave goods.

Fifty-six percent of the graves from the Puerto Moorin Period had a ceramic vessel(s), followed by 93%, 79% and 85% for the Virú, Huancaco and Tomaval Periods, respectively. Of the individuals with ceramic vessels in the Puerto Moorin Period, 56% have one to two vessels, whereas 44% have three or more vessels. In the Virú Period, 60% of individuals with ceramic vessels have one to two, and the remainder have three or more. Fifty-two percent of individuals with ceramic vessels have one to two in the Huancaco Period, with the rest having three or more. Finally, in the Tomaval Period, more individuals were interred with only one or two ceramics (82% of individuals), as opposed to three or more.

Gourd vessels were another relatively common category of grave goods in certain periods, with 19% of individuals from the Puerto Moorin Period having been interred with at least one gourd vessel, followed by 4%, 25% and 5% in the Virú, Huancaco and Tomaval Periods, respectively. Interestingly, when present in graves in the Virú Period, there were always three or more gourd vessels placed in the same grave. When present in graves in the Puerto Moorin or Tomaval Periods, there were only one or two vessels.

There was more variety in the number of vessels in the Huancaco Period, however.

Textiles and woven reed mats were more common in the Puerto Moorin Period (19% and 25%, respectively) than during the Virú Period (4% and 2%, respectively). Woven mats remained uncommon during the Huancaco Period (5%) and in the Tomaval Period there were none present in the sample. However, textiles were much more common in the Huancaco than the Virú Period, at 43%, which continued into the Tomaval Period at 45% of the sample.

Copper pieces were present in all periods, but for the Puerto Moorin Period. In the Virú Period, 28% of individuals had at least one copper piece in their graves, followed by 34% and 60% in the Huancaco and Tomaval Periods. There was not a great distinction between the number of individuals with one piece of copper, versus the number of individuals with two or more pieces. However, there were slightly more individuals with one piece of copper in the Virú and Huancaco Periods, although this trend reversed in the Tomaval Period. Gold-plated copper was introduced in burials in the Virú Period (4%) in
adult male burials and continued into the Huancaco Period (3%) in adult male and subadult burials. Copper was identified in some cases as being placed in an individual’s mouth beginning in the Virú Period (4% of total number of individuals, or 13% of individuals with copper pieces in their graves), and continuing into the Huancaco Period (18% of total individuals, or 54% of individuals with copper pieces in their graves). Copper was also at times placed in an individual’s hand(s) in the Huancaco Period (4% of total individuals and 12% of individuals with copper pieces in their graves). Silver and turquoise were also present in some graves in the Huancaco Period, silver being present in one adult male and one adult female grave (3% of the Huancaco sample) and turquoise in one adult male grave (1% of the Huancaco sample).

Beads and/or jewellery were present in each of the periods amongst subadults and adults of both sexes, apart from the Puerto Moorin Period, for which they were only present in one adult female grave. Only subadults and female adults were identified as having been buried with spindle whorls and items identified as “weaving baskets”, given the fact that these weaving materials were only associated with female adults, it is possible that these subadult individuals were also female. Several items, which could be considered under the category of toys (whistles, flutes, trumpets, figurines, and spinning tops), were only buried with subadults. The total number of each of these items, however, was not great. Weapons (mace, knives, spears) and hammerstones were only present in a small number of adult male graves in the Virú and Huancaco Periods, apart from one knife having been placed in a subadult burial in the Virú Period. Food was also not present in a high number of graves in the Puerto Moorin (13% of individuals), Virú (4% of individuals) and Huancaco (5% of individuals) Periods. However, this is not a very reliable indication of how many individuals were interred with food, as it does not preserve well. Despite this, it can be said that food did not seem to be restricted to either sex or age group.

Tools (made of bone, gourd, copper and wood) were found in a small number of graves in the Puerto Moorin, Virú and Huancaco Periods, with no clear pattern as to age or sex or time period. Shells were found in graves in the Virú, Huancaco and Tomaval Periods, also not in great numbers and with no clear patterns. Wooden ceremonial staffs were found in one male adult burial in each of the Puerto Moorin and Virú Periods, and
also in one adult male and one adult female burial from the Huancaco Period. Red pigment (or paint) was sometimes found in burials in all but the Tomaval Period, often covering the skull. Two adult females had burials containing red pigment in the Puerto Moorin Period, one adult male in the Virú Period and two subadults, one adult male and one undetermined (in age and sex) individual from the Huancaco Period. Only one adult burial from the Tomaval Period contained an awl.

Finally, one burial (the multiple individual burial of the “Warrior Priest” from the Huancaco Period at Huaca de la Cruz), was interred with multiple headdresses, a copper face mask, ear plugs, llamas and feathers (Strong and Evans 1952), but these items were not found in any other graves.

2.4.5.3 Summary

Burials were typically placed in simple pits in all periods, although in the Huancaco and Tomaval Periods, some individuals were placed in cane coffins or tubes. The majority of individuals during the Puerto Moorin and Virú Periods were interred in an extended and supine position. This changed in the Huancaco and Tomaval Periods, when the majority of individuals were interred in a flexed position. Jumbled bones (or, secondary burials) were introduced in the Virú and Huancaco Periods. Finally, multiple individual burials were rare, but occurred during the Virú and Huancaco Periods.

Grave goods (when present) typically consisted of ceramic vessels and textiles, although gourd vessels were another relatively common item. There seems to have been an increase in the quantity, variety and richness of grave goods, beginning in the Virú Period and ending (with its peak) in the Huancaco Period, indicating a greater energy investment in burials in these periods.
3 BIOARCHAEOLOGICAL STUDIES

Bioarchaeology makes use of biocultural models that look at the inter-relationship of different forces (social, physical, cultural) and their impact on the skeleton, recognizing that these forces can impact biological processes. In recent years, there has been a shift towards focusing on the individual and their experience of health and disease within a larger social context in bioarchaeology (Zuckerman and Armelagos 2011). This integration of social theory has lent much to the study of social identity, which, “encompasses age, gender, social and socioeconomic status, ethnic affiliation, and religion, as well as their associated roles and behavioural expectations” (Zuckerman and Armelagos 2011:27). Thus, this has led to interesting discussions on the experience and life histories of specific individuals, and of groups, in past societies.

This chapter outlines the frameworks, rooted in bioarchaeology, that were used to analyze human remains from Huaca Gallinazo and Huaca Santa Clara in order to elucidate each individual’s experience of health and disease during their life histories. This information, along with burial contexts will prove valuable in attempting to document patterns of ritual violence in the Virú Valley during the Virú and Tomaval Periods.

3.1 Bioarchaeology, Identity and the Individual

An individual consists of multiple complex identities (based upon ethnicity, gender, status, religion, etc.) that can change over the course of a lifetime and that, “can be both personal and communal, ascribed and achieved, manipulated and feigned” (Knudson and Stojanowski 2008:398). These can often be inferred through a bioarchaeological analysis that considers as many aspects of identity as possible through a variety of methods (Knudson and Stojanowski 2008). Ethnicity is one important aspect of social identity that will be considered in this analysis, and thus requires further attention here.

Ethnicity is a culturally constructed category that is recognized by individuals within a social group and is defined by interaction with other groups, creating an “us” versus “them” categorization based upon perceived cultural differences (which does not necessarily extend to other aspects of social identity) (Barth 1970; Jones 1996). Ethnic
differences are visible in both cultural practice and material culture (for example clothing, body modification, or mortuary practices) and as such, are an important area of study in bioarchaeology (Sutter 2005; Torres-Rouff and Yablonsky 2005).

3.1.1 Identity and Times of Transition

In times of stress or transformation, such as in the Tomaval Period in the Virú Valley, Peru, social identity becomes very important as individuals seek to either change or reaffirm different social identities (Torres-Rouff and Yablonsky 2005). During these times, social identities are also negotiated and renegotiated in order to suit various needs, and often for political and economic interests (Barth 1970; Jones 1996).

Bioarchaeology can offer a unique perspective for the study of times of transition by assessing how social and cultural changes impacted the lives of individuals through the study of their human remains and burial contexts. The “life course perspective” is particularly interesting in this context, focusing on how changing social and cultural contexts and various events have shaped the lives of individuals, keeping in mind that individuals are active agents influencing their own life courses (Glencross 2011).

3.1.2 Bioarchaeological Frameworks

Using an approach that focuses on the individual and their multiple social identities allows for a discussion of multiple experiences of, for instance, disease and illness in society. This approach is not meant to replace broader studies of populations, but rather should be used in tandem to create a more nuanced view of a given society (Knudson and Stojanowski 2008). Two such approaches are: 1) osteobiographic analysis and, 2) the life course perspective.

An “osteobiographic” approach involves, “relating skeletal change to ecology and culture history and…[with a] more specific emphasis on relating observed bone pathology to how the individual and group actually functioned in life” (Saul and Saul 1989:288). It allows, from an analysis of the life history of an individual within an archaeological and cultural context, to infer broader conclusions of the life history of the population of which that individual is a member. This can lead, for instance, to interesting discussions on ethnicity and cultural change (Nelson et al. 2000; Saul and Saul 1989).
The "life course" perspective construes life course (as opposed to the biologically-based "lifecycle") as a culturally mediated passage of time that is marked both symbolically and materially, and can thus be observed in the archaeological record (Gilchrist 2000). It incorporates a historical and developmental framework useful to study the lives of individuals, understanding that certain events in the individual’s life can lead to changes in the skeleton and that what we observe in the skeleton is an accumulation of these events. Thus, “for studies of skeletal injury in the past this means that aspects of age, gender, inequality, and agency can be explored anew as social phenomena in the lives of individuals, communities and across generations” (Glencross 2011:392).

Ultimately, regardless of the approach, a bioarchaeological analysis requires that a regional perspective (taking into account regional historical and social contexts) within the broader context of the burials themselves (for instance the associated cemetery or site) be considered when studying mortuary rituals (Shimada et al. 2004). Thus, a regional perspective has been employed in this study.

### 3.2 Bioarchaeological Approaches to Identity and the Individual

As previously mentioned, a bioarchaeological approach to the study of identity involves an integrative methodology. The following section details the types of analyses utilized here (the study of body modification, trauma, and stress and disease) to study the individuals interred at Huaca Santa Clara and Huaca Gallinazo.

#### 3.2.1 Body Modification

Body modification—a term which incorporates practices such as circumcision, clitoridectomy, foot binding, dental modification, intentional scarring, tattooing, piercing, uvulectomy, and artificial cranial modification (Gerszten and Gerszten 1995)—is one way human beings worldwide have distinguished themselves from others and displayed their social identity (or identities). Through these practices that alter the body, the body becomes imbued with cultural meaning, thus creating “symbolic boundaries” which separate individuals or groups of individuals (Blom 2005). In the Andean region, the most common forms of body modification found among skeletal remains are trephination and artificial cranial modification (Dingwall 1931).
3.2.1.1 Artificial Cranial Modification

Artificial Cranial Modification (ACM)\(^9\), the result of the molding of the skull during a period from infancy to 2-3 years of age (when the skull is less malleable), has long been practiced throughout the world (Allison et al. 1972; Gerszten and Gerszten 1995; Imbelloni 1950). ACM has persisted even into the twentieth century among Caribbean, Latino, European, African American, Asian and Native American groups (FitzSimmons et al. 1998; Tiesler 2014).

ACM can be the result of either intentional or unintentional forces. Unintentional cranial modification is typically the result of cradle-boarding practices, usually resulting in the flattening of the occiput. Intentional forms of cranial modification include the use of pads, boards, cords, stones and other devices in order to intentionally shape the skull of an infant (Gerszten and Gerszten 1995). Even today, some groups intentionally shape the skull using their hands, often in conjunction with an apparatus used to mold the head (FitzSimmons et al. 1998).

The practice of ACM has been attributed to a number of motivations, including aesthetic and religion considerations, perceived beliefs that ACM helps develop qualities such as intelligence or bravery, or the materialization of social status or ethnic identity (FitzSimmons et al. 1998; Gerszten and Gerszten 1995). This form of body modification represents an ascribed form of identity; it is not the individual that has chosen the modification, but rather the caregivers of that child. Regardless of intent, cranial modification ultimately becomes a permanent, powerful and highly visible marker of group identity and membership (Torres-Rouff and Yablonsky 2005).

3.2.1.1.1 Classification Schemes

Over the past century numerous terms have been used to describe the various forms of cranial modification, leading to a great deal of confusion when attempting comparative work (O’Brien and Stanley 2013). Despite the variable terminology and methods used to describe various forms of ACM, the forms group into two main categories based on the final produced shape of the cranium: annular and tabular. Both of

\(^9\) See Appendix B for a list of acronyms.
these forms have erect and oblique variants\(^{10}\) (depending on the angle of the occiput relative to the Frankfort Horizontal Plane) (Anton 1989; Cocilovo et al. 2011; Dembo and Imbelloni 1938; Dingwall 1931; O’Brien and Stanley 2013), which can ultimately be categorized in the form of a nested typology (Boston 2012).

Annular forms consist of a conical cranial vault which extends posterosuperiorly, whereas tabular forms are identified by an anteroposterior flattening of the frontal and occipital (or occasionally only the occipital) often with lateral (bilobed) bulging of the parietals in compensation (Anton 1989; Dembo and Imbelloni 1938; Dingwall 1931; O’Brien and Stanley 2013). In tabular forms, the occipital flattening often results in asymmetry due to uneven positioning of the board (Bjork and Bjork 1964; Clark et al. 2007).

Allison et al. (1972) have described a variety of techniques employed in the Andean region for the purpose of modifying crania and all the possible resultant forms. Their study incorporated crania from Arica (Chile), Huacho (Peru) and Ica (Peru), from a number of cultures and ranging from 5,000 – 400 BP. The resultant forms, however, can be grouped into the same categories of annular and tabular with variants, a classificatory system developed by Imbelloni (Dembo and Imbelloni 1938). It has been argued that this is ultimately the better system as it would be the final shape of the skull which would have been the basis of differentiating people, and thus it is the shape of the skull which would have had cultural meaning (O’Brien and Stanley 2013).

The annular modification is typically produced by means of a cloth band wrapped around the frontal bone and lower parietals and tied at the base of the occiput. In order to produce the tabular erect form, the infant would have been placed in a cradle with the head held in place by pressure on the forehead. The tabular oblique form would have been produced by means of boards attached to the frontal and the occipital bones, and attached

\(^{10}\) The annular form is also known in the literature as circumferential and circular. The tabular form is also known as fronto-occipital flattening or anteroposterior flattening, the tabular erect form is also known as fronto-vertico-occipital flattening and the tabular oblique form is also known as parralelo-fronto-occipital flattening (Anton 1989; Dingwall 1931; Imbelloni 1950; Stewart 1950). Occipital or posterior flattening are used interchangeably to refer to the flattening of the occipital region, which can be intentional or the result of cradle-boarding practices, and thus intentional or unintentional (Pomeroy et al. 2009).

Many researchers classify types of ACM on the basis of visual examination. This may not be a very reliable method, however, since various definitions exist for the different types of ACM, and these are not always consistent with each other (Cocilovo et al. 2011; O’Brien and Stanley 2013). Clark et al. (2007), while still performing a visual examination (based on a seriation of cranial forms in order to identify ACM), created a function in order to confirm modification and help to classify ambiguous cases. O’Brien and Stanley (2013) established an alternative method using a mathematical function to classify crania as normal (unmodified), annular or tabular, the results of which can be plotted on a territorial map in order to ascertain the degree to which the skull was modified. Another option is to calculate the cranial index of each skull (cranial breadth/cranial length x100). This, together with visual examination, can provide a good idea of the form of modification (Nelson et al. 2000).

3.2.1.1.2 Artificial Cranial Modification in the Andean Region

The practice of artificial cranial modification was widespread and varied in South America. The earliest evidence of the practice in the Andean region is from the Chinchorro culture of northern Chile and southern Peru. They practiced a form of annular ACM (ca. 2,570 – 2,090 B.C.), during a period great cultural change (Arriaza 1995). Within a thousand years from the end of this period, ACM became widespread in the Andes, where it persisted until the Colonial period (Torres-Rouff and Yablonsky 2005).

3.2.1.1.2.1 Motivation Behind the Practice

In her review of ethnohistoric documents pertaining to the practice of ACM in the Andes, Blom (2005) noted the spiritual and aesthetic components of the practice, as well as its purpose of symbolizing group membership. According to ethnohistoric literature, cranial shape often matched a particular form of headdress worn in that particular society. Cranial shape also had religious significance in some cultures (Blom 2005; Dingwall 1931). For instance, one source writes that, “the Collaguas wore on their heads something they called chucos, a type of tall brimless hat, and so they could wear this hat they molded the heads of their newborns to lengthen and narrow them as high and as elongated
as they could so that in remembrance the head would have the form of the volcano from which they came” (Blom 2005:3). This, as a part of their origin myth, had special religious significance for this group. It was also hypothesized that tabular cranial modification would help hold the head bands used to carry loads (Dingwall 1931). Regardless of the motivation behind the practice, however, cranial modification is a very visible indicator of identity, and thus conveyed information about that individual to all who interacted with them (Torres-Rouff and Yablonsky 2005).

In the Andean region, there has generally been a differentiation between highland (called Aymara\(^{11}\)) and lowland (coastal) practices of ACM. The highland form is annular and the coastal from is predominantly tabular. The tabular erect form was the common type for the north coast of Peru, while the tabular oblique form was the most common type on the southern coast of Peru (Allison et al. 1981a; Dembo and Imbelloni 1938; Dingwall 1931; Imbelloni 1950; Stewart 1950).

Torres-Rouff (2002) and Blom (1999; 2005) have recently challenged the simple dichotomy of highland versus lowland in the Andean region with studies linking different ethnicities to forms of ACM. While these studies have been challenged by some authors (Boston 2012; Cassman 2000; Sutter 2005), what they do reveal is that the presence of different forms of ACM at a site does not necessarily indicate migration, and that simple highland versus lowland categorization of people based on ACM types needs to be discarded.

3.2.1.2 Tattooing

Like ACM, tattooing has a widespread distribution over the world and has been practiced for thousands of years (Lobell and Powell 2013). It can also be a highly visible marker of identity, although one that is less often preserved in archaeological contexts than evidence of ACM.

3.2.1.2.1 Tattooing in the Andes

Tattoos have often been depicted on Moche portrait vessels and fine-line drawings on ceramics, or in other art forms (such as the metal funerary mask from Huaca de la

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\(^{11}\) The highland form is often called Aymara after the language spoken in the Altiplano regions of Bolivia, Peru, and Chile (Torres-Rouff and Yablonsky 2005).
Luna). These tattoos seemed most often to feature animal or geometric designs (Allison et al. 1981b; Donnan 1978; Hill 2000). Tattoos would have been created with the application of various types of needles (for example: parrot feathers, thorns, or the spines from shells) to the skin. A pigment would then have been introduced to the puncture marks in the skin, thus colouring the design (Allison et al. 1981b; Vasquez Sánchez et al. 2013).

Tattoos have been reported preserved on human remains from archaeological contexts in Peru. Ubbelohde-Doering (1933) described such a burial from the Early Intermediate Period at Pacatnamú. The burial was that of a principal individual male who had geometric and animal tattoos on his forearms. Allison et al. (1981b) described a number of human remains with evidence of tattoos from Ica and Ancash contexts. Tattoos were found on the forearms, upper arms, hands, feet, wrists, and ankles of both males and females, the youngest individuals being adolescents. Vásquez Sánchez et al. (2013) also described tattoos from the Early Intermediate Period on the forearms, hands and feet of the Lady of Chao (interred at Huaca Cao Viejo in the Chicama Valley) which included spiders, snakes, and jaguars, along with geometric designs.

3.2.2 Trauma

Trauma is defined as “an injury to living tissue that is caused by a force or mechanism extrinsic to the body” (Lovell 1997:139). Trauma can be divided into a number of types and analyzed depending on the force employed (blunt force trauma, sharp force trauma, or gunshot and projectile injuries), whether it was intentional or accidental, and the general period of time in which the injury was sustained (ante-mortem, peri-mortem or post-mortem) (Galloway 1999; Lovell 1997).

Intentional or violent injury can be defined in bioarchaeology as “skeletal injuries for which there is strong circumstantial evidence of malevolent intent” (Walker 2001:576). This is tricky in practice, but allows for a differentiation between intentional and accidental injuries, depending upon the archaeological context and the nature of the trauma (Walker 2001). The study of accidental trauma is also a productive area of study in bioarchaeology because it can reveal certain patterns of behaviour in the individual (which can reveal aspects of their identity), and more broadly at the group level (Lovell 1997).
3.2.2.1 Ritual Violence

Ritual is an active performance and a process of several stages which is both symbolic and expressive (Bell 1992; Bloch 1992; Turner 1977). Ritual regulates and sustains boundaries, it maintains social structure and social order through symbolic representation, and it creates a feeling of solidarity for those who participate. Ritual can be a locus for the transformation of meaning and ideology, and subsequently of social structure, social roles, and boundaries in times of social conflict (Kertzer 1988; Kertzer 1991; Turner 1977). By containing elements of tradition and divine legitimacy, and by manipulating symbols, ritual can act to legitimize the power and authority of those who perform, or are seen to control, the ritual (Moore 2004; Swenson 2011; Valeri 1985). This then allows those who have power to create boundaries and maintain social inequalities (Pader 1982; Turner 1977).

This, however, is not to say that power and authority are not negotiated in the ritual process. Participants need to buy into the ritual performance and this is often accomplished through aesthetic appeal and the emotional intensity that the ritual creates. By buying into this process participants negotiate their own identity, social role and beliefs. Ritual thus reveals social relations at the same time as it produces them (Swenson 2011). Ritual can also be subversive and can become a mechanism of rebellion when it fails and participants do not buy into it (Kertzer 1988; Metcalf and Huntington 2008).

Ritual violence, as a specific category of ritual behaviour which includes the practice of sacrifice, is imbued with power because it demonstrates control over life and death and is thus often used in the creation of political subjectivity by the elite who then gain that power (Swenson 2003). However, the determination of the presence of, and intention behind, ritual violence is challenging for several reasons: 1) the presence of violent trauma does not necessarily indicate that a ritual took place (Eeckhout and Owens 2008); 2) the presence of ritual violence does not indicate a sacrifice took place; and, 3) what is considered violence and what is considered veneration differs depending on the context and culture (Duncan 2005; Millaire 2015b).

While there have been a number of definitions for the term “sacrifice”, they tend to agree that it involves the giving of something of value in order to communicate with or influence the supernatural (Toyne 2008). Determining whether something or someone
had value to the community is not an easy process in archaeology and never absolute, thus making the identification of sacrifice in the archaeological record precarious (Eeckhout and Owens 2008). For the identification of ritual violence (including sacrifice) in the bioarchaeological record (such as throat-slitting, strangulation, bludgeoning, defleshing, dismemberment, trophy-taking and decapitation), researchers have looked to a number of cues. They look for the presence of perimortem trauma indicating violent death, along with the context of the burial and the reconstructed identities of the individual(s), which may indicate a ritual pattern outside the norm of ritual funerary behaviour. They also look at ethnohistoric, historic and iconographic evidence for the presence of ritual violence (Besom 2000; Buzon and Judd 2008; Eeckhout and Owens 2008; Hamilton 2005; Toyne 2008; Toyne 2011).

For Bloch (1992), violence (in whatever form that may be) is a necessary component of any ritual process, allowing progression from everyday life into and out of the liminal state. Thus, rites designed for veneration and violation proceed through the same model, but with a different intention. Violation denies the deceased victory over death, whereas veneration celebrates it. Violation, however, can be positive or negative. If the deceased’s “vitality” is used for the reproduction of society, this is seen as a positive violation. Negative violation, on the other hand, is meant as a punishment for the deceased (Duncan 2005). Another way of looking at negative violation is that it is a way of marking an individual as “atypical” or “deviant” when an individual has behaved in a way contrary to the accepted norms of that society, which thus helps to mark out boundaries of accepted conduct (Shay 1985). In order to apply this model to archaeology, Duncan (2005) employed Carr’s (1995) mortuary practice variables (body preparation and treatment, form of disposal, grave location and kinds of grave goods) in comparison to other burial forms employed in that society in order to determine the intention behind the ritual violence.

As ritual is a performance, it necessarily has a spatial element, which is an aspect of ritual that archaeology can help to dissect (beyond considering only spatial aspects in relation to the burial location). For instance, plazas are an important architectural feature in Andean archaeology and are areas defined for public interaction, although their specific functions may differ based on their design. It is thus through these differences
that we can elucidate the function of the ritual as well (Moore 1996; Swenson 2011). *Huacas*, which are “objects that are material manifestations of the sacred” (Moore 2004:86), such as mountains, rocks, or pyramid mounds, are another important spatial contextual element to consider in Andean archaeology, especially in relation to ritual. By using the symbolic value of the *huaca*, rituals can tap into a power.

### 3.2.2.1.1 Ritual Violence in the Andes

Up until the 1980s, iconographic evidence, as well as ethnohistoric accounts of Inca sacrifice, were the only evidence of the practice of human sacrifice in the Andes (Hamilton 2005). The following overview includes iconographic, as well as the more recent archaeological evidence available for different types of ritual violence in the Andean region, up to and including the Late Intermediate Period.

A typology for ritual violence in the Andean region has been established by Verano (1995, 2001) in his review of ethnohistoric, iconographic and archaeological evidence, and it will be employed in the following discussion. It includes: 1) retainer burial (individual(s) such as family members and/or servants who would be buried with a principal, prominent individual); 2) dedicatory (or foundation) burials (human remains placed within architectural features for the dedication of certain buildings); 3) trophy taking (body parts, often heads taken as trophies); 4) prisoner sacrifice; and, 5) mass burials.

#### 3.2.2.1.1.1 Decapitation and Trophy Taking

The earliest evidence of ritual violence in the Andes comes from art from the Cupisnique culture (1,500 – 1 B.C.) on the north coast of Peru. This art depicts a “Decapitator” figure performing decapitation rituals. Interestingly, this same iconography was used in later Moche religious art (ca. A.D. 300 – 800), indicating a continuity in ritual violence (at least, iconographically) in the region (Cordy-Collins 2001). In her review of iconographic evidence of ritual violence in the Andean region, Hamilton (2005), describes further evidence of decapitation from the Initial Period (ca. 1,500 B.C.) in the Casma Valley, Callejón de Huaylas and in the eastern highlands of Peru. Decapitation iconography continues from the Early Horizon into the Middle Horizon with the Chavín culture in the Peruvian highlands (900 – 200 B.C.), with the Paracas (700 – 1
B.C.) and the Nasca (100 B.C. – A.D. 700) cultures on the south coast of Peru, with the Moche culture on the north coast of Peru, and with the Tiwanaku (A.D. 1 – 1,000) and Huari (A.D. 600 – 1,000) cultures in Peru’s southern highlands (Hamilton 2005).

The existence of the practice of decapitation in the Andean region was further demonstrated by archaeological evidence from the Moche site of Dos Cabezas consisting of 18 severed heads in a narrow chamber, consistent with the decapitation process seen in iconography. A burial of an elderly man thought to be a “Moche Decapitator” (based on the presence of a *tumi* knife, used in decapitation scenes, in his hand and a severed ceramic head next to it) was also found (Cordy-Collins 2001). Further evidence comes from the Lambayeque (Sicán) site of Cerro Cerrillos, in the Reque river drainage, where 81 burials, mostly subadults, were found in the floor of a platform and plaza with evidence of decapitation, throat cutting and chest opening (Klaus et al. 2010). Finally, at Túcume during the Chimú period, 110 individuals were recovered in the plaza in front of a temple with perimortem trauma indicating throat cutting and decapitation (Toyne 2008, 2011).

Paracas, Nasca, Moche, Tiwanaku and Huari iconography additionally contains images of trophy heads (disembodied heads). These trophy heads were sometimes depicted being eaten by mythical beings and sometimes they were shown as decoration on the garments of mythical beings, or were shown in the hands of mythical beings who were holding a knife, presumably used to sever the head. The presence of Moche ceramics modeled after human skulls with large holes at the top, presumably indicate that trophy heads were used as some sort of vessel in Moche culture (Verano et al. 1999). In Huari iconography, there are also images of severed arms and legs, along with trophy heads (Hamilton 2005).

Archaeological evidence of trophy taking has been found among the Nasca, Moche and Huari based on the presence of articulated human remains missing body parts, headless interments and separate burial caches of disembodied heads showing perimortem trauma indicative of intentional decapitation (Cook 2001; DeLeonardis 2000; Proulx 2001; Tung and Knudson 2010; Verano et al. 1999). Among the Huari, there is also
evidence of trophy heads being made from sacrificed local and nonlocal \(^{12}\) children’s skulls. While some trophy heads among the Nasca were made from children’s skulls, the difference between the percentages are statistically significant with Huari trophy heads having more children represented (Tung and Knudson 2010). The identification of sacrifice was based, in this case, on the presence of perimortem fractures (with one case being a strangulation) and cutmarks, as well as the age range of the children (3 – 11 years) which is not a period of time when children are particularly susceptible to disease or stress, representing a small percentage of natural deaths in skeletal populations (Tung and Knudson 2010).

\subsection{Retainer Burials and Dedicatory Offerings}

Archaeological evidence of “dedicatory offering” burials have been found at the Moche site of Huaca de la Luna in the Moche Valley, where a burial of three children (two of which were headless) was found in a plaza during a period of construction and in association with a rocky outcrop (Bourget 2001). There is also evidence of dedicatory offerings of young females placed in architectural features (ramps and the floors of plazas) at the Chimú site of Chan Chan (Verano 1995) and at Moche sites (Millaire 2002).

Identifying “retainer” burials is typically done by examining the contextual and spatial evidence and by examining grave goods. The relative absence of grave goods, unusual body position and location relative to a principal individual are all indicators of the presence of a retainer burial. Archaeological evidence of retainer burials comes from a number of Moche and Chimú contexts (Alva and Donnan 1993; Donnan 1995; Donnan 2007; Gaither et al. 2008; Millaire 2002; Millaire 2004; Rowe 1995; Verano 1995).

\subsection{Prisoner Sacrifice and Mass Burials}

The Moche culture (Early Intermediate Period), as previously mentioned, has an extensive iconographic tradition of ritual decapitation, dismemberment, ritual bloodletting, mutilation, torture, and the making and display of trophy heads (on

\(^{12}\) Strontium isotope data suggest that two of the four children came from a nonlocal area (outside the Ayacucho Basin, which is the former Huari heartland) (Tung and Knudson 2010).
supernatural beings and the Moche elite). These scenes are usually associated with prisoners (shown naked with ropes around their necks and hands bound behind their backs), who were captured during war for sacrifice. This is called the “Warrior Narrative” (Donnan 1978; Donnan and McClelland 1999), and a good example of this can be seen on a wall relief at Huaca Cao Viejo in the Chicama Valley (Franco et al. 1994). Another scene in Moche sacrifice iconography is the “Mountain Sacrifice” theme where individuals are sacrificed at the top of a mountain and then flung off of it. Moche trophy head, prisoner sacrifice and mutilation iconography continues beyond the Moche Period into the Late Intermediate Period Lambayeque (Sicán; A.D. 800 – 1,350) and Chimú (A.D. 900 – 1,550) cultures (Hamilton 2005).

Archaeological evidence of prisoner sacrifice and mass burials has been found at Huaca de la Luna where a mass burial of male prisoners was found dating to the end of the Moche Period. These individuals shared a pattern of trauma indicating that they were warriors. They were buried over the course of two rituals between periods of torrential rainfall. This mass prisoner burial was found overtop of the potential dedicatory offering of children found in association with the rocky outcrop in the previous section. The individuals were buried with clay effigies of nude males with ropes around their necks, such as is seen in the iconography of prisoner sacrifice in the “Warrior Narrative” (Bourget 2001; Verano 2001). Another example comes from a mass burial at Pacatnamú in the Jequetepeque Valley, where 14 adolescent and young adult males were interred in superimposed groups representing three separate rituals. Fragments of rope found around ankles and wrists and evidence of trauma and missing body parts indicate trophy taking and decapitation. Isotopic analyses of the individuals from the mass burials at Pacatnamú and Huaca de la Luna furthermore revealed that these individuals were nonlocal (Toyne et al. 2014; Verano 2001).

3.2.3 Stress and Disease

The examination of stress and disease in bioarchaeology is based on the knowledge that various factors impact the skeleton, including environmental, genetic, cultural and social, psychological, political, economic and nutritional, and do so in a number of ways (an osteoblastic response, an osteoclastic response or a combination of the two) (Farnum 2002). For the purpose of this thesis, a paleopathological analysis of
each individual was conducted in order to approximate each individual’s experience of “health”, which can be an integral part of identity. If any pathological lesions were present, a differential diagnosis was attempted. Lesions that are typically indicative of stress, were sought in each individual, and thus require more attention here.

Stress in the body is a physiological disruption as a result of an environmental threat, real or imagined. This disruption can materialize in the form of abnormal tissue growth or loss, and can be studied in the skeleton in a number of ways. Enamel hypoplasia, cribra orbitalia and porotic hyperostosis, are all ways in examples of these, that can be studied in archaeological samples (Larsen 1997; Webb et al. 2010). While the study of the “health status” of individuals in an archaeological population is problematic for a number of reasons, and is ideally used only for large sample sizes (Larsen 1997; Ribot and Roberts 1996), these methods will be used in the analysis of individuals from Huaca Gallinazo and Huaca Santa Clara, with caution, if only to provide data for future research.

3.2.3.1 Enamel Hypoplasia

Hypoplastic lesions in enamel are areas of decreased enamel thickness on teeth produced by an interruption of enamel formation, likely due to a general metabolic stress mechanism. Based on the location of the hypoplasia on the tooth, the period of time when the stress event occurred can be calculated, thus providing a time frame for period(s) of childhood stress in an individual’s life (Goodman and Rose 1991; Ribot and Roberts 1996).

3.2.3.2 Porotic Hyperostosis and Cribra Orbitalia

Porotic hyperostosis involves the pitting of the compact bone of the skull, usually with an associated increase in the thickness of the diploic bone in the affected area. Porotic hyperostosis is identified when these lesions are present on the skull vault, particularly on the frontal, parietal and occipital bones, whereas cribra orbitalia is

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13 Attempting to elucidate the “health status” of a deceased individual is challenging for many reasons. One such reason is that the individual may have died before any signs of stress or disease appeared on the bones (Wood et al. 1992). It can, however, be attempted while recognizing the inherent imitations of these types of studies.
restricted to the roof of the orbits. Lesions range from 1 mm in size to large coalescing apertures (Ortner 2003; Stuart-Macadam 1985; Ribot and Roberts 1996).

There has been debate over a number of years regarding the cause of porotic hyperostosis and cribra orbitalia, but most researchers now agree that it is the bony evidence of marrow hyperplasia which is a response to a number of conditions (acquired and genetic anemias and other rare conditions) that ultimately lead to hypoxia (Blom et al. 2005). It has also been suggested that the reason for high frequencies of porotic hyperostosis in certain samples may be due to the practice of ACM, which may cause similar lesions on the cranium. Without further study, however, this is but a hypothesis (Morgan 2014). Countering this hypothesis, Blom et al. (2005) have suggested that since their study of pre-Columbian Peruvian populations revealed cribra orbitalia was likely a precursor to porotic hyperostosis, when the two are present together, it is fairly solid evidence of the lesions not being the result of ACM.
4 MATERIALS AND METHODS

This chapter outlines the materials and methods used for the bioarchaeological analysis of individuals from Huaca Gallinazo (HG) and Huaca Santa Clara (HSC) excavated by Jean-François Millaire and colleagues (Millaire and La Torre Calvera 2003, 2008, 2011). The purpose of this analysis was to discern whether some of these burials were indeed atypical, as they appeared based on their archaeological contexts, and whether they were evidence of some form(s) of ritual violence occurring in the Virú (Early Intermediate Period) and Tomaval (Middle Horizon) Periods. If the presence of ritual violence could be determined at these sites, the next question was whether there was any difference between the forms of ritual violence in the Virú Period compared to the Tomaval Period, and whether these differences could be related in any way to broader socio-political changes occurring on the north coast of Peru during this time. It is hypothesized that this will be the case, especially in light of archaeological research indicating that a new form of ritual violence had appeared during the Middle Horizon (see Millaire 2015b).

This will be determined by comparing the burial contexts of individuals from HSC and HG with overall trends in burial patterns for the Virú Valley (see Chapter 2). Furthermore, each individual’s skeleton will be analyzed according to the osteological information previously gathered from my lab research in order to approximate, if possible, how each individual lived and whether there was any evidence of physical violence towards individuals who would later be interred in atypical contexts.

4.1 Materials

The human remains studied herein consist of six individuals from Huaca Gallinazo (part of the Gallinazo Group), dated to the Virú Period (c. 200 B.C. – A.D. 600)\textsuperscript{14}, and eleven individuals from Huaca Santa Clara. Five dated to the Virú Period\textsuperscript{15}

\textsuperscript{14} The radiocarbon dates from this sample were obtained from HG1 (Cal. A.D. 260 – 535), HG2 (Cal. A.D. 257 – 533) and HG6 (Cal. A.D. 240 – 391) (Millaire 2015a).

\textsuperscript{15} The radiocarbon dates were obtained from HSC13 (Cal. A.D. 247 – 533) and HSC14 (Cal. A.D. 610 – 780) (Millaire 2015a).
and six dated to the Tomaval Period (c. A.D. 750 – 1,150)\textsuperscript{16} (Table 4.1, Figure 4.1) (Millaire and La Torre Calvera 2003, 2008, 2011) (see Appendix C for drawings of each burial).

Table 4.1: Burials analyzed in this thesis.

<table>
<thead>
<tr>
<th>Huaca Santa Clara</th>
<th>Time Period</th>
<th>Burial No.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virú Period (EIP)</td>
<td>7, 8, 9, 13, and 14</td>
<td>Millaire and La Torre Calvera 2003</td>
<td></td>
</tr>
<tr>
<td>Tomaval Period (MH)</td>
<td>3, 4, 5, 6, 10, and 11</td>
<td>Millaire and La Torre Calvera 2003</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Huaca Gallinazo</th>
<th>Time Period</th>
<th>Burial No.</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virú Period (EIP)</td>
<td>1 and 2</td>
<td>Millaire and La Torre Calvera 2008</td>
<td></td>
</tr>
<tr>
<td>Virú Period (EIP)</td>
<td>3, 4, 5, and 6</td>
<td>Millaire and La Torre Calvera 2011</td>
<td></td>
</tr>
</tbody>
</table>

![Map of the Virú Valley and major archaeological sites. Image courtesy of Jean-François Millaire.](image)

\textsuperscript{16} The radiocarbon dates were obtained from HSC6 (Cal. A.D. 1,160 – 1,300) and the femur of an associated llama burial (no. 21) (Cal. A.D. 900 – 1,160) (Millaire 2015a).
4.1.1 Huaca Santa Clara

Huaca Santa Clara (otherwise known as site V-67, Castillo de Santa Clara or Castillo Virú) is an Early Intermediate Period (EIP) administrative and fortification site south of the Virú River, in the Virú Valley. The site is built on a natural triangular shaped hilltop (Cerro Cementerio), 60 m above the surrounding desert plane and features ancient adobe platforms and a modern cemetery (Figure 4.2). This ancient settlement is placed in a strategic position in the central part of the valley, one of six sites that were located at the only entry point from the highlands and at the location of major irrigation canal intakes. As there are no other hills in the immediate area, it is ideal site for defense and it would have been an important site within the Virú polity settlement system. The site had large-scale storage facilities containing evidence of food crops, suggesting that it was part of the valley-wide redistribution network of agricultural products (Millaire and La Torre Calvera 2002, 2003; Millaire 2010b; Willey 1953).

Figure 4.2: Reconstruction of Huaca Santa Clara with labelled sectors. Image courtesy of Jean-François Millaire.

The site was first studied by Kroeber (1930) who identified it as a Huancaco Period site based on the Moche-style ceramics that he found. Both Bennett (1939) and Willey (1953) supported the idea of it being a Huancaco Period site based on their review of the ceramics from the site. Fogel (1993), however, revised their ceramic analyses and
contended that it was essentially a Virú Period center with a brief Huancaco (Moche) occupation. Millaire’s excavation at the site in 2002 and 2003 confirmed this hypothesis, indicating that the occupation occurred between 160 B.C. and A.D. 780 (Millaire 2009a, 2009b, 2010a).

Huaca Santa Clara is divided into seven sectors (Figure 4.3). Sectors 1, 4 and 6 at the top of the mound were elite/ceremonial areas. Sector 1 consists of a high platform and storage rooms filled with household waste. Sector 4 consists of a terrace and a low platform containing burials (HSC3 – HSC11), as well as number of rooms containing artifacts and ecofacts as well as more burials (HSC13 and HSC14). Sector 6 was likely a special religious area with no storage facilities (Millaire and La Torre Calvera 2002, 2003).

Sector 2, on the northeast side of the upper platform, is part of a set of three platforms and likely functioned as a warehouse. After the storage rooms were abandoned, they were filled with refuse. HSC1 was found in this sector associated with a domestic ceramic jar, 50 cm below the surface; the original context is unknown as it was significantly disturbed (Millaire and La Torre Calvera 2002). The remains were not available to study for this research project.

Sector 3 is located north of the upper platform, at the base of the hill. Thirteen rooms that were constructed on three terraces were identified here. The large amount of refuse recovered indicates that it was likely a domestic area. Three kilns were also found in this sector in an area deduced as being a metal workshop. HSC2 was recovered from room A-43 of Sector 3, 70 cm below the current surface. A cotton mantle was placed over the legs, a gourd plate near the knees and maize cobs were placed near the feet. The individual was placed in the supine position with the feet towards the east. Only the legs were present as the burial was disturbed (Millaire and La Torre Calvera 2002). This individual was not studied as a part of this research project.

Investigations in Sector 5 and Sector 7 were restricted to the collection of surface material and test pitting, but evidence suggested that these were residential areas. Overall, it was determined that the lower parts of the site (at the bottom of the hill) consisted of craft production workshops and domestic areas that were likely for individuals of a lesser status than those who resided on the top of the hill. The middle part
of the hill was likely a storage area and the top of the hill was occupied by a series of platforms likely associated with elite residence and occupational areas (Millaire and La Torre Calvera 2003).

Figure 4.3: Image of Huaca Santa Clara (aerial view) with each sector identified. Image courtesy of Jean-François Millaire.

4.1.1.1 Burials from Huaca Santa Clara

Two burials were found in Sector 4. HSC13 was found just below the current surface (50 cm) and HSC14 was found in Room A-122 between two superimposed floors,
70 cm below the current surface. HSC13, partially disturbed due to looting, was an adult placed in the fetal position on the left side, and with the head towards the west. The grave goods consisted of three mantles, a small golden ball tied with thread, red wool and more thread. HSC14 (also an adult), partially disturbed due to looting, was placed in supine position with the head towards the west in a cane coffin. Grave goods consisted of an external mantle, and internal mantle, red ochre paint, gourd containers placed under the head, under the feet and over the feet, and copper pieces placed in the mouth, in each hand and below the feet (Millaire and La Torre Calvera 2003).

Nine burials were found in Sector 6. Three were dated to the Virú Period (HSC7 – HSC9) and six were dated to the Tomaval Period (HSC3 – HSC6 and HSC10 – HSC11). The six Tomaval Period burials, in contrast to the Virú Period burials were interred in the ruins of the site, centuries after it was abandoned, as a part of a late ritual event which included the probable sacrifice of 27 juvenile camelids (as evidenced by perimortem cutmarks on the ribs of at least two of the llamas) (Figure 4.4) (Millaire and La Torre Calvera 2003; Millaire 2015b).

HSC8 was found 10 cm below the current surface, northeast of room A-106. This adult individual was placed in a supine position with the head towards the south. The feet were disturbed either by looting or due to erosion. Grave goods consisted of a textile cloth panel and a mantle. HSC7 and HSC9 were excavated in room A-102 on the west side of the wall, dug into different levels of a ramp (HSC7 below HSC9). The room contained artifacts and ecofacts, a niche on one wall, and posts that indicated the room was covered by a roof, but was open on the eastern side with a view of the valley. This room would likely have been an area for elite activities, due to its restrictive access and its prime location as a lookout over the eastern side of the settlement, agricultural lands and the valley neck (on a trade route from the highlands to the coast). This room’s importance was evident also by the presence of a propitiatory ritual, whereby a series of ceramics were broken for the foundation of the room (Millaire 2015c). HSC7, 180 cm below the surface, was placed in a supine position and slightly on the right side with the head to the north. This individual was an adult and had tattoos on the face. Grave goods consisted of a tunic below the knees, three funerary mantles, a textile bag on the chest, a gourd plate and a yellow-haired dog. HSC9, also an adult, was found 225 cm below the surface, on
the right side, with the right arm up and right leg extended and out of the pit. The left leg was bent and the head was towards the north. There were tattooed lines around the left wrist. Grave goods consisted of a tunic over the knees, a mantle and a gourd plate (Millaire and La Torre Calvera 2003).

HSC3, HSC4 and HSC6 (all subadults) were recovered from room A-105, which was filled with refuse, artifacts and ecofacts. Several camelids and an offering of Spondylus shells were also buried in this area. The burials were dug into the floor, in the northwest corner of the room (HSC3 and HSC4 at the northern wall and HSC6 at the western wall). HSC3 was placed in a supine position with the head to the north and slightly bent backwards. A llama was interred with HSC3, with the arms of HSC3 wrapped around the legs of the llama. The lower portion of HSC3 was disturbed either by erosion or looting. HSC4 was lying on the right side inside a bench with the head to the

Figure 4.4: Map of Sector VI showing the position of the llama and human burials. Image courtesy of Jean-François Millaire.
north. The burial was disturbed from the neck down as a result of either erosion or looting. HSC4 was interred with a llama and a ceramic cup. HSC6, buried 1 m below the surface, was placed in a fetal position with the face oriented to the south with a scarf, a sling, 4 funerary mantles, a gourd plate and a llama (Millaire and La Torre Calvera 2003; Millaire and Surette 2011). Interestingly, these textiles are similar to those that were produced in the Late Chimú Period (Millaire and Surette 2011).

HSC5, HSC10 and HSC11 (all subadults) were found in rooms A-106 and A-106a just north of A-105. The room was filled with artifacts and ecofacts and several camelids. All three of these burials were disturbed either by looting or erosion and found approximately 10 cm below the current surface. HSC5 was buried with the head to the north and turned towards the left. The rest of the body (from the neck down) was disturbed and jumbled with a llama offering. HSC10 was placed with the top portion of the body in a prone position; the lower part of the body was disturbed. Grave goods consisted of 3 mantles. HSC11 was placed in a supine position with the head to the south; the grave was disturbed from the neck down. Grave goods consisted of a mantle, a textile, a scarf and a cream-coloured cotton thread ball (Millaire and La Torre Calvera 2003).

4.1.2 Huaca Gallinazo

The Gallinazo Group consists of a series of adobe mounds spread over approximately 600 ha of flatlands (although the mounds themselves take up an area of approximately 40 ha), of which V-59 (Huaca Gallinazo) is the largest and most central unit (Figure 4.5). Of the 30 identified mounds, six contain civic architecture and the rest are raised habitation platforms. The Gallinazo Group is located on the north side of the Virú River, several kilometers away from the present day coast. The site was occupied continuously from the first century B.C. to the seventh century A.D., and contained a population between 10,000 and 14,400 people at its zenith in the Virú Period (Millaire and La Torre Calvera 2008; Millaire 2010b; Millaire and Eastaugh 2011).
Huaca Gallinazo features a number of architectural compounds, each containing multiroom residential units. Building quality varied from more modest construction to more elaborate houses with courtyards. The largest civic building (approx. 82,000 m$^3$) at the Gallinazo Group is on the top of Huaca Gallinazo and is composed of a large platform and an adjacent terrace (Southern Platform) that is in front of a wide plaza (Figure 4.6). This combination of architecture is common in Moche sites as well and was likely used for ceremonial activities and large public gatherings (Millaire 2010b).

The site, in addition to residential and ceremonial components, had an administrative component as evidenced by a series of warehouses (Millaire and La Torre Calvera 2008). The growth of the site does not appear to be very ordered, likely demonstrating the rapid population growth during the Virú Period. The occupation of the site also appears to have been constant throughout this period (Bennett 1950; Millaire and La Torre Calvera 2008).

4.1.2.1 Burials from Huaca Gallinazo

The excavation of Trench 1 in Architectural Complex 1 (Sector B) (Figure 4.6) revealed a courtyard area with a series of levels. HG1, found 66 cm below the current surface, was originally placed below a number of these floors. HG1 was an adult buried in extended and supine position with the head to the east and face turned to the south.
Some textile and gourd container fragments were present in the grave. Tattooed fragments of skin were also preserved. HG2, found 88 cm below the surface, was interred near the east wall of the courtyard, dug into floors 1 and 2 (the last two floors constructed). HG2 was a subadult buried inside what appears to be a small textile bundle. A gourd container filled with maize was found in the grave, as well as parts of a neonatal llama (Millaire and La Torre Calvera 2008).

Figure 4.6: Map of Huaca Gallinazo showing the location of Sector A (Southern Platform) and Sector B (Architectural Complex 1). Image courtesy of Jean-François Millaire.
As mentioned previously, the main, and largest, civic building is at the center of Huaca Gallinazo. The building was heavily looted, but consisted of a number of chambers, a high platform (Main Platform) and a shelf platform next to it (Southern Platform) that faced a large, likely public, courtyard. The Southern Platform (Sector A) consists of several layers of occupation. Intrusive into the semi-compact layer above level 2 in the northwest corner were three subadult burials (Figure 4.7). HG4 was found in a bundle of disintegrated textile remains, 2.2 m below the surface, and 8 cm into the second floor at the base of the north wall. HG5 was found 2.16 m below the surface and 5 cm into the second floor in the north-west corner, with the skull upright and facing south. The rest of the skeleton was a jumble of bones and disintegrated textiles, placed beneath the skull. HG6 was 2.2 m below the surface and 5 cm into the second floor, at the base of the west wall. This subadult was placed in an extended position, and lying on the right side with the head to the north. Grave goods consisted of disintegrated fragments of textiles and a gourd bowl placed over the pelvis. HG3 was also found in the Southern Platform of Sector A (Figure 4.7), 1.6 m below the surface in an extended and supine position with the head to the north. This individual was placed with textile fragments, 3 gourd bowls, a decorated ceramic jug, as well as fragments of a jar and a bowl (Millaire and La Torre Calvera 2011).
Figure 4.7: Map of the Southern Platform (Sector A) showing HG3-HG6 (Entierro means Burial). Image courtesy of Jean-François Millaire.

4.2 Methods

4.2.1 Demographic Information

Age and sex were estimated using standards presented in Buikstra and Ubelaker (1994). Sex estimates were applied only with individuals aged from late adolescence onwards (once differences in certain characteristics of the skull and pelvis have been established). Sex was scored as male, probable male, female, probable female and
undetermined based on morphological features of the skull (nuchal crest, mastoid process, supraorbital margin, prominence of glabella and mental eminence), following Acsadi and Nemeskeri (1970), and the pelvis (preauricular sulcus, greater sciatic notch, ventral arc, subpubic concavity and ischiopubic ramus ridge), following Phenice (1969) and Buikstra and Ubelaker (1994). When different scores were assigned to different characteristics, the average of the scores was taken and was considered along with general observations regarding the overall size and shape of the pelvis and skull (Buikstra and Ubelaker 1994).

Age was assigned for subadults predominantly based on a dental calcification and eruption chart established by Gaither (2004) in her study of growth and development for pre-Columbian coastal Peruvian populations. Epiphyseal fusion (scored as open, partial union, complete union or unobservable) and long bone lengths were also recorded (Buikstra and Ubelaker 1994) and compared to the ages established by Gaither’s dental calcification and eruption chart.

Adult age was established using Suchey-Brooks pubic symphysis scoring system (Brooks and Suchey 1990; Suchey and Katz 1986) and the Meindl and Lovejoy scoring system for assessing age-related changes to the auricular surface of the ilium (Meindl et al. 1985). Epiphyseal fusion was also assessed and individuals were assigned ages based on Buikstra and Ubelaker’s epiphyseal union chart (1994:43). Where multiple ages were generated from these different methods, the age ranges were averaged out (White et al. 2011). Individuals were then placed in age categories of fetus (before birth), infant (0-3 years), child (3-12 years), adolescent (12-20 years), young adult (20-35 years), middle adult (35-50 years), and old adult (50+ years) (Buikstra and Ubelaker 1994).

4.2.2 Stature

Stature was calculated for each adult individual (individuals for whom epiphyseal fusion of the long bones was complete, indicating that growth in height was complete). The regression formulae used herein are revised versions of the Genovés (1967) formulae by Del Angel and Cisneros (2004) (see Table 4.2). They were developed from a Mesoamerican sample and are thus a better method for calculating living stature for South American populations than other existing standards.
Table 4.2: Estimated living stature formulae from Del Angel and Cisneros (2004).

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur</td>
<td>Stature = $63.89 + 2.262\times(femur\ length\ in\ cm)$</td>
<td>Stature = $47.25 + 2.588\times(femur\ length\ in\ cm)$</td>
</tr>
<tr>
<td>Tibia</td>
<td>Stature = $91.26 + 1.958\times(tibia\ length\ in\ cm)$</td>
<td>Stature = $61.29 + 2.720\times(tibia\ length\ in\ cm)$</td>
</tr>
<tr>
<td>Fibula</td>
<td>Stature = $94.09 + 1.919\times(fibula\ length\ in\ cm)$</td>
<td>Stature = $54.55 + 2.988\times(fibula\ length\ in\ cm)$</td>
</tr>
<tr>
<td>Humerus</td>
<td>Stature = $83.52 + 2.505\times(humerus\ length\ in\ cm)$</td>
<td>Stature = $32.35 + 4.160\times(humerus\ length\ in\ cm)$</td>
</tr>
<tr>
<td>Ulna</td>
<td>Stature = $94.80 + 2.615\times(ulna\ length\ in\ cm)$</td>
<td>Stature = $58.72 + 3.991\times(ulna\ length\ in\ cm)$</td>
</tr>
<tr>
<td>Radius</td>
<td>Stature = $98.22 + 2.668\times(radius\ length\ in\ cm)$</td>
<td>Stature = $66.88 + 3.926\times(radius\ length\ in\ cm)$</td>
</tr>
</tbody>
</table>

4.2.3 Artificial Cranial Modification

Adult crania were classified according to the types established by Imbelloni (Dembo and Imbelloni 1938): tabular, annular (with erect or oblique variants) or unmodified. These classifications were made according to visual assessment using a modified version of the coding scheme in Buikstra and Ubelaker (1994), created by Blom (2005). Additionally, cranial indexes (cranial breadth/cranial length x100) were calculated. Cranial indexes above 85 (the unmodified range for most pre-Columbian coastal Peruvian populations being between 80-85) indicated that the cranium was probably modified (Nelson et al. 2000). Interestingly, unmodified crania from the highlands seem to have been longer in general than those from the coast (Ross et al. 2008), thus crania with lower cranial indexes (below 80) should be interpreted with caution as they may be highlanders.

4.2.4 Trauma

Any observable trauma was thoroughly described following Buikstra and Ubelaker (1994), discerning antemortem, perimortem or postmortem trauma in the process. The type and frequency of ante-mortem and perimortem injuries, and the pattern of these injuries were assessed in order to attempt to determine accidental versus
intentional injuries and the most likely mechanism behind the injury (Galloway 1999; Lovell 1997).

4.2.5 Specific Diseases

Any observed pathological lesions were thoroughly recorded, photographed and described according to established standards (Buikstra and Ubelaker 1994). Based on these observations, a differential diagnosis was attempted for any of these observed pathological lesions.

4.2.6 Non-Specific Indicators of Stress

4.2.6.1 Enamel Hypoplasia

Enamel hypoplasia was recorded and classified following Buikstra and Ubelaker (1994) who use the Developmental Defects of Dental Enamel (DDE) Index which classifies according to the type of defect, the colour of the defect, the number and demarcation of the defect and the location of the defect on the tooth (Federation Dentaire Internationale 1982). The approximate chronological time of onset of the stress episode was determined following Goodman and Rose’s (1991) method which measures the position of the defect (from a point in the middle of the defect) from the cemento-enamel junction (CEJ) and based on a series of regression equations, determines an estimate for the age of onset of the enamel hypoplasia, and thus the stress episode.

17 The age of onset established by the Goodman and Rose (1991) method is an estimation only. There are a number of potential sources of error in these estimates, although they are thought to be minimal (for more information, see Goodman and Rose 1990; Goodman and Rose 1991).

18 Although there has been some debate over the use of different methods for determining the timing of stress episodes from Linear Enamel Hypoplasia (LEH), Goodman and Rose’s (1991) method was employed here over that of Reid and Dean (2006) for ease of comparison as it is the standard chosen by Buikstra and Ubelaker (1994). Hillson (2005) has noted several issues with the Goodman and Rose (1991) method. The measurement system that it is based upon (CEJ) has several mistakes in the table for age conversion, the calipers are not very precise for measuring small defects and the table assumes a constant unworn crown height (Hillson 2005). The two methods have been compared in studies which have shown that the Reid and Dean (2006) method produces significantly older age estimates for LEH formation ages, however which method is preferable has not been entirely agreed upon (Martin et al. 2008; Ritzman et al. 2008).
4.2.6.2 Porotic Hyperostosis and Cribra Orbitalia

Cribra orbitalia and porotic hyperostosis were scored according to Stuart-Macadam’s (1982) five degrees of severity, replicated and pictured in Ribot and Roberts (1996). The position of the lesions as well as whether or not they showed any evidence of healing was also described.

4.2.6.3 Non-Specific Osteoperiostitis

Non-specific osteoperiostitis was scored according to distribution, the type of reaction (remodelled, active or a combination of both). It was also scored according to severity in six stages following Buikstra and Ubelaker (1994) and Ribot and Roberts (1996).

4.2.7 Dental Pathology

Fourteen individuals (adults and subadults) had partial or complete dentition or alveoli that were analyzed for dental pathological lesions including: caries, calculus, periapical abscesses, antemortem tooth loss and alveolar resorption. Of this number, one adult female and three subadults were from the Virú Period at Huaca Gallinazo, two adult females and two adult males were from the Virú Period at Huaca Santa Clara and six subadults were from the Tomaval Period at Huaca Santa Clara. Only subadults with teeth that had erupted were included in this sample, therefore HG4 and HG5 were not analyzed. One adult (HSC7) was not included in the analysis as the mouth was inaccessible due to coverage by mummified tissue.

Dental pathological lesions were recorded according to established standards (Buikstra and Ubelaker 1994). Each carious lesion on each tooth was recorded and the location of the lesion noted and sketched. The number of teeth that each individual lost antemortem was recorded, as well as the number and location of abscesses, and the distribution and degree (or severity) of dental calculus formation and alveolar resorption. Frequencies for each of these pathological lesions were calculated per individual and per tooth for all individuals (separating subadults from adults). For scoring tooth wear among subadults, as there is of yet no standard charts, a 10 stage system was used.

See Appendix G for photos of each degree of severity for dental calculus and alveolar resorption.
used, following Dawson and Robson Brown (2013). In order to more easily compare the degree of attrition, a 10 stage system was also used to score anterior adult dentition, as opposed to Smith (1984), following Littleton et al. (2013).
5 RESULTS

5.1 Sample Composition

The human remains studied herein were excavated from several contexts from the sites of Huaca Santa Clara (HSC) and Huaca Gallinazo (HG). Age and sex estimates for each individual are presented below (Table 5.1). See Appendix D for details on the age and sex estimates.

Table 5.1: Age and sex estimates for individuals from Huaca Santa Clara and Huaca Gallinazo.

<table>
<thead>
<tr>
<th>Burial Number</th>
<th>Estimate Age</th>
<th>Age Category</th>
<th>Estimated Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>30 – 35 years</td>
<td>Young adult</td>
<td>F</td>
</tr>
<tr>
<td>HG2</td>
<td>1 year +/- 4 months</td>
<td>Infant</td>
<td></td>
</tr>
<tr>
<td>HG3</td>
<td>3 years +/- 11 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HG4</td>
<td>Birth +/- 2 months</td>
<td>Infant</td>
<td></td>
</tr>
<tr>
<td>HG5</td>
<td>3 months</td>
<td>Infant</td>
<td></td>
</tr>
<tr>
<td>HG6</td>
<td>5 years +/- 20 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC3</td>
<td>4 years +/- 15 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC4</td>
<td>12 years +/- 21 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC5</td>
<td>7 years +/- 20 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC6</td>
<td>10 years +/- 14 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC7</td>
<td>20 – 25 years</td>
<td>Young adult</td>
<td>F?</td>
</tr>
<tr>
<td>HSC8</td>
<td>30 – 35 years</td>
<td>Young adult</td>
<td>M</td>
</tr>
<tr>
<td>HSC9</td>
<td>20 – 25 years</td>
<td>Young adult</td>
<td>F</td>
</tr>
<tr>
<td>HSC10</td>
<td>7 years +/- 20 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC11</td>
<td>12 years +/- 21 months</td>
<td>Child</td>
<td></td>
</tr>
<tr>
<td>HSC13</td>
<td>45 – 50 years</td>
<td>Middle adult</td>
<td>F?</td>
</tr>
<tr>
<td>HSC14</td>
<td>35 – 40 years</td>
<td>Middle adult</td>
<td>M</td>
</tr>
</tbody>
</table>

The majority of the individuals in these samples were subadults (77%). All the individuals from the Tomaval Period interments at Huaca Santa Clara were children and all of the individuals (n=4) from the Southern Platform at Huaca Gallinazo were either infants or children. Of the other remaining interments from Huaca Gallinazo (n=2) from Architectural Complex 1 of Sector B, one individual was a young adult female and the other was a child. All individuals from the Virú Period from Huaca Santa Clara were adults (2 males and 3 females) (see Table 5.2 for demographic profile).
Table 5.2: Demographic profile of the individuals from Huaca Gallinazo and Huaca Santa Clara.

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Huaca Gallinazo (Virú Period)</th>
<th>Huaca Santa Clara (Virú Period)</th>
<th>Huaca Santa Clara (Tomaval Period)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Fetus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant (birth-3 years)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child (3-12 years)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adolescent (12-20 years)</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Young Adult (20-35 years)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Middle Adult (35-50 years)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Old Adult (50+ years)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2 Stature

All the adults in these samples were from the Virú Period (the Early Intermediate Period). The mean living stature (calculated following Del Angel and Cisneros (2004)) for the females was 149.6 cm, with a range of 145.3 cm to 153.2 cm. The mean living stature for the males was 160.9 cm with a range of 159.8 cm to 161.9 cm (Table 5.3).

Table 5.3: Living stature estimates for adult individuals from Huaca Gallinazo and Huaca Santa Clara.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Sex</th>
<th>Stature Estimate (using femur length) in cm</th>
<th>Stature Estimate (using tibia length) in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>F</td>
<td>147.7</td>
<td>151.1</td>
</tr>
<tr>
<td>HSC7</td>
<td>F?</td>
<td>140.4</td>
<td>145.3</td>
</tr>
<tr>
<td>HSC8</td>
<td>M</td>
<td>155.3</td>
<td>159.8</td>
</tr>
<tr>
<td>HSC9</td>
<td>F</td>
<td>157.0</td>
<td>153.2</td>
</tr>
<tr>
<td>HSC13</td>
<td>F?</td>
<td>148.2</td>
<td>148.6</td>
</tr>
<tr>
<td>HSC14</td>
<td>M</td>
<td>159.4</td>
<td>161.9</td>
</tr>
</tbody>
</table>

Average Male Stature Using Tibia Estimates (cm)\(^{20}\) 160.9

Average Female Stature Using Tibia Estimates (cm) 149.6

HG1, the only individual from Huaca Gallinazo in this sample, fell close to the female mean, as well as close to the mean for San José de Moro (see Table 5.4, Figure

\(^{20}\) The tibia was used in order to calculate the averages for the living stature estimates.
HG1 was taller than the female means from Pacatnamú and El Brujo (though was still within the range of heights, for all but one sample), but was shorter than the mean from Sipán. From Huaca Santa Clara, HSC7 was the shortest individual among the females at 145.3 cm, although was close to the means from Pacatnamú (A-C) and El Brujo. HSC13, at 148.6 cm was close to the sample mean and the mean for San José de Moro and fell within all available population ranges (although was taller than the means for Pacatnamú (A-D) and El Brujo, and shorter than the mean for Sipán). HSC9, however, was at the taller end of many of the female ranges, and fell outside of the ranges for Pacatnamú (B-C) and El Brujo. This individual was, however, close to the mean for Sipán. Of the two males, HSC8 was closer to the means from other populations (although was taller than the means for Pacatnamú (A-C) and Huaca de la Luna) and HSC14 was closer to the taller end of the ranges (although was close to the means for Sipán and San José de Moro).

Interestingly, most individuals from the Huaca Gallinazo and Huaca Santa Clara sample fell closer to the means of the samples of elite individuals (Sipán, San José de Moro and Pacatnamú D (Andrew Nelson, personal communication 2014; Verano 1997b)), as opposed to the samples from Pacatnamú (A-C) and El Brujo, which consisted of commoners (Verano 1997a). This perhaps is an indication that these individuals were members of an elite class.

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21 See Table 5.4 for details on the source for each comparison sample and how each author’s stature estimates were treated for comparison to the samples from Huaca Santa Clara and Huaca Gallinazo.
Table 5.4: Comparison of stature estimates for the north coast of Peru during the Early Intermediate Period.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Number of Individuals</th>
<th>Average</th>
<th>Range</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Huaca Santa Clara and Huaca Gallinazo</td>
<td>2</td>
<td>4</td>
<td>160.9</td>
<td>149.6</td>
</tr>
<tr>
<td>Site S2 (Pacatnamú A)</td>
<td>19</td>
<td>18</td>
<td>154.2</td>
<td>144.9</td>
</tr>
<tr>
<td>Site S24 (Pacatnamú B)</td>
<td>17</td>
<td>21</td>
<td>155.8</td>
<td>143.7</td>
</tr>
<tr>
<td>Site H45CM1 (Pacatnamú C)</td>
<td>17</td>
<td>13</td>
<td>155.3</td>
<td>144.4</td>
</tr>
<tr>
<td>El Brujo</td>
<td>9</td>
<td>4</td>
<td>157.4</td>
<td>144.1</td>
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<tr>
<td>Sipán</td>
<td>3</td>
<td>3</td>
<td>159.0</td>
<td>154.1</td>
</tr>
<tr>
<td>Plaza 3A, Huaca de la Luna</td>
<td>29</td>
<td></td>
<td>153.9</td>
<td>148.0-161.3</td>
</tr>
<tr>
<td>Pacatnamú (Pacatnamú D)</td>
<td>6</td>
<td>1</td>
<td>158.8</td>
<td>140.9</td>
</tr>
<tr>
<td>San José de Moro</td>
<td>9</td>
<td>6</td>
<td>161.1</td>
<td>149.7</td>
</tr>
</tbody>
</table>

*Calculated following del Angel and Cisneros (2004), using the averaged tibia estimates (when available).

**Calculated following Génoves (1967). In this work, 2.5 cm was subtracted from the original published data to account for the correction for living stature.

22 Note that the stature estimates presented in this table from other authors do not match the estimates provided in the original sources, due to a correction applied for living stature (subtraction of 2.5 cm). See the comments at the bottom of the table.
23 Only those individuals who were identified as being interred during the Early Intermediate Period were included here.
24 Only those individuals who were identified as being interred during the Early Intermediate Period were included here.
Figure 5.1: Chart comparing male living stature estimates from Early Intermediate Period samples on the north coast of Peru.

Figure 5.2: Chart comparing female living stature estimates from Early Intermediate Period samples on the north coast of Peru.
5.3 Artificial Cranial Modification

Eleven individuals had fused crania for which a cranial index could be calculated. HSC9, had multiple perimortem fractures to the skull, which precluded the calculation of the cranial index. A visual examination of the skull of HSC9 was conducted, however, and revealed that the skull was likely unmodified. There did not appear to be any flattening superiorly, and while there may have been some pouching in the nuchal area of the occipital squama, there were no obvious markings indicating an apparatus.

Of the individuals for which a cranial index could be calculated (Table 5.5), six (HG1, HSC3, HSC7, HSC10, HSC11, HSC14) were above the non-modified range (80-85) for pre-Columbian Peruvian populations (Nelson et al. 2000). HSC4 and HSC13 were considered unmodified based on their cranial indexes25, however HSC4 did show some indication of a band having been placed posterior to the coronal suture and around the base of the occiput, perhaps indicating a slight annular modification (Form G) (see Appendix E for cranial modification typology).

Table 5.5: Cranial index and ACM classification of individuals from Huaca Gallinazo and Huaca Santa Clara.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Cranial Index</th>
<th>ACM Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>88.96</td>
<td>Form C</td>
</tr>
<tr>
<td>HSC3</td>
<td>95.33</td>
<td>Form D</td>
</tr>
<tr>
<td>HSC4</td>
<td>80.72</td>
<td>Form G?</td>
</tr>
<tr>
<td>HSC5</td>
<td>73.33</td>
<td>Form E</td>
</tr>
<tr>
<td>HSC6</td>
<td>69.49</td>
<td>Form G</td>
</tr>
<tr>
<td>HSC7</td>
<td>90.67</td>
<td>Form C</td>
</tr>
<tr>
<td>HSC8</td>
<td>79.55</td>
<td>Form B</td>
</tr>
<tr>
<td>HSC10</td>
<td>91.25</td>
<td>Form F</td>
</tr>
<tr>
<td>HSC11</td>
<td>110.20</td>
<td>Form F</td>
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<tr>
<td>HSC13</td>
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</tr>
<tr>
<td>HSC14</td>
<td>89.35</td>
<td>Form C</td>
</tr>
</tbody>
</table>

Many of the crania (HG1, HSC3, HSC7, HSC8, HSC10, HSC11, HSC14) had slight posterior flattening, and some of these were asymmetric (HG1, HSC3, HSC8, HSC10 and HSC14), with no preference as to the side of the asymmetry. Posterior flattening can occur accidentally as a result of cradle-boarding and asymmetrical posterior

25 The cranial index is only a guide, however, and should only be considered in conjunction with a visual examination (Andrew Nelson, personal communication 2014).
flattening can be the result of cradle-boarding when the child has a preference for laying on a certain side (Andrew Nelson, personal communication 2014, Blom 2005). Alternatively, posterior flattening could result from a board being placed asymmetrically on the cranium, which would likely explain the accidental asymmetry in some cases where there is some form of intentional modification. In the case of HSC8, the asymmetry, although extreme, was likely the result of accidental cradle boarding, with no intention to modify. HG1, HSC3, HSC10 and HSC14 were likely all modified intentionally with accidental asymmetry being the result of a board being placed asymmetrically.

The majority of the individuals with artificial cranial modification had some form of tabular (fronto-occipital) modification. HG1, HSC7 and HSC14 were all Form C with flattening frontally and occipitally. HSC3 (Form D) had an additional degree of flattening on the superior aspect of the cranium. HSC5 (Form E) had a slightly different angle of occipital flattening, producing a lengthened cranium, with the flattening having been centered on lambda and angled acutely. HSC10 and HSC11 (Form F) had a type of tabular modification that shortens the cranium dramatically and produces bulging parietals (creating a heart shape when viewed superiorly).

HSC6 and HSC4 differed from the rest of the sample in that they had annular modifications (Form G), producing an elongated and narrow cranium. HSC4, although in the non-modified cranial index range, did show some indication of modification (as previously mentioned), approaching Form G, although it was by no means pronounced.

There was a slight outline of a possible triangular pad above lambda on the cranium of HG1 and a similar slight outline of a pad (either triangular or oval) was also present at lambda on HSC11. HSC11 is a clear example of a tabular modification. It was not clear whether this is also the case with HG1, as the modification is so slight. The pad of HG1 was placed higher than that of HSC11, so it is possible that the applied apparatus was intended to produce a different result from that of HSC11. There was also a slight indication of a pad (unknown shape) at lambda on HSC10.

5.4 Trauma

Two individuals (HG1 and HG6) out of six from Huaca Gallinazo (Virú Period), one individual (HSC13) out of five from Huaca Santa Clara (Virú Period) and two
individuals (HSC4 and HSC10) out of six from Huaca Santa Clara (Tomaval Period) had evidence of antemortem trauma. Only one individual (HSC9) out of five from Huaca Santa Clara (Virú Period) had any evidence of perimortem fractures, and only one individual (HSC8) out of five from Huaca Santa Clara (Virú Period) had any evidence of perimortem cutmarks. Finally, from Huaca Santa Clara (Tomaval Period), four (HSC3, HSC4, HSC5, HSC10) out of six individuals had evidence of perimortem cutmarks. All individuals with evidence of antemortem trauma were described separately and then summarized by skeletal element, age and time period. Individuals with perimortem cutmarks were discussed collectively. See Appendix F for photographs.

5.4.1 Antemortem Trauma

5.4.1.1 HG1

The sternal ends of the left third and fourth ribs of this individual had healing transverse fractures. This type of transverse fracture in ribs is commonly associated with a direct blow to the chest, and would have required a significant amount of force, as this area is highly flexible antero-posteriorly. With the degree of healing to these fractures, the injury would not have significantly damaged the soft tissue around the area as any significant damage in this area would have been life-threatening, before any healing was possible (Galloway, 1999; Lovell, 1997).

There was also a fracture to the left fifth proximal phalange of the foot, with some healing involved. This injury was likely the result of a stubbed toe, as it was a compression fracture in the anterior-posterior direction (Galloway 1999).

5.4.1.2 HG6

This individual had fractures to four ribs that had only just begun to heal (with periosteal new bone around the fracture site in each case). The fractures were located at the sternal ends of the first and second right ribs, and at the midshaft of one right middle rib and at the rib neck of another right middle rib. It is likely that these are ribs three and four on the right side, as based on the degree of healing, they appear to all be from the same injury.

This injury would have evidently required a great deal of force due to the location of these fractures, and especially due to the first rib fracture often being associated with
car accidents in modern times – where there is a great deal of force involved (Galloway 1999). First rib fractures (often the result of major blunt force trauma to the thorax, but which can also be the result of a violent muscular pull) often mean major chest injury, vascular injury and nerve damage and are associated with a high mortality rate (Matos 2009; Richardson et al. 1975).

5.4.1.3 HSC4

There was a healed lateral and oblique fracture to the left third rib that was likely the result of anteroposterior compression. This would have occurred by means of some form of weight being on top of the individual leading to the broken rib(s) (the other ribs from this side are missing and may have been fractured as well given the type of injury). The sharp point of the rib from this fracture may have damaged the surrounding soft tissue, however, the individual obviously lived for some time following injury, so if there was damage it was not immediately fatal.

This individual also had a healed Colles fracture to the right radius and ulna which has associated osteoperiostitis and which was not set properly, leading to a permanent bend in the distal radius and ulna. This injury may have possibly resulted in damage to the growth plate in these epiphyses, explaining why these bones were so short for this individual’s age range (Galloway 1999; Lovell 1997).

5.4.1.4 HSC10

The right clavicle of this individual was previously fractured at the scapular end, foreshortening the clavicle and creating an exaggerated bend, but it had completely healed. This type of fracture was likely the result of a fall onto the shoulder, or, less likely, a fall onto the outstretched right hand (Lovell 1997).

5.4.1.5 HSC13

This individual had a midshaft fracture to the left ulna with a callus. This was unlikely the result of a ‘parry’ fracture (resulting from a blow by a weapon or a falling object on a upraised arm), as the fracture occurs more towards the proximal end of the ulna. It is more likely a Monteggia fracture (resulting from a fall onto a sharp edge or a direct blow to the posterior forearm as the arm is raised very high in front of the face to block the blow), as it involves the fracture of the proximal radius with the dislocation of
the radial head (Galloway 1999; Larsen 1997; Lovell 1997). This fracture was ununited, despite the stage of healing, which suggests that the injury was not immobilized during healing, which is not unusual for the forearm (Jurmain 2001).

HSC13 also had a spiral fracture to the distal shaft of the left tibia. Indirect force would have caused this injury, and torsion would have been involved with a significant degree of force due to the longitudinal length of the spiral fracture. It would have been a compound fracture that subsequently became infected. There was some evidence of a callous formation indicating healing.

Additionally, this individual had a fully healed fracture of the right clavicle (at the anterior bend), which foreshortened it (likely the result of a fall onto the shoulder or, less likely, an outstretched hand (Lovell 1997)). There was also a fully healed fracture of the right fourth rib near the neck, and multiple healing fractures to the facial region (the left nasal bone (which is the most commonly fractured bone in the maxillofacial region (Brickley and Smith 2006)) and the left maxilla, into the left orbit) indicating multiple blunt force trauma to this area, which was likely the result of interpersonal trauma (Brickley and Smith 2006).

5.4.1.6 Summary

5.4.1.6.1 Huaca Gallinazo (Virú Period)

Two individuals from the Virú Period at Huaca Gallinazo (HG1, a young adult female, and HG6, a subadult) showed evidence of antemortem trauma. Both individuals had fractures to the ribs that, due to the nature of the fractures, would have had to be the result of a great deal of direct force. HG1 additionally had a fracture of the left fifth proximal toe phalange, which was likely the result of a stubbed toe.

5.4.1.6.2 Huaca Santa Clara (Virú Period)

Only one individual (HSC13) from the Virú Period at Huaca Santa Clara out of five had evidence of antemortem trauma. This individual (an adult female) also had the only evidence of antemortem cranio-facial trauma from any of these periods, with blunt

________________________________________
26 Due to the scarcity of published data available on rib fractures, comparison in order to reconstruct the cause of the injury is difficult (Matos 2009) and in this study, no more than generalized mechanisms behind these injuries could be ventured.
force trauma to the facial region. This individual also had a previously fractured ulna, clavicle, rib, and tibia, with the tibia being subsequently infected as the result of it being a compound fracture.

5.4.1.6.3 Huaca Santa Clara (Tomaval Period)

Two individuals (HSC4 and HSC10) out of six from Huaca Santa Clara (Tomaval Period) exhibited antemortem trauma, all of which was postcranial. HSC4 had fractured ribs and an improperly set (but fully healed) Colles fracture to the ulna and radius, and HSC10 had a fractured clavicle (fully healed).

5.4.2 Perimortem Trauma

5.4.2.1 Fractures

Only one individual from the Virú Period at Huaca Santa Clara (HSC9) had evidence of perimortem fractures. This individual had multiple radiating fractures, from what looks like two blunt force trauma points of origin on the posterior right side of the skull. There was also evidence of blunt force trauma with radiating fractures at several points of origin in the facial region and the left temple. It is very unlikely that this individual would have survived this trauma, a conclusion supported by the lack of healing, although it is also possible that these injuries were sustained shortly after death as the bone responds for a time as if it were living.

One child from the Tomaval Period interment at Huaca Santa Clara (HSC10) had perimortem fractures to four of the right middle ribs (possibly ribs seven through ten) ranging from the sternal ends to the bend of the rib, indicating a blow to the right side of the chest in this area.

5.4.2.2 Cutmarks

There were no individuals from Huaca Gallinazo with perimortem cutmarks. However, one individual from the Virú Period at Huaca Santa Clara (HSC8) and three individuals from the Tomaval Period at Huaca Santa Clara (HSC3, HSC5 and HSC10) had skeletal elements with perimortem cutmarks (see Appendix F for photographs).
5.4.2.2.1  Huaca Santa Clara (Virú Period)

5.4.2.2.1.1  HSC8

HSC8 (a young adult male) had a perimortem cutmark to the fourth left rib at the sternal end and on the superior surface, going in a medial to lateral direction. Given the direction of the cut, and its position, HSC8 would have been stabbed from the front, likely by an individual using their right hand.

5.4.2.2.2  Huaca Santa Clara (Tomaval Period)

5.4.2.2.2.1  HSC3

One of the sternal bodies (or the manubrium) of this subadult individual had a perimortem cutmark bisecting the body. It was not possible to tell which sternal body and in which direction the cut was made (given the young age of the individual), however it seems to have been made as a cut across a small portion of the upper chest (just below the neck).

HSC3 also had three cutmarks to the sternal rib ends. Two of these cutmarks were on the sternal end of the right third rib. These were on the superior surface of the sternal end going from a medial to lateral direction. This indicates that HSC3 was likely stabbed from the front, twice, by an individual using their left hand. The other cutmark was on the sternal end of the third left rib going from the superior edge to the inferior edge medially to laterally. This cutmark cut off the sternal end completely. This would have been the result of someone stabbing from the front using their right hand.

5.4.2.2.2.2  HSC5

HSC5 (a child) had one unsided rib fragment with a perimortem cutmark. It was cut completely through on one side creating a point at the end.

5.4.2.2.2.3  HSC10

HSC10’s manubrium had several perimortem cutmarks from right to left (angled superiorly to inferiorly from right to left), skipping some portions of bone in the middle of the manubrium. One of the sternal bodies was also cut in several places although it was not clear in what direction; it is likely that it was also cut in the same direction as the manubrium (from right to left, angled superiorly to inferiorly), and with one cutmark the
sternal body was bisected. These marks would have been the result of the individual being cut several times across a small section of the upper chest (just below the neck).

Cutmarks to the ribs were all on the left side and mostly towards the sternal end and on the superior surface. There were two cutmarks right at the sternal end of the fourth rib, one on the superior surface and one right below going from a medial to lateral direction. There were two cutmarks on the fifth rib close to the sternal end, one on the superior surface and the other cut all the way through the rib (both were cut, from the superior surface going in a medial to lateral direction). There was one cutmark on the superior surface of the sixth rib, just where the rib bends, going in a medial to lateral direction. Finally, on the third rib there was a cutmark going laterally to medially from the superior surface, and cutting all the way through the rib.

5.4.2.2.3 Summary

The left side ribs were the most commonly affected (2% of left ribs displaying perimortem cutmarks in the Virú Period and 13% in the Tomaval Period, versus none of the right ribs displaying perimortem cutmarks from the Virú Period and only 3% from the Tomaval Period). Ribs three through ten were the only ribs with perimortem cutmarks, showing a preference for cuts to the upper torso (indeed, the third and fourth ribs were the most affected). None of the sterna were cut in the Virú Period, however one manubrium and two sternal bodies from the Tomaval Period displayed perimortem cutmarks (Table 5.6). The unidentified rib fragment with a perimortem cutmark from HSC5 was not included in the analysis of the data.
Table 5.6: Perimortem cutmark distribution of individuals from Huaca Santa Clara.

<table>
<thead>
<tr>
<th>Skeletal Element</th>
<th>Total #</th>
<th># with Cuts</th>
<th>% of Bones Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left Side</td>
<td>Right Side</td>
<td>Left Side</td>
</tr>
<tr>
<td>1st Rib</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2nd Rib</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Ribs 3-10</td>
<td>32</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>11th Rib</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>12th Rib</td>
<td>5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49</strong></td>
<td><strong>58</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>Manubrium</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sternal Body</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Huaca Santa Clara (Tomaval Period)**

<table>
<thead>
<tr>
<th>Skeletal Element</th>
<th>Total #</th>
<th># with Cuts</th>
<th>% of Bones Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left Side</td>
<td>Right Side</td>
<td>Left Side</td>
</tr>
<tr>
<td>1st Rib</td>
<td>6</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>2nd Rib</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Ribs 3-10</td>
<td>23</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>11th Rib</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>12th Rib</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>37</strong></td>
<td><strong>5</strong></td>
</tr>
<tr>
<td>Manubrium</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sternal Body</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

This perimortem trauma seems to be characterized by multiple cutmarks in one area (sometimes on the same rib) at the sternal ends of the ribs, going medially to laterally from the superior portion of the rib shaft to the posterior portion. This indicates multiple stabs to the same area of the chest (the left upper chest). There were, however, some deviations from this pattern with one individual (HSC3) with cuts to both the right and left sides. The cutmarks to the manubrium and sternal bodies in some cases bisected the element completely, but in many cases there were also shallow cutmarks around the bisection, or on their own. This trauma may indicate the act of blood-letting (of which there is archaeological evidence in the Andean region (Hamilton 2005)), as it would be a strange way to try to kill someone outright (due to the location of the cuts – being below the throat).
5.5  Non-Specific Indicators of Stress

5.5.1  Osteoperiostitis

Only individuals from the Virú Period at Huaca Gallinazo and at Huaca Santa Clara had evidence of osteoperiostitis, as considered a non-specific indicator of stress. While some other individuals did have osteoperioseal reactions, these were not considered in this section as they were localized in nature, and thus were likely the result of trauma (Ortner 2003; Ribot and Roberts 1996; Wheeler 2012).

5.5.1.1  Huaca Gallinazo (Virú Period)

Only one subadult individual from this sample had any indication of osteoperiostitis (HG6). The reaction was present along the shaft of an unsided fibula (degree of severity 3), along the right tibial midshaft (degree of severity 4), and the distal shaft of the left ulna (degree of severity 5). The degree of severity of osteoperioseal lesions for this individual ranged from degree 3 to degree 5, thus representing a severe case.

5.5.1.2  Huaca Santa Clara (Virú Period)

Four individuals from Huaca Santa Clara during this time period had bones with osteoperiostitis. HSC7 had osteoperiostitis along the shafts of both femora (degree of severity 2). For HSC8, osteoperiostitis was present on the medial shafts and distal epiphyses of the tibiae and on the femora along on anterior shafts and posterior portion of the distal epiphyses (degree of severity 5). Both left and right femoral and tibial shafts had osteoperiostitis for HSC9 (degree of severity 2). Finally, HSC13 also had a reaction along the shafts of the femora (degree of severity 3).

5.5.1.3  Summary

Huaca Santa Clara (Virú Period) had the most individuals overall with osteoperiostitis (80% \((n=4)\) of that sample: HSC7, HSC8, HSC9 and HSC13), followed by Huaca Gallinazo (Virú Period: HG6) at 17% \((n=1)\). Of all individuals from all sites and periods, 29% \((n=5)\) had some degree of osteoperiostitis, with adults being more affected at 67% \((n=4)\), than subadults at 9% \((n=1)\). The frequency of adults with osteoperiostitis in this sample does seem high, especially when compared to adults from
Villa El Salvador and Túcume, although the frequency of subadults with osteoperiostitis in this sample is low compared to Túcume (Table 5.7). Finally, there was no evident pattern in terms of the degree of severity (Table 5.8).

Table 5.7: Frequency of osteoperiostitis in samples from Huaca Gallinazo and Huaca Santa Clara.

<table>
<thead>
<tr>
<th></th>
<th>Subadult (n=5)</th>
<th>Adult (n=1)</th>
<th>Total (n=6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Huaca Gallinazo (Virú Period, EIP)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>20%</td>
<td>0%</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Huaca Santa Clara (Virú Period, EIP)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>N/A</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>N/A</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td><strong>Huaca Santa Clara (Tomaval Period, MH)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>0%</td>
<td>N/A</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>9%</td>
<td>67%</td>
<td>29%</td>
</tr>
</tbody>
</table>

**Villa El Salvador (EIP)**

<table>
<thead>
<tr>
<th></th>
<th>Subadult (n=0)</th>
<th>Adult (n=59)</th>
<th>Total (n=59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>N/A</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>N/A</td>
<td>29%</td>
<td>29%</td>
</tr>
</tbody>
</table>

**Túcume (LIP)**

<table>
<thead>
<tr>
<th></th>
<th>Subadult (n=47)</th>
<th>Adult (n=63)</th>
<th>Total (n=110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Individuals with Periosteal Reactions</td>
<td>21</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>% of Individuals with Periosteal Reactions</td>
<td>45%</td>
<td>14%</td>
<td>27%</td>
</tr>
</tbody>
</table>

27 Data from Pechenkina and Delgado (2006).
28 Data from Toyne (2008).
Table 5.8: Degree of severity of osteoperiostitis in individuals from Huaca Santa Clara and Huaca Gallinazo.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Degree of Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>None</td>
</tr>
<tr>
<td>HG2</td>
<td>None</td>
</tr>
<tr>
<td>HG3</td>
<td>None</td>
</tr>
<tr>
<td>HG4</td>
<td>None</td>
</tr>
<tr>
<td>HG5</td>
<td>None</td>
</tr>
<tr>
<td>HG6</td>
<td>Degree 3-5</td>
</tr>
<tr>
<td>HSC3</td>
<td>None</td>
</tr>
<tr>
<td>HSC4</td>
<td>None</td>
</tr>
<tr>
<td>HSC5</td>
<td>None</td>
</tr>
<tr>
<td>HSC6</td>
<td>None</td>
</tr>
<tr>
<td>HSC7</td>
<td>Degree 2</td>
</tr>
<tr>
<td>HSC8</td>
<td>Degree 5</td>
</tr>
<tr>
<td>HSC9</td>
<td>Degree 2</td>
</tr>
<tr>
<td>HSC10</td>
<td>None</td>
</tr>
<tr>
<td>HSC11</td>
<td>None</td>
</tr>
<tr>
<td>HSC13</td>
<td>Degree 3</td>
</tr>
<tr>
<td>HSC14</td>
<td>None</td>
</tr>
</tbody>
</table>

5.5.2 Cribra Orbitalia and Porotic Hyperostosis

5.5.2.1 Huaca Gallinazo (Virú Period)

Two subadult individuals from the Virú Period at Huaca Gallinazo had lesions indicative of porotic hyperostosis and/or cribra orbitalia. HG3 had active cribra orbitalia (degree of severity 1) and HG5 also had active cribra orbitalia (degree of severity 1) and active porotic hyperostosis (degree of severity 2).

5.5.2.2 Huaca Santa Clara (Virú Period)

Three adult individuals (1 female: HSC7 and 2 males: HSC8 and HSC14) from the Virú Period at Huaca Santa Clara had evidence of healed lesions indicative of cribra orbitalia and/or porotic hyperostosis. HSC7 had evidence of healed porotic hyperostosis (degree of severity 1), HSC8 had evidence of healed cribra orbitalia (degree of severity 3) and healed porotic hyperostosis (degree of severity 5) and HSC14 had healed lesions indicative of porotic hyperostosis (degree of severity 2).

5.5.2.3 Huaca Santa Clara (Tomaval Period)

Four subadult individuals from the Tomaval Period at Huaca Santa Clara had active lesions indicative of cribra orbitalia and/or porotic hyperostosis. HSC3 had porotic
hyperostosis (degree of severity 2), HSC6 had porotic hyperostosis (degree of severity 2) and cribra orbitalia (degree of severity 2), HSC10 had porotic hyperostosis (degree of severity 2) and HSC11 had cribra orbitalia (degree of severity 1) and porotic hyperostosis (degree of severity 4).

5.5.2.4 Summary

Approximately half (53%) of the total number of individuals from all samples had evidence of porotic hyperostosis and/or cribra orbitalia (Table 5.9). Twenty-nine percent of individuals from all sites and time periods were affected by cribra orbitalia (24% active lesions and 6% healed lesions), while 47% of individuals were affected by porotic hyperostosis (29% active and 18% healed). A higher percentage of individuals were affected at Huaca Santa Clara in the Tomaval Period by porotic hyperostosis (67%) than individuals at Huaca Gallinazo in the Virú Period (17%) and individuals at Huaca Santa Clara during the Virú Period (60%). Huaca Gallinazo (Virú Period) and Huaca Santa Clara (Tomaval Period) had the same percentage of individuals affected by cribra orbitalia (33%), which was higher than that of Huaca Santa Clara (Virú Period) at 20%. Overall, there was a higher percentage of subadults with cribra orbitalia (36%), than adults with cribra orbitalia (17%), and adults had a higher percentage of individuals with porotic hyperostosis (50%), than did subadults (46%).

When compared to roughly contemporaneous populations in this region, Huaca Gallinazo had a higher frequency of individuals with cribra orbitalia and porotic hyperostosis than Pacatnamú (EIP), although not higher than Villa El Salvador. Huaca Santa Clara (Virú Period) had a higher frequency of individuals with porotic hyperostosis and cribra orbitalia than Pacatnamú (EIP), although a lower frequency of individuals with cribra orbitalia than at Villa El Salvador, and a similar frequency of individuals with porotic hyperostosis. Finally, there was a higher frequency of subadult individuals with porotic hyperostosis from the Huaca Santa Clara (Tomaval Period) sample than the subadult Túcume sample, although there was a lower frequency of individuals with cribra orbitalia at Huaca Santa Clara than at Túcume (Table 5.9). Finally, no adults had active lesions, whereas no subadults had healed lesions, and in terms of degree of severity of the lesions (Table 5.10), there were no clear patterns.
Table 5.9: Frequency of cribra orbitalia and porotic hyperostosis in samples from Huaca Santa Clara and Huaca Gallinazo.

<table>
<thead>
<tr>
<th></th>
<th>Unaffected</th>
<th></th>
<th></th>
<th></th>
<th>Cribra Orbitalia</th>
<th></th>
<th></th>
<th></th>
<th>Porotic Hyperostosis</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>Active</td>
<td>Healed</td>
<td>Total</td>
<td>Active</td>
<td>Healed</td>
<td>Total</td>
<td>Active</td>
<td>Healed</td>
</tr>
<tr>
<td><strong>Huaca Gallinazo (Virú Period, EIP)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>1</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Subadult</td>
<td>3</td>
<td>60%</td>
<td>2</td>
<td>40%</td>
<td>0</td>
<td>0%</td>
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<td>40%</td>
<td>1</td>
<td>20%</td>
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<tr>
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<td>33%</td>
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<td>0%</td>
<td>2</td>
<td>33%</td>
<td>1</td>
<td>17%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Huaca Santa Clara (Virú Period, EIP)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>2</td>
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<td>0</td>
<td>0%</td>
<td>1</td>
<td>20%</td>
<td>1</td>
<td>20%</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td>Subadult</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td>40%</td>
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<td>0%</td>
<td>1</td>
<td>20%</td>
<td>1</td>
<td>20%</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Huaca Santa Clara (Tomaval Period, MH)</strong></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>2</td>
<td>33%</td>
<td>2</td>
<td>33%</td>
<td>0</td>
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<td></td>
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<td>33%</td>
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<td>33%</td>
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</tr>
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<td><strong>Total</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Huaca Gallinazo (Virú Period, EIP)</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>3</td>
<td>50%</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>17%</td>
<td>1</td>
<td>17%</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>50%</td>
</tr>
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<td>5</td>
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<td>4</td>
<td>36%</td>
<td>0</td>
<td>0%</td>
<td>4</td>
<td>36%</td>
<td>5</td>
<td>46%</td>
<td>0</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
<td>47%</td>
<td>4</td>
<td>24%</td>
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<td>6%</td>
<td>5</td>
<td>29%</td>
<td>5</td>
<td>29%</td>
<td>3</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Túcume (LIP)</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Adult</td>
<td>29</td>
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<td>1</td>
<td>2%</td>
<td>3</td>
<td>5%</td>
<td>4</td>
<td>7%</td>
<td>2</td>
<td>4%</td>
<td>22</td>
<td>39%</td>
</tr>
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<td>13%</td>
<td>10</td>
<td>25%</td>
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<td>10%</td>
<td>7</td>
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</tr>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pacatnamú (LIP)</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Adult</td>
<td>31</td>
<td>27%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Villa El Salvador (EIP)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>32</td>
<td>53%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

29 Data from Toyne (2008).
30 Data from Verano (1997a).
31 Data from Verano (1997a).
32 Data from Pechenkina and Delgado (2006).
Table 5.10: Degree of severity of cribra orbitalia and porotic hyperostosis in individuals from Huaca Santa Clara and Huaca Gallinazo.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Cribra Orbitalia</th>
<th>Porotic Hyperostosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HG2</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HG3</td>
<td>Degree 1</td>
<td>None</td>
</tr>
<tr>
<td>HG4</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HG5</td>
<td>Degree 1</td>
<td>Degree 2</td>
</tr>
<tr>
<td>HG6</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HSC3</td>
<td>None</td>
<td>Degree 2</td>
</tr>
<tr>
<td>HSC4</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HSC5</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HSC6</td>
<td>Degree 2</td>
<td>Degree 2</td>
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<td>HSC7</td>
<td>None</td>
<td>Degree 1</td>
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<td>HSC8</td>
<td>Degree 3</td>
<td>Degree 5</td>
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<td>HSC9</td>
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<td>Degree 1</td>
<td>Degree 4</td>
</tr>
<tr>
<td>HSC13</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>HSC14</td>
<td>None</td>
<td>Degree 2</td>
</tr>
</tbody>
</table>

5.5.3 Enamel Hypoplasia

All individuals with available teeth were assessed for the presence of linear enamel hypoplasia (LEH) (a total of 16 individuals, 11 subadults and 5 adults). Of these individuals, six (HSC8, HSC9, HSC10, HSC11, HSC13, HSC14) had teeth with LEH (Table 5.11). The majority of the teeth with LEH were anterior teeth (77% of all teeth with enamel hypoplasia) (Table 5.12). None of the six individuals (one adult and five subadults) from Huaca Gallinazo (Virú Period) had any teeth with LEH, all of the individuals (all adults) from Huaca Santa Clara (Virú Period) had teeth with LEH and 33% of individuals (all subadults) from Huaca Santa Clara (Tomaval Period) had teeth with LEH. Compared to other roughly contemporaneous populations in this region, there is a higher frequency of individuals with LEH at Huaca Santa Clara (Virú Period) than at Villa El Salvador, for both males and females. Interestingly, there is a much lower frequency of subadult individuals with LEH from both the Huaca Gallinazo and Huaca Santa Clara contexts, than at Túcume (Table 5.11).
Table 5.11: Frequency of linear enamel hypoplasia in samples from Huaca Santa Clara and Huaca Gallinazo (individual count).

<table>
<thead>
<tr>
<th>Site</th>
<th>Male Frequency</th>
<th>Male N</th>
<th>Female Frequency</th>
<th>Female N</th>
<th>Subadult Frequency</th>
<th>Subadult N</th>
<th>Total Frequency</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huaca Gallinazo (VP, EIP)</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Huaca Santa Clara (VP, EIP)</td>
<td>1.00</td>
<td>2</td>
<td>1.00</td>
<td>2</td>
<td>1.00</td>
<td>4</td>
<td>1.00</td>
<td>4</td>
</tr>
<tr>
<td>Huaca Santa Clara (TP, MH)</td>
<td>0.33</td>
<td>2</td>
<td></td>
<td></td>
<td>0.33</td>
<td>2</td>
<td>0.33</td>
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</tr>
<tr>
<td>Total</td>
<td>1.00</td>
<td>2</td>
<td>0.67</td>
<td>2</td>
<td>0.18</td>
<td>2</td>
<td>0.38</td>
<td>6</td>
</tr>
<tr>
<td>Villa El Salvador (EIP)</td>
<td>0.66</td>
<td>19</td>
<td>0.82</td>
<td>18</td>
<td></td>
<td></td>
<td>0.73</td>
<td>37</td>
</tr>
<tr>
<td>Túcume (LIP)</td>
<td>0.79</td>
<td>33</td>
<td></td>
<td></td>
<td>0.81</td>
<td>47</td>
<td>0.80</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 5.12: Frequency of linear enamel hypoplasia in samples from Huaca Santa Clara and Huaca Gallinazo (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Number of Teeth with Linear Enamel Hypoplasia (N)</th>
<th>Total Number of Teeth (N)</th>
<th>Linear Enamel Hypoplasia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>15</td>
<td>110</td>
<td>13.6%</td>
</tr>
<tr>
<td>Canine</td>
<td>5</td>
<td>55</td>
<td>9.1%</td>
</tr>
<tr>
<td>Premolar</td>
<td>3</td>
<td>65</td>
<td>4.6%</td>
</tr>
<tr>
<td>Molar</td>
<td>3</td>
<td>142</td>
<td>2.1%</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>372</td>
<td>7.0%</td>
</tr>
</tbody>
</table>

Following Goodman and Rose (1990, 1991), the number of periods of growth arrest for each individual were determined based on the presence of enamel hypoplasia on more than one tooth in the same age period. Following this methodology, HSC8 and HSC10 did not have any periods of growth arrest (as they did not have enamel hypoplastic lesions on more than one tooth in a given age category), HSC11 had one (2-2.5 years), HSC9 and HSC14 had two periods each (2-2.5 years and 3.5-4 years, and 2.5-3 years and 3-3.5 years, respectively) and HSC13 had five periods of growth arrest (2-2.5 years, 3-3.5 years, 3.5-4 years, 4.5-5 years and 5-5.5 years). The highest number of individuals in a particular period of growth arrest was three individuals, in the 2 – 2.5 years age range possibly indicating a common age for weaning, although without a larger sample size, this is conjecture (Figure 5.3).

---

33 Data from Pechenkina and Delgado (2006).
34 Data from Toyne (2008).
Figure 5.3: Number of individuals for each period of growth arrest, as determined by linear enamel hypoplasia.

Another notable case of enamel hypoplasia was observed on the molars of HSC9 (a young adult female). She had small pits over the entirety of the cusps on all the M3s and partially (distally) on the maxillary M2s (see Appendix F for photographs). These are likely the result of a disruption in normal enamel development due to stress from illness or malnutrition and would have occurred between 9.5 and 10.5 years of age (based on the timing of the crown development) (Stan Kogon, personal communication 2014).

5.6 Disease and Other Anomalies

Each individual will be described separately in this section. For photographs, see Appendix F.

5.6.1 HG1

This young adult female had two vertebral bodies (C5 and C6) that were completely fused together (called a single block vertebra), apart for a small cleft between
the vertebral bodies in some places. This was the result of the failure of the precursor development units of C5 and C6 to separate during the development of the spinal column. Single block vertebrae (a genetic trait) are typically not pathological, as the vertebral bodies maintain the same degree of separation between each other and most often appear in the cervical vertebrae (Barnes 2012).

5.6.2 HG2

This infant had first ribs that were different sizes, with the right being shorter and with an odd bony growth on the sternal end, which matches with the right second rib. The right second rib had an abnormally wide shaft and a bony protuberance with exposed trabecular bone where the bony protuberance of the first right rib fitted. This was likely a fusion error, whereby the two ribs were fused together, a congenital abnormality known as a merged rib, which is common in the first two ribs (Barnes 2012).

5.6.3 HG3

This child showed signs of a Beaten-Copper Cranium, which is a radiological term used to describe a cranium that has deep impressions (thinning of the diploë) in the endocranium (but most prominently on the basal part of the frontal bone). Beaten-Copper crania are often the result of chronically increased intracranial pressure, which can be the result of a number of conditions. This appearance can be the result of normal variation, if restricted to the posterior skull (convolutional markings), but in this case it was all over the endocranium and in the diagnostic basal portion of the frontal bone (Rühli et al. 2007).

The lack of obvious cranial distortions or premature fusion of the sutures (which would be indicative of craniosynostosis), possibly indicates a case of later onset hydrocephalus (Rühli et al. 2007). In this cranium, there were also endocranial lesions in some of the thinned areas (immature new bone), which may be normal growth deposits, but could also be a non-specific indicator of haemorrhage or infection (Lewis 2004). The nature of the endocranial lesions would rule out tubercular meningitis as a possible cause as there are no eroded defects (Rühli et al. 2007).
5.6.4 HG4

This infant had porous endocranial lesions. Due to the age of the individual and the nature of the lesions, it is likely a case of normal growth deposits (Lewis 2004).

5.6.5 HG5

This individual had a possible case of infantile scurvy (a deficiency of vitamin C with clinical manifestations apparent after 6-10 months). This was identified by the presence of abnormal porosity and new bone on multiple parts of the cranium (the maxilla, the mandible, the occipital and parietal bones (endocranial and ectocranial surfaces), and the orbits). Together (and without the presence of abnormal porosity and new bone on any long bones), this suggests the presence of infantile scurvy over other possible aetiologies (Brickley and Ives 2006; Klaus 2014; Lewis 2004). Given that subadult scurvy was common on the coast and in the highlands in pre-Columbian Peru (Klaus 2014), this diagnosis seems to fit.

Given the young age of this individual (3 months), however, this diagnosis should be viewed with caution as infants who are still breastfeeding have passive immunity from their mothers (Katzenberg et al. 1996). Additionally, the types of food that individuals at Huaca Santa Clara and Huaca Gallinazo possibly had access to (Masur 2012; Venet-Rogers 2014) were high in vitamin C. This, however, is not to say that this infant was necessarily given or had access to these foods.

5.6.6 HG6

This child had hair-on-end endocranial lesions in the cruciform eminence with some evidence of healing. This type of lesion was possibly a result of inflammation, secondary to infection (Lewis 2004).

5.6.7 HSC6

This child had osteoperiostitis localized to the anterior crests of both tibiae. This would have likely been the result of infection or of some form of trauma.

5.6.8 HSC13

There were several randomly dispersed lytic pits on the ectocranial surface of the unmodified cranium of this individual (on the posterior aspect of the parietals, the
occipital squama and the nuchal area of the occiput). The pits had sharp edges, were oval or circular in shape (sometimes coalescing with another pit to form an irregular shape) and ranged from 4.35 to 19.23 mm at their widest points. The pits varied as to the depth they went into the ectocranial table, but they did not go so deep as to go through the endocranial table.

These lesions, although similar in some ways to the cranial lesions of trepanematosis (at the tertiary stage), did not show the remodelling aspect that should be present in caries sicca; rather, they were entirely lytic in nature (Waldron 2009). A mycotic infection is a likely candidate for the lesions due to the relatively random pattern of skeletal involvement. Possibilities include cryptoccosis where lesions usually appear lytic (with no associated new bone) and highly circumscribed on bony prominences, cranial bones and vertebrae. Another possibility is histoplasmosis whereby cystic lytic lesions with sclerosis and periosteal new bone may develop on the skull, ribs and pelvis; this is, however, the less likely option (Ortner 2003; Waldron 2009).

Mycotic infections are rarely reported in paleopathological literature (Roberts and Manchester 2005); however, a South American case of paracoccidiomycosis in a mummy from Chile has been reported (Allison et al. 1979). This, however, is not a possible option for this individual, as paracoccidiomycosis does not affect the skull, nor does coccidioidomycosis, another mycosis found in this region (Waldron 2009).

5.7 Degenerative Conditions

Of the six adults from Huaca Gallinazo and Huaca Santa Clara, three (HSC8, HSC13 and HSC14) showed signs of degenerative changes. HSC8 (young adult male), and HSC13 (middle adult female) showed signs of intervertebral disc disease with pitting on the superior surfaces of the vertebral bodies and marginal osteophytes. HSC14 (middle adult male) had degenerative joint disease (DJD) and Schmorl’s nodes (caused by great stress on the lower spine) on the superior surfaces of the lower lumbar vertebral bodies (Waldron 2009). HSC8 showed these signs on T11 (the other vertebrae as of yet did not show obvious evidence of intervertebral disc disease) and HSC13 and HSC14 on both L4 and L5. These changes in the lower thoracic and lumbar area are characteristic of generalized physical stress, as reported for both hunter-gatherer and for urban populations (Kennedy 1989).
5.8 Dental Pathology

The first section will give details for each type of dental pathology (caries, calculus, periapical abscesses, alveolar resorption, and antemortem tooth loss). The next section will present a summary of dental pathology for each sample (Huaca Gallinazo (VP), Huaca Santa Clara (VP), and Huaca Santa Clara (TP)).

5.8.1 Caries Summary

Out of the 14 individuals analyzed for the presence and frequency of caries, all but one subadult had carious lesions. Three individuals had a frequency of caries equal to or exceeding 50%, the rest also exhibiting high frequencies, ranging between 5% and 35% (Figure 5.4).

Figure 5.4: Frequency of dental caries for individuals from Huaca Santa Clara and Huaca Gallinazo.

Subadults from Huaca Gallinazo (Virú Period) (33%) had a higher caries rate than subadults from Huaca Santa Clara (Tomaval Period) (24%). The subadults from both of these samples had much higher caries rates than the subadults from Túcume (4%) (Table 5.13). The overall caries rate (subadults and adults) for Huaca Gallinazo (44%) was
higher than both the Huaca Santa Clara caries rates (23% for the Virú Period and 24% for the Tomaval Period). The caries rates for subadults, males and females for the all these samples combined were higher than all but the Cerro Oreja sample, among other roughly contemporaneous samples. Females had a higher caries rate than males (39% versus 21%), as did subadults (27%). This was also the case for individuals from other roughly contemporaneous sites (Table 5.13). The reason for the higher caries rate in females in these samples may be because females are more prone to caries\(^{35}\), but may also be in part due to differences in the abrasiveness and quality of diet (Gagnon and Wiesen 2013).

Molars had the highest caries rates (for both maxillary and mandibular teeth) with a caries rate of 45% for maxillary molars and 34% for mandibular molars (Table 5.14), which follows general patterns for caries rates (Hillson 2005). Anterior, maxillary teeth had much higher caries rates (43%) than did anterior, mandibular teeth (20%). However, the caries rate for the anterior, maxillary teeth of the individuals of Huaca Gallinazo was significantly higher (75%) than those of Huaca Santa Clara (Virú Period) (33%) and Huaca Santa Clara (Tomaval Period) (21%). The majority of all caries were occlusal surface caries (56%), which was true for all both sites and periods (Table 5.15) and follows general caries patterns (Hillson 2005).

\(^{35}\) Females tend towards higher caries rates than males in general due to lower salivary flow. Additionally, following pregnancy, the saliva changes its consistency also making them more prone to caries (Gagnon and Wiesen 2013; Lukacs 2011).
Table 5.13: Frequency of dental caries by age and sex (tooth count).

<table>
<thead>
<tr>
<th>Context</th>
<th>Male</th>
<th>Female</th>
<th>Subadult</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Huaca Gallinazo (VP)</td>
<td>18</td>
<td>69%</td>
<td>18</td>
<td>33%</td>
</tr>
<tr>
<td>Huaca Santa Clara (VP)</td>
<td>11</td>
<td>21%</td>
<td>15</td>
<td>26%</td>
</tr>
<tr>
<td>Huaca Santa Clara (TP)</td>
<td></td>
<td></td>
<td>30</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>21%</strong></td>
<td><strong>33</strong></td>
<td><strong>39%</strong></td>
</tr>
</tbody>
</table>

Table 5.14: Frequency of dental caries by tooth class (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Huaca Gallinazo (VP)</th>
<th>Huaca Santa Clara (VP)</th>
<th>Huaca Santa Clara (TP)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maxilla</td>
<td>Mandible</td>
<td>Maxilla</td>
<td>Mandible</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Incisor</td>
<td>8</td>
<td>50</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Canine</td>
<td>2</td>
<td>25</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Premolar</td>
<td>4</td>
<td>100</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Molar</td>
<td>8</td>
<td>50</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>50</strong></td>
<td><strong>12</strong></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>

Table 5.15: Frequency of caries by surface (tooth count).

<table>
<thead>
<tr>
<th>Location of Caries</th>
<th>Huaca Gallinazo (VP)</th>
<th>Huaca Santa Clara (VP)</th>
<th>Huaca Santa Clara (TP)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Occlusal Surface</td>
<td>25</td>
<td>42%</td>
<td>19</td>
<td>53%</td>
</tr>
<tr>
<td>Interproximal</td>
<td>19</td>
<td>32%</td>
<td>5</td>
<td>14%</td>
</tr>
<tr>
<td>Smooth Surfaces</td>
<td>14</td>
<td>23%</td>
<td>6</td>
<td>17%</td>
</tr>
<tr>
<td>Large Caries</td>
<td>2</td>
<td>3%</td>
<td>4</td>
<td>11%</td>
</tr>
<tr>
<td>Root Surface</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>36</strong></td>
<td><strong>39</strong></td>
<td><strong>135</strong></td>
</tr>
</tbody>
</table>
5.8.2 Calculus Summary

All but one adult (HG1) with observable dentition, had teeth with calculus. All but one subadult individual from Huaca Santa Clara (HSC3) had teeth with calculus. However, none of the subadults from Huaca Gallinazo had calculus, save one (HG6). Three individuals in particular had high frequencies (above 50%) of teeth with calculus (HSC8, HSC10 and HSC14), with only HSC14, however, ranging from slight to heavy\(^\text{40}\). HSC5 also had a high frequency of teeth with calculus at 47% and was the only other individual with a range of slight to heavy amounts of calculus (Figure 5.5). In terms of tooth class, incisors were the most affected (37% of all incisors had calculus), followed by premolars (22%) and molars (19%) (Table 5.16).

Table 5.16: Frequency of calculus for all samples combined by tooth class (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Number of Teeth with Calculus (N)</th>
<th>Total Number of Teeth with Calculus (N)</th>
<th>Calculus (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>41</td>
<td>110</td>
<td>37%</td>
</tr>
<tr>
<td>Canine</td>
<td>5</td>
<td>55</td>
<td>9%</td>
</tr>
<tr>
<td>Premolar</td>
<td>14</td>
<td>65</td>
<td>22%</td>
</tr>
<tr>
<td>Molar</td>
<td>27</td>
<td>142</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>87</strong></td>
<td><strong>372</strong></td>
<td><strong>23%</strong></td>
</tr>
</tbody>
</table>

\(^\text{40}\) See Appendix G for reference photos for the scoring system used to assess the degree of severity of calculus.
Figure 5.5: Frequency and degree of severity of calculus in individuals from Huaca Santa Clara and Huaca Gallinazo.

5.8.3 Periapical Abscesses, Attrition, Alveolar Resorption and Antemortem Tooth Loss Summary

All observable teeth had some degree of attrition apart from HG2 and HG3 (an infant and a child, respectively), neither of whom had any teeth with attrition, which is not surprising given their ages. Of the remaining individuals, only one individual (HSC11) had teeth with only a slight degree of attrition. The rest had at least one tooth with a moderate degree of attrition, and two individuals had a severe degree of attrition (HSC10 and HSC13). None of the individuals had attrition to the extent of root exposure (Figure 5.6, Table 5.17).
Table 5.17: Degree of severity of dental attrition in individuals from Huaca Santa Clara and Huaca Gallinazo.

<table>
<thead>
<tr>
<th>Burial</th>
<th>Total # of Observable Teeth</th>
<th>No Attrition</th>
<th>Slight Attrition*</th>
<th>Moderate Attrition**</th>
<th>Heavy Attrition***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>HG1</td>
<td>26</td>
<td>0</td>
<td>0%</td>
<td>6</td>
<td>23%</td>
</tr>
<tr>
<td>HG2</td>
<td>15</td>
<td>15</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>HG3</td>
<td>20</td>
<td>20</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>HG6</td>
<td>20</td>
<td>0</td>
<td>0%</td>
<td>14</td>
<td>70%</td>
</tr>
<tr>
<td>HSC3</td>
<td>19</td>
<td>0</td>
<td>0%</td>
<td>8</td>
<td>42%</td>
</tr>
<tr>
<td>HSC4</td>
<td>24</td>
<td>0</td>
<td>0%</td>
<td>23</td>
<td>96%</td>
</tr>
<tr>
<td>HSC5</td>
<td>22</td>
<td>0</td>
<td>0%</td>
<td>19</td>
<td>86%</td>
</tr>
<tr>
<td>HSC6</td>
<td>25</td>
<td>0</td>
<td>0%</td>
<td>23</td>
<td>92%</td>
</tr>
<tr>
<td>HSC8</td>
<td>28</td>
<td>0</td>
<td>0%</td>
<td>6</td>
<td>21%</td>
</tr>
<tr>
<td>HSC9</td>
<td>26</td>
<td>0</td>
<td>0%</td>
<td>20</td>
<td>77%</td>
</tr>
<tr>
<td>HSC10</td>
<td>17</td>
<td>0</td>
<td>0%</td>
<td>11</td>
<td>65%</td>
</tr>
<tr>
<td>HSC11</td>
<td>21</td>
<td>0</td>
<td>0%</td>
<td>21</td>
<td>100%</td>
</tr>
<tr>
<td>HSC13</td>
<td>27</td>
<td>0</td>
<td>0%</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>HSC14</td>
<td>23</td>
<td>0</td>
<td>0%</td>
<td>4</td>
<td>17%</td>
</tr>
</tbody>
</table>

*Slight Attrition is a score of 1-3 for incisors, canines and premolars and 1-15 for molars.
**Moderate Attrition is a score of 4-6 for incisors, canines and premolars and 16-30 for molars.
***Heavy Attrition is a score of 7-8 for incisors, canines and premolars and 31-40 for molars.

Figure 5.6: Degree of severity of dental attrition in individuals from Huaca Santa Clara and Huaca Gallinazo.
Periapical abscesses were fairly common in these samples, which is not surprising given the high caries rates. One of the five subadults from Huaca Gallinazo had an abscess (HG6) as well as the only adult in this context (HG1). Three of the four adult individuals with observable dentition from Huaca Santa Clara (Virú Period) had one periapical abscess (HSC8, HSC9 and HSC13) and one of the six subadults individuals from Huaca Santa Clara (Tomaval Period) had a periapical abscess (HSC3). The majority of the periapical abscesses observed in this sample were found on the alveoli of molar teeth (5/7), followed by premolars (1/7) and incisors (1/7) (Table 5.18). This is not surprising given that caries most often affect the molars (Hillson 2005).

Table 5.18: Frequency of periapical abscesses by tooth class (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Periapical Abscesses (N)</th>
<th>Total Number of Alveoli Observed (N)</th>
<th>Periapical Abscesses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>1</td>
<td>110</td>
<td>1%</td>
</tr>
<tr>
<td>Canine</td>
<td>0</td>
<td>55</td>
<td>0%</td>
</tr>
<tr>
<td>Premolar</td>
<td>1</td>
<td>65</td>
<td>2%</td>
</tr>
<tr>
<td>Molar</td>
<td>5</td>
<td>142</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
<td><strong>372</strong></td>
<td><strong>2%</strong></td>
</tr>
</tbody>
</table>

Three out of the four adult individuals from Huaca Santa Clara (Virú Period) had at least one tooth lost antemortem (HSC9, HSC13 and HSC14) and the only adult from Huaca Gallinazo (HG1) had three teeth lost antemortem. No subadults from either period had any teeth lost antemortem. The majority of teeth lost antemortem were molars (6/9), followed by canines (1/9), premolars (1/9) and incisors (1/9) (Table 5.19).

Table 5.19: Frequency of antemortem tooth loss by tooth class (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Antemortem Tooth Loss (N)</th>
<th>Total Number of Alveoli Observed (N)</th>
<th>Antemortem Tooth Loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>1</td>
<td>110</td>
<td>1%</td>
</tr>
<tr>
<td>Canine</td>
<td>1</td>
<td>55</td>
<td>2%</td>
</tr>
<tr>
<td>Premolar</td>
<td>1</td>
<td>65</td>
<td>2%</td>
</tr>
<tr>
<td>Molar</td>
<td>6</td>
<td>142</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9</strong></td>
<td><strong>372</strong></td>
<td><strong>2%</strong></td>
</tr>
</tbody>
</table>
Of all the alveoli examined in this sample, 38% showed evidence of alveolar resorption. The molars were generally less affected by alveolar resorption than the anterior teeth and the premolars (Table 5.20). All adults had alveolar resorption on at least one alveolus. None of the subadults from Huaca Gallinazo had any alveoli showing signs of alveolar resorption, whereas 50% of subadults from Huaca Santa Clara had alveolar resorption on at least one alveolus (Figure 5.7)\textsuperscript{41}; although this, however, may be accounted for by the older ages of the subadults from Huaca Santa Clara.

Table 5.20: Frequency of alveolar resorption by tooth class (tooth count).

<table>
<thead>
<tr>
<th>Tooth Class</th>
<th>Number of Alveoli with Alveolar Resorption (N)</th>
<th>Total Number of Alveoli Observed (N)</th>
<th>Alveolar Resorption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>48</td>
<td>110</td>
<td>44%</td>
</tr>
<tr>
<td>Canine</td>
<td>25</td>
<td>55</td>
<td>46%</td>
</tr>
<tr>
<td>Premolar</td>
<td>27</td>
<td>65</td>
<td>42%</td>
</tr>
<tr>
<td>Molar</td>
<td>41</td>
<td>142</td>
<td>29%</td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>372</td>
<td>38%</td>
</tr>
</tbody>
</table>

Figure 5.7: Severity of alveolar resorption for individuals from Huaca Santa Clara and Huaca Gallinazo.

\textsuperscript{41} See Appendix G for reference photos for the scoring system used to assess the degree of severity of alveolar resorption.
5.8.4 Sample Summaries

The following section will discuss dental pathology for each sample separately. See Appendix G for more detailed charts.

5.8.4.1 Huaca Gallinazo (Virú Period)

Of the individuals with teeth that had erupted (HG1, HG2, HG3 and HG6), one was an infant (HG2) and had no caries. The only adult (HG1, a young adult female) had a caries rate of 69%, with the majority being occlusal surface caries (43%), followed by interproximal caries (30%) and then smooth surface caries (24%). The majority of the caries occurred on posterior teeth (88% of total teeth affected).

HG6 (a child) had a similarly high rate at 65%, the majority being occlusal surface caries (53%) and the majority being on the anterior teeth (72% of total teeth affected) (as well as the maxillary molars at 27% of total teeth affected). In contrast, HG3 (a child) had a lower rate at 20%, the majority being interproximal caries (67%) and all on the maxillary incisors.

Overall, the majority of the caries in this sample were occlusal surface caries (42%), followed by interproximal (32%) and then smooth surface caries (23%)\(^{42}\). There were only a small number of large surface caries (3%). The majority of the caries were present on maxillary teeth (63% of all affected teeth) and there was no obvious preference for posterior (56% of affected teeth) versus anterior teeth (44%). However, when comparing the adult individual in this sample (HG1) to the subadults (HG3 and HG6), a pattern emerges whereby the majority of teeth affected are anterior teeth, as opposed to posterior teeth for HG1.

The only individual from this context exhibiting teeth with calculus is a child (HG6) at 5% (slight) frequency of teeth affected. This may be partially explained by the younger ages for the individuals in this sample (three infants and two children). The only adult in this sample did not have any teeth with calculus.

\(^{42}\) The percentage of smooth surface caries in this sample (23%) is higher than in the other samples (17% for Huaca Santa Clara (VP), and 3% for Huaca Santa Clara (TP)), this is particularly due to the high frequency of smooth surface caries on the dentition on HG1. These caries, however, were not indicative of coca-leaf chewing based on criteria from Indriati and Buikstra (2001).
One of the subadults (the eldest) from this context (HG6) had a periapical abscess (rm\(^1\)). The only adult in this sample (HG1, a young adult female) also had one abscess (LP\(^2\)) and four teeth lost antemortem (LM\(_2\), RM\(_1\), RM\(_2\), RM\(_3\)), which is quite a lot (the most teeth lost antemortem among all individuals from all contexts) considering the younger age of this individual. This individual also had alveolar resorption with 56% of alveoli affected (slight to severe). The degree of attrition, however, was mostly moderate (77% of teeth). It is likely that this individual lost her teeth antemortem due to periodontal disease given the severe alveolar resorption, leading to the exposure of the root in some places.

5.8.4.2 Huaca Santa Clara (Virú Period)

All four individuals (HSC8, HSC9, HSC13 and HSC14) for whom the dentition could be examined had evidence of caries. HSC8 had a caries rate of 28%, the majority being occlusal surface caries (73%) and affecting the mandibular posterior teeth most of all (63%). HSC9 had a caries rate of 33%, with 67% of affected teeth being posterior teeth and with no evident majority in terms of the affected surface. HSC13 had a caries rate of 18% with no evident majority in terms of the affected surface and all affected teeth being the posterior dentition (mainly mandibular at 80%). Finally, HSC14 had a caries rate of 13%, the majority being occlusal surface caries (80%) and all being maxillary molars. Overall, the majority of the caries were occlusal surface caries (53%), followed by smooth surface caries (17%), then interproximal caries (14%), large caries (11%) and root surface caries (6%). The posterior teeth were affected most of all (76% of all affected teeth), particularly the mandibular posterior teeth.

HSC13, based on the criteria of Indriati and Buikstra (2001), was found to be the only individual in all of the samples who could be categorized as a coca-leaf chewer (although it is possible that the other individuals also chewed coca-leaf but perhaps not as often, or, given that the majority of the sample was younger than HSC13, the signs may not have appeared yet in their dentition). HSC13 had large and wide cervical-root caries on molars and premolars with severe root exposure, buccal pit caries, and the antemortem loss of molars, all of which are indicators of coca-leaf chewing following Indriati and Buikstra (2001).
All individuals from this context had teeth with calculus. HSC8 and HSC14 (a young adult male and middle adult male, respectively) had particularly high frequencies at 93% (slight to moderate) and 67% (slight to heavy), respectively. HSC9 and HSC13 (young adult female and middle adult female, respectively) had lower frequencies at 13% (slight to moderate) and 18% (slight) respectively. This may indicate differences in diet or oral hygiene between males and females.

Three of the four adult individuals from this context (HSC8, HSC9 and HSC13) had periapical abscesses (at RI2 for HSC8, LM1 for HSC9 and RM1 and LM1 for HSC13). HSC9 and HSC13 additionally had teeth lost antemortem (RM2 for HSC9 and RM1 for HSC13). HSC8, HSC9 and HSC13 had evidence of alveolar resorption with 100% of alveoli affected (slight to moderate for HSC8, 19% (slight to moderate) for HSC9, 100% (slight to severe) for HSC13). HSC14 also had teeth lost antemortem (RI1, LP1 and LC1) and evidence of alveolar resorption with 75% of alveoli affected (slight to moderate).

Of the young adults in this sample, HSC8 (a male) had the greatest degree of attrition (79% of teeth with moderate attrition), whereas HSC9 (a female) had a lesser degree of attrition (77% of teeth with slight attrition, and 23% with moderate). Of the middle adults, HSC13 (a female) had a more significant degree of attrition (ranging from slight to severe), whereas HSC14 (a male) ranged from slight to moderate attrition (though still a significant amount of attrition with 83% of teeth having a moderate degree of attrition).

5.8.4.3 Huaca Santa Clara (Tomaval Period)

All six children (HSC3, HSC4, HSC5, HSC6, HSC10 and HSC11) from this context had evidence of caries. HSC3 had a caries rate of 50%, the majority being occlusal surface caries (71%) and occurring mainly on the molars, but also on the maxillary incisors. HSC4 had a caries rate of 25%, all occurring on the posterior maxillary dentition and the majority being occlusal surface caries (83%). HSC5 had a caries rate of 35%, the majority of the caries being occlusal surface caries (89%) and occurring mostly on the molars. HSC6 had a caries rate of 17%, all of which were occlusal surface caries and all occurring on the posterior dentition. HSC10 had a caries rate of 6%, with large and interproximal caries occurring on a maxillary molar. Finally, HSC11 had a caries rate of 13%, all of which were occlusal surface caries and occurring
on the molars. Overall, the majority of the caries were occlusal surface caries occurring on the molars.

All but one individual (HSC3) in this context had teeth with calculus. The other individuals had 25% (slight to moderate), 47% (slight to heavy), 17% (slight), 56% (slight) and 25% (slight) of their teeth with calculus present (HSC4, HSC5, HSC6, HSC10 and HSC11, respectively).

Only one of the subadult individuals out of six from this context (HSC3) had a periapical abscess (lm$^{1}$). No individuals from this context had any teeth lost antemortem; however, some of these individuals (HSC3, HSC5 and HSC11) did have alveolar resorption at 45% (slight), 67% (slight to moderate) and 21% (slight) of alveoli, respectively.

For the majority of the children in the sample (HSC4, HSC5, HSC6 and HSC11), the degree of attrition was mostly slight, as expected given their ages. HSC3, however, had a much greater frequency of teeth with a moderate degree of attrition (58%) and HSC10 also had a greater frequency of teeth with moderate attrition (24%) and also teeth with severe attrition (12%).

5.9 Individual Summaries

The following section will give summaries for each individual from the findings of the bioarchaeological analysis.

5.9.1 Huaca Gallinazo (Virú Period)

5.9.1.1 HG1

HG1 was a young adult female (approx. 30 years) with a stature of 151.1 cm (close to the sample mean) and a Form C fronto-occipital modification (the same as HSC7 and HSC14). This individual had a single block vertebra, a genetic condition whereby two of her vertebrae (C5 and C6) had fused together during development. Antemortem trauma for HG1 included trauma to the thorax (in the form of partially healed, fractured third and fourth ribs indicating a direct blow to the chest) and a fracture to a toe phalange (indicating a stubbed toe).

HG1 had a high frequency of dental caries (69% of teeth affected, the majority being occlusal surface caries and occurring mainly on posterior teeth), one abscess
(maxillary premolar), and four teeth lost antemortem (all mandibular molars). Attrition was for the most part moderate, and alveolar resorption affected more than half of alveoli ranging in severity from slight to severe, likely indicating that periodontal disease was probably responsible for her antemortem tooth loss.

5.9.1.2 HG2

HG2 was an infant (1 year +/- 4 months). HG2 had a rib fusion error whereby the right first and second ribs had fused together during development.

5.9.1.3 HG3

HG3 was a child (3 years +/- 11 months) who had active cribra orbitalia at the time of death and late-onset hydrocephalus. This individual had a caries rate of 20%, the majority being interproximal caries and all being on the maxillary incisors.

5.9.1.4 HG4

HG4 was an infant (birth +/- 2 months). HG4 had porous endocranial lesions on several cranial bones that were likely the result of normal growth.

5.9.1.5 HG5

HG5 was an infant (3 months) with active cribra orbitalia and porotic hyperostosis. HG5 also had a possible case of infantile scurvy.

5.9.1.6 HG6

HG6 was a child (5 years +/- 20 months) who experienced antemortem trauma in the form of four fractured ribs that had only just begun to heal (sternal ends of first and second right ribs, and possibly the right third and fourth ribs at midshaft and the rib neck) which indicates a major force. This individual also had osteoperiostitis spread across the body (ranging from slight to severe in places) and hair-on-end endocranial lesions which were possibly the result of inflammation secondary to infection.

HG6 had a high frequency of caries (65%) with the majority being occlusal surface caries and on the anterior teeth and was the only subadult in this sample with a periapical abscess (maxillary molar) and attrition (slight to moderate). HG6 was also the only individual in this sample with calculus (although this was slight).
5.9.2 Huaca Santa Clara (Virú Period)

5.9.2.1 HSC7

HSC7 was a young adult (approx. 20 years), probably female, and was the shortest among the females in this sample (145.3 cm). She had a Form C fronto-occipital cranial modification (the same as HG1 and HSC14). This individual had osteoperiostitis and healed porotic hyperostosis. The dentition was unavailable for examination as mummified tissue covered the dental arcade.

5.9.2.2 HSC8

HSC8 was a young adult male (30-35 years) whose height (159.8 cm) was below the mean for this sample but was close to the mean stature for El Brujo, Sipán and Pacatnamú (sample D) and is well within the male ranges for all samples. He had Form B asymmetrical occipital flattening, which was likely accidental and the result of cradle boarding. This is the only individual from the Virú Period at Huaca Santa Clara with a perimortem cutmark. This consists of a cut to the left fourth rib at the sternal end. This individual had osteoperiostitis as well as healed cribra orbitalia and porotic hyperostosis. Finally, HSC8 had intervertebral disc disease, which, given the younger age of this individual, likely indicates that he participated in some form of labour from a young age.

5.9.2.3 HSC9

HSC9 was a young adult female (20-22 years). HSC9 was the tallest female individual in this sample (153.2 cm), and was above all the available female ranges for other populations, although she was close to the female mean for Sipán. She had several perimortem fractures to the skull. These were all radiating fractures indicative of BFT on the posterior right side of the skull, the facial region and the left temple area. It is unlikely that this individual would have survived this trauma, if it was incurred before death. Based on the shattered nature of the skull, it was difficult to determine whether there was any form of ACM, however, based on what remained, the skull appeared to be unmodified. There were signs that this individual suffered from some form of systemic stress due to the presence of osteoperiostitis and enamel hypoplasia (indicating two periods of childhood growth arrest at 2 – 2.5 years and 3.5 – 4 years). There were also a series of small pits on molars indicative of a disruption in development due to illness or
malnutrition. HSC9 had a caries rate of 35% with the majority of affected teeth being the posterior teeth, slight to moderate calculus and slight to moderate attrition. Additionally, she had one periapical abscess on a mandibular molar, a tooth lost antemortem (a mandibular molar) and slight to moderate alveolar resorption.

5.9.2.4 HSC13

HSC13 was a middle adult (45-49 years) and probably a female. HSC13’s estimated living stature (148.6 cm) was close to the sample mean and was also close to the mean for San José de Moro. While she was taller than the other sample means, she was still within the female range for all other samples. She had no form of artificial cranial modification. HSC13 had a partially healed midshaft fracture to the left ulna (a Monteggia fracture), and a compound fracture to the distal left tibia with evidence of osteomyelitis. Additionally, HSC13 had a fully healed fracture to the right clavicle and a healed fracture to the fourth right rib near the rib neck. Finally, there was evidence of antemortem BFT to the facial region, which had healed to some extent.

HSC13 had osteoperiostitis on both femora and five periods of growth childhood arrest (based on enamel hypoplasia) at 2 – 2.5 years, 3 – 3.5 years, 3.5 – 4 years, 4.5 – 5 years and 5 – 5.5 years. She had intervertebral disc disease and also had lesions on the cranium (posteriorly) indicative of a mycotic infection.

Finally, HSC13 had a low caries rate (18%) with all affected teeth being posterior teeth, slight to moderate calculus, two periapical abscesses (a mandibular and a maxillary molar) and a tooth lost antemortem (a maxillary molar). HSC13 had dental attrition ranging from slight to severe and evidence of alveolar resorption with all alveoli being affected (ranging from slight to severe). HSC13, based on the nature of her dental pathology, was interpreted to have been a coca-leaf chewer.

5.9.2.5 HSC14

HSC14 was a middle adult male (35-40 years). HSC14 was the tallest male in this sample (161.9 cm) and was above all means for other samples apart from the mean for San José de Moro. HSC14’s height was, however, within all the male height ranges for other samples (although was only slightly above the range for Huaca de la Luna). HSC14 had a Form C fronto-occipital modification (as does HG1 and HSC7).
HSC14 does show signs of having anemia as evidenced by the healed porotic hyperostosis and experienced two periods of childhood growth arrest (based on enamel hypoplasia) at 2.5 – 3 years and 3 – 3.5 years. Additionally, HSC14 had intervertebral disc disease and Schmorl’s nodes. HSC14 had a low caries rate (13%) (the majority being occlusal surface caries and affecting the maxillary molars above all), a high frequency of calculus (slight to heavy) and three teeth lost antemortem (a maxillary incisor and a mandibular premolar and canine). The majority of HSC14’s teeth were affected by attrition (ranging from slight to moderate) and many of the alveoli were affected by alveolar resorption (ranging from slight to moderate).

5.9.3 Huaca Santa Clara (Tomaval Period)

5.9.3.1 HSC3

HSC3 was a child (4 years +/- 15 months) with a Form D fronto-occipital cranial modification (with additional flattening superiorly). HSC3 had a perimortem cutmark on the left third rib (at the sternal end), a sternal body (bisecting the sternal body) and two cutmarks on the right third rib (at the sternal end). HSC3 also had active porotic hyperostosis.

HSC3 had a caries rate of 50%, mostly being occlusal surface caries on the molars (but also the maxillary incisors). HSC3 had alveolar resorption (slight) on almost half of the alveoli and a much greater frequency of teeth with attrition than the other children in this sample. Additionally, HSC3 was the only child in this Tomaval Period sample with a periapical abscess (on a maxillary molar).

5.9.3.2 HSC4

HSC4 was a child (2 years +/- 21 months) with a cranium that shows some indication of being intentionally modified, possibly Form G (an annular form), but this is very slight. This individual has a healed lateral and oblique fracture to the left third rib indicating anteroposterior compression and possibly associated soft tissue damage, a Colles fracture to the right radius and ulna which had healed but was not properly set and had associated osteoperiostitis. HSC4 had a caries rate of 25%, all occurring on the posterior maxillary dentition and the majority being occlusal surface caries. HSC4 also had calculus (slight to moderate) affecting 25% of teeth and only slight attrition.
5.9.3.3 HSC5

HSC5 was a child (7 years +/- 20 months) with a Form E fronto-occipital modification (a process which elongated the skull). HSC5 had one unsided rib fragment with a perimortem cutmark. HSC5 had a low caries rate (35%) with the majority being occlusal surface caries on the molars. Additionally, HSC5 had calculus (slight to heavy) affecting almost half of all teeth, a slight degree of attrition and 67% of teeth affected by alveolar resorption (slight to moderate).

5.9.3.4 HSC6

HSC6 was a child (10 years +/- 14 months) with a quite prominent Form G cranial modification (annular). There was osteoperiostitis (severe) on the anterior crests of both tibiae (although localized to the extent that it was likely the result of trauma or infection), as well as active porotic hyperostosis and cribra orbitalia. HSC6 had a caries rate of 17%, all of which occurred on the posterior dentition and were occlusal surface caries. HSC6 had only a slight amount of calculus, affecting 17% of teeth, as well as slight attrition.

5.9.3.5 HSC10

HSC10 was a child (7 years +/- 20 months) with a Form F fronto-occipital modification (creating a heart-shaped profile superiorly). HSC10’s right clavicle was previously fractured but had completely healed (it was likely the result of a fall). HSC10 had perimortem fractures to four right middle ribs near the sternal rib ends in some places and near the rib bends. HSC10 additionally had perimortem cutmarks on the manubrium and a sternal body (one of the cuts bisecting the sternal body) and multiple cutmarks on the left ribs (ribs three through six) mostly to the sternal ends and in the area of the rib bend on the superior surfaces, although sometimes cutting through the rib. HSC10 had active porotic hyperostosis. HSC10 had a low caries rate of 6% (only affecting a maxillary molar), 56% of teeth were affected by calculus (slight); as well, the teeth exhibited moderate and severe attrition.

5.9.3.6 HSC11

HSC11 was a child (12 years +/- 21 months) with a very prominent Form F fronto-occipital modification (creating a heart-shaped profile superiorly). HSC11 had active porotic hyperostosis and active cribra orbitalia. HSC11 had one period of growth
arrest as indicated by enamel hypoplasia at 2 – 2.5 years. HSC11 had a caries rate of 13%, all of which were occlusal surface caries occurring on molars; 25% of teeth affected by calculus (slight). HSC11 also had 25% of alveoli affected by alveolar resorption (slight) and teeth with a slight amount of attrition.
6 DISCUSSION

6.1 Virú Period Burials from Huaca Gallinazo and Huaca Santa Clara

The Virú Period in the Virú Valley was characterized by unprecedented demographic growth, the creation of a valley-wide polity, and the expansion of farming to support the increased population (Downey 2015; Millaire 2010b; Willey 1953). Ties existed between highland Recuay societies and Virú societies based on trade, and with the Moche and Chicama Valleys, as evidenced by the presence of Virú outposts. The end of this period c. A.D. 600, was marked by the expansion of the Moche polity from Huacas de Moche, with their influence being felt in the Virú Valley, and the Virú administration moving from the Gallinazo Group to Huancaco (Millaire 2009b; Millaire 2015a).

6.1.1 Virú Period (Early Intermediate Period)

A contextual analysis of the burials from the Virú Period reveals the existence of five clusters of graves that are either from the same archaeological context or are believed to be coeval based on stratigraphic information:

- HG1 and HG2
- HG3, HG4, HG5, and HG6
- HSC7 and HSC9
- HSC8
- HSC13 and HSC14

6.1.2 HG1 and HG2

Burials HG1 and HG2 at Huaca Gallinazo were interred below the final floor of a patio in Architectural Complex 1 (Sector B), a residential compound located at the base of the main platform mound of the site. HG1 (a young adult female) was interred in semi-flexed position on her side. HG2 (an infant) was likely a secondary burial, due to the jumbled nature of the bones in the grave. Both individuals were interred with textiles and gourd vessels, which were common grave goods for this period. HG2 was additionally interred with the bones of a juvenile llama (a partial skeleton) and a food offering of
maize (Millaire and La Torre Calvera 2008). A review of the literature on burials from the valley (see Chapter 2 and Appendix A) shows that llamas and food were seldom reported as funerary offerings by members of the Virú Valley Project. That being said, it is likely that food offerings were present in at least some burials but were not reported, or not always identified, or may not have been preserved in the postmortem environment.

Delayed (or secondary) burial, which is the burial of individuals after they have been dead for some time\(^{43}\) (either having been interred first in a primary location, or not having been buried initially), has been well documented as a burial form among the Moche. For instance, Nelson found that 13 Moche individuals at San José de Moro (Jequetepeque Valley) were delayed burials (Nelson 1998). Verano described a similar context at Santuario de Sipán (Lambayeque Valley) where five individuals were buried some considerable time after they had died (Verano 1997b). Millaire (2002, 2004), in his review of Moche burials practice identified more cases of delayed burials that fell into two categories: (1) delayed burials of non-subordinates; the reasons for this could vary and could include political constraints, particular social conditions not being present, religious restrictions, environmental disruptions or the individual having died in a distant region; and, (2) delayed burials of retainers; in some cases these individuals had been dead for an extended period of time (sometimes years) before they were re-buried (advanced state of decomposition), indicating that they had been stored until they had been re-interred as retainers.

Nothing suggests that HG2 was a retainer (an individual who would be selected to accompany a deceased “principal” or elite individual in death (Millaire 2002)) to the adult buried close-by (HG1). For one thing, HG2 was buried with more grave goods than HG1 and, secondly, most cases of the principal-individual-and-retainer scenario have been documented in non-residential contexts (Millaire 2002). The jumbled remains of HG2 could, rather, have been the result of a reburial below the floor of this room due to the

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\(^{43}\) The presence of a delayed (or secondary) burial is indicated by the position of the bones in the burial. If some of the bones are not in anatomical position (or if the burial consists of a pile of jumbled bones), this indicates that advanced decomposition had set in before the individual was moved to that burial context. Another indicator of a delayed burial is the presence of insect pupae close to the skeleton, again indicating decomposition prior to interment (Nelson 1998; Verano 1995).
infant’s grave being disturbed, or this infant’s remains could have been re-buried here as a dedicatory offering for the building.

From a paleopathological standpoint, HG2 had no discernable trauma or disease, having lived for approximately one year. This is not surprising in the case of disease, however, given that it takes time for bone to show pathological signs of a disease.

HG1 was taller than the means for many other roughly contemporaneous samples on the north coast of Peru, but was still within the range for these samples. HG1 was, however, close to the mean of a sample from San José de Moro, but shorter than the mean for a sample from Sipán (both which were samples consisting of elite individuals). Based on this information and the lack of enamel hypoplasia, cribra orbitalia, porotic hyperostosis, and osteoperiostitis, it seems likely that HG1 did not experience any dramatic periods of growth arrest or anemia that impacted her growth and development, as the presence of these pathological changes would have indicated (Larsen 1997).

HG1 had a type of cranial modification (Form C fronto-occipital modification) that was common along the north coast of Peru (Allison et al. 1981a; Dembo and Imbelloni 1938; Dingwall 1931; Imbelloni 1950; Stewart 1950). Indeed, this type of modification has been reported more recently in the literature as well, in contexts from the north coast of Peru, for instance by Verano (1997a) at Pacatnamú from the Early Intermediate Period, and by Lichtenfeld (2001) for the Jequetepeque Valley from several pre-Columbian periods. This individual also had antemortem trauma to the thorax, indicating a direct blow to the chest with significant force. This injury would likely have been life-threatening at the time, due to the location of the trauma (upper ribs at the sternal ends) and the soft-tissue damage that would likely have resulted from the injury.

The caries rate for this individual is very high (69%), especially considering her young age (approximately 30 – 35 years). In fact, this individual’s caries rate is much higher than even the average caries rate for the middle adult females from the Early Intermediate Period at Pacatnamú (16%), and is even outside the range for these individuals (Verano 1997a). HG1 additionally had a periapical abscess (a maxillary premolar), which along with the high caries rate, is suggestive of a highly cariogenic diet. Given the findings from Masur’s (2012) analysis of plant remains from Huaca Gallinazo,

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44 There were no young adult females in this sample for comparison.
this is not surprising as the proportion of maize (a highly cariogenic food (Gagnon and Wiesen 2013; Larsen 1997; Lukacs 1989)) among the plant remains is very high, and due to the fact that an increasing reliance on maize as a result of the intensification of agriculture has been documented for the north coast in the Early Intermediate Period (Gagnon and Wiesen 2013).

While perhaps not considered an elite member of society, as HG1 did not have a particularly elaborate burial, nor was she buried in the elite center at the top of the huaca, she nonetheless did not show any evidence of being particularly low status. Notably, she did have some grave goods and was interred at the base of an important huaca.

6.1.3 HG3, HG4, HG5, and HG6

Four subadults were interred into the floors of the Southern Platform (Sector A) of Huaca Gallinazo during the last phase of construction: HG3 (a child), HG4 (an infant), HG5 (an infant), and HG6 (a child). Each of these burials was placed in a simple and shallow pit of circular or oval shape. HG3 was in extended and supine position, HG6 was in extended position on the side (in a pit that was slightly too small) and both HG4 and HG5 were likely delayed burials due to the jumbled nature of the bones (see above). All burials were associated with textiles. HG6 was additionally buried with a gourd bowl, while HG3 was buried with three gourd bowls and three ceramic vessels, one of which contained gourd seeds and peanut shells (Millaire and La Torre Calvera 2011).

Peanuts were considered prestige items in Virú (and Moche) society and were not found in non-elite contexts, thus their presence in this burial is noteworthy. A peanut shell was also found in association with HSC9, who was likely a retainer and non-elite (see below). Thus, the presence of the peanut shell in HG3’s burial is not evidence directly of this individual being elite, but is rather a result of both the Southern Platform at Huaca Gallinazo and Sector 4 at Huaca Santa Clara being elite contexts where peanuts may be expected to be found (Masur 2012).

This cluster of burials corresponds to a very specific subset of the population (infants and young children), and its location on top of the tallest building of the site clearly makes it an atypical context that deserves discussion. As noted by Tung and Knudson (2010), children (3 to 11 years of age) represent a small percentage of natural deaths in skeletal populations, thus the age-at-death distribution of this sample is unusual.
These individuals furthermore may have had a number of conditions that would have significantly impacted their quality of life, and perhaps led to their premature death (either directly or indirectly). These conditions include anemia (HG3 and HG5), late-onset hydrocephalus (HG3), infantile scurvy (HG5), and non-specific infection (HG6). Some of these conditions would have predisposed them to other conditions, given a compromised immune system. Both HG3 and HG5 had active cribra orbitalia and HG5 additionally had porotic hyperostosis.

In a study by Blom et al. (2005), porotic hyperostosis and cribra orbitalia were found to be most likely the result of acquired iron-deficiency anemia in pre-Columbian Peru. Other, less likely, causes could include genetic anemias such as thalassemia and sickle-cell anemia, or in rare cases cyanotic congenital heart disease, renal osteodystrophy, hereditary spherocytosis, or dystrophic myotonia. Furthermore, childhood anemia was found to be more common in individuals who lived in less arid environments (irrigated areas or areas that were naturally less arid) as these environments have higher parasite loads and other diseases. On the north coast of Peru, this, as well as water-borne contamination from neighbouring groups, was likely a big contributor to the high pathogen load. Thus, the more likely reason for the high prevalence of childhood iron-deficiency anemia in coastal Pre-Columbian Peru was shown to be more a result of environmental stressors (parasites and disease), as opposed to specific dietary practices (Blom et al. 2005).

On the other hand, some researchers (such as Fairgrieve and Molto (2000) and Walker et al. (2009)) have argued that porotic hyperostosis and many cribra orbitalia lesions were more likely the result of megaloblastic anemia. Anemia would then be acquired by nursing infants because of depleted maternal vitamin B₁₂ and unsanitary living conditions (which can lead to gastrointestinal infection and thus, associated nutrient loss) (Fairgrieve and Molto 2000; Walker et al. 2009).

Anemia would have greatly impacted the lives of those affected. In a review of the literature on anemia, Blom et al. (2005) found that there is an association between

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45 Genetic anemias were likely only introduced in the New World after contact from malaria-adapted populations from the Old World. These types of anemias produce characteristic bony changes to the face and/or long bones, which do not appear in pre-Columbian skeletal series in the New World (Blom et al. 2005).
mothers who have anemia and an elevated mortality rate for their infants (either pre- or postnatal). Studies have also shown that children with anemia are less alert, active, responsive, and goal-directed, speak less and have shorter attention spans; the cognitive and motor functions in adolescents and adults may also be altered, leading to reduced work productivity. The results of their study have furthermore shown that there is a strong association between childhood anemia and childhood mortality in the Andean coastal region (Blom et al. 2005).

HG3 had a case of Beaten-Copper cranium, possibly as a result of late-onset hydrocephalus, which would not have caused the diagnostic cranio-facial changes associated with hydrocephalus with an onset in the first six months of life (Roberts and Manchester 2005; Rühli et al. 2007). Without craniotomy (a modern surgical procedure) it is likely that HG3 would have suffered from headaches and psychomotor retardation. It is also possible that the premature death of this individual resulted from this condition (Rühli et al. 2007). Late-onset hydrocephalus arises as a result of acquired disease. This occurs today through the infection of the brain by the viruses of mumps and measles, and may have also been the cause in the past. However, these are Old World pathogens, and thus would not have been present in the Americas in pre-Columbian times. Bacterial infection would not be a likely cause, as it would have likely killed the individual before signs of hydrocephalus appeared. A slow growing tumour is also a possibility, but this is speculative (Roberts and Manchester 2005).

A possible case of infantile scurvy has also been identified in this sample (HG5). Signs and symptoms in children include irritability, pain (in the muscles and joints), and anemia (which this individual did have, as evidenced by the presence of cribra orbitalia and porotic hyperostosis on the cranium). Capillary bleeding occurs, with bruising and perifollicular haemorrhages, as well as swollen and bleeding gums, tooth loss and subperiosteal bleeding. If left untreated, scurvy is often fatal due to the effects on the heart (Roberts and Manchester 2005; Waldron 2009). Vitamin C is required to fight off infection, as well as for the absorption of iron and the functioning of body tissues, thus HG5 would have been susceptible to infection (Roberts and Manchester 2005). Infantile scurvy is often associated with weaning infants onto foods which are deficient in vitamin C (Waldron 2009).
The only individual in this context with evidence of trauma was HG6, with antemortem fractures to four ribs indicating major force that would have likely been life-threatening at the time based on the location of the fractures (Galloway 1999). HG6 also suffered an infection as indicated by the hair-on-end endocranial lesions (Lewis 2004), although it is not clear what type of infection, and had osteoperiostitis, indicating some sort of physiological stress (Ortner 2003; Wheeler 2012).

HG3 and HG6 (the only children in this group with erupted teeth) had relatively high caries rates (20% and 65%, respectively) for their respective ages. This, along with a periapical abscess on one of HG6’s alveoli indicates that the weaning foods given to these individuals were highly cariogenic. It is likely that their weaning food incorporated maize, which, as mentioned earlier was a prominent food at this site (Masur 2012).

Why these young individuals were chosen to be buried below the floor of this platform is puzzling. One hypothesis is that these infants and children, having passed away at a time near to the completion of a phase of construction in the Southern Platform, were kept in order to be interred later (in the case of HG4 and HG5) or interred directly (in the case of HG3 and HG6) in the Southern Platform as a dedicatory offering.

### 6.1.4 HSC7 and HSC9

Both HSC7 and HSC9 were young adult females interred in Room A-102 (Sector 6) at Huaca Santa Clara, in pits dug into a long ramp against the west wall of the room. This room would have been a highly elite area, given its restrictive access and its strategic view over the valley neck, and it indeed was the site of a former propitiatory ritual (Millaire 2015c). HSC7 was interred in extended and supine position with textiles, a gourd bowl, and a dog (an uncommon grave good for this period, and not one reported for other contexts in the Virú Valley (see Chapter 2)). HSC9 was in an extended position on her side, apparently shoved into a pit that was slightly too small for her body. She was wearing a textile shirt and a gourd bowl was found inside the pit with traces of peanut shells (Masur 2012; Millaire and La Torre Calvera 2003).

HSC7 was determined to have a Form C fronto-occipital cranial modification, which was common on the north coast of Peru (Allison et al. 1981a; Dembo and Imbelloni 1938; Dingwall 1931; Imbelloni 1950; Stewart 1950). Unfortunately, the type of cranial modification for HSC9 (if one was present) could not be determined.
HSC7 had no evidence of trauma (antemortem or perimortem). In contrast, HSC9 had severe perimortem blunt force trauma to multiple locations on the cranium, injuries that likely caused her death.

Finally, HSC9 had a caries rate of 35% with the majority of the teeth affected being posterior teeth. Given the age of HSC9 (20 – 25 years), this caries rate is fairly high, especially when compared to the middle adult\textsuperscript{46} female EIP burials from Pacatnamú, who had an average caries rate of 16% and a range of 0% to 33%. This indicates that HSC9’s diet was highly cariogenic, and, as discussed earlier given Masur’s (2012) findings, probably dominated by maize. It is quite evident from the burial context, grave goods and the perimortem treatment of the corpses, that these two individuals were not considered equals among Huaca Santa Clara society, at least at their death. Moreover, during life, HSC9 suffered from some form of systemic stress, which resulted in osteoperiostitis, pitting on the molars and enamel hypoplasia. While HSC7 did show some signs of stress in the form of osteoperiostitis and healed porotic hyperostosis (indicating anemia during childhood), it does not seem to have been to the same degree as the systemic stress experienced by HSC9. This pairing may thus represent a principal individual (HSC7) and retainer (HSC9) burial scenario, particularly given the burial context. Interestingly, both individuals also had evidence of tattoos. HSC7 had facial tattoos in geometric designs (and possibly drawings of animals, although this is not clear) and HSC9 had tattoos of lines on the wrists and ankles. Without further analysis on tattooing in Virú, any conclusions drawn about the reasons for these differences would be conjectural, however, it is interesting that the facial tattoos on the potential principal individual (HSC7) seem similar to tattoos pictured on Moche portrait vessels depicting elite individuals (Allison et al. 1981b; Donnan 1978; Hill 2000). Alternatively, the tattoos on HSC9 are interesting in that they could perhaps be interpreted as images of rope binding along the wrists and ankles, which brings to mind images of prisoner sacrifice in Andean iconography (Hamilton 2005).

\textsuperscript{46} There were no young adult female burials for comparison.
6.1.5 HSC8

HSC8 was a young adult male, interred in an extended and supine position with textiles in Sector 4. The burial was disturbed by looting, however, so the original context is not known (Millaire and La Torre Calvera 2003). He had asymmetrical occipital flattening which was likely the unintentional result of cradle-boarding.

HSC8 was the only individual with evidence of perimortem cutmarks in the Virú Period sample. However, there was no indication that HSC8 was a retainer given that he was placed in a standard burial position for this period (see Chapter 2) and that he was not placed in close proximity to any other individuals with elaborate burials. It is possible that the perimortem cutmark that this individual sustained to the rib was a wound inflicted during combat (however, it is notable that this individual did not have any other antemortem trauma that would indicate injuries sustained as a warrior), or it may have been inflicted in a performance of ritual violence, prior to his death. Given the angle of the cut and its position, it is likely that this individual was stabbed with some form of sharp force implement, by a person using their right hand.

HSC8 had healed cribra orbitalia and porotic hyperostosis indicating that he had anemia during childhood. Furthermore, he had osteoperiostitis, indicating generalized systemic stress, and intervertebral disc disease indicating a life of intense physical labour that likely started at a young age given that this young individual (30 – 35 years) was already experiencing degenerative changes (Kennedy 1989).

HSC8 had a fairly cariogenic diet as he had a periapical abscess and his caries rate was 28%, which is higher than the caries rate for the older age group of middle adult men from the Moche period at Pacatnamú (24%), although it is still within the range (Verano 1997a). He also had a fair amount of attrition for his age, indicating an abrasive diet which follows Gagnon and Wiesen’s (2013) findings that males (with higher mean molar wear scores than females) had a diet more focused on non-domesticates, meat and marine resources, over the softer maize-focused diets.

47 Only one young adult male from the Moche period at Pacatnamú was available for comparison and he had a caries rate of 1% (Verano 1997a).
6.1.6 HSC13 and HSC14

HSC13 (a middle adult and probably female) and HSC14 (a middle adult male) were both interred in Sector 4 at Huaca Santa Clara. HSC14 was buried in a cane coffin (in an extended and supine position) inside a pit dug through two floors in room A-122. This individual was buried with textiles, three gourd vessels, as well as fragments of copper placed in the mouth, hands, and below the feet (copper was a relatively common grave good beginning in the Virú Period and continuing into the Tomaval Period, see Chapter 2). Red pigment stained part of the shroud covering the cane coffin (red pigment has also been noted in graves in the Virú Valley, beginning in the Puerto Moorin Period and continuing into the Huancaco Period). The original context of HSC13 is not known, having been disturbed by looting. She was placed on her side in a flexed position with textiles and maize straw covering the burial (Millaire and La Torre Calvera 2003).

HSC13 had no artificial cranial modification, whereas HSC14 had Form C fronto-occipital cranial modification, which was common along the north coast of Peru (Allison et al. 1981a; Dembo and Imbelloni 1938; Dingwall 1931; Imbelloni 1950; Stewart 1950).

Both HSC13 and HSC14 had intervertebral disc disease in the lower lumbar region; HSC14 additionally had Schmorl’s nodes and degenerative joint disease. This is not altogether surprising given the ages of these individuals (45-49 and 35-40 years, respectively), although it likely indicates a relatively high degree of physical labour during their lifetimes and likely starting at a fairly young age, especially in the case of HSC14 (Kennedy 1989). HSC14 had evidence of healed porotic hyperostosis, indicating anemia. Both HSC13 and HSC14 had periods of childhood growth arrest (HSC13 had five periods, while HSC14 had two).

HSC13 had a caries rate of 18%, similar to the average caries rate for middle adult females from the Moche Period at Pacatnamú (16%) (Verano 1997a). However, based on an analysis of the caries (following Indriati and Buikstra (2001)) it was hypothesized that she was a coca-leaf chewer. HSC14 had a lower caries rate (13%) than HSC13 which was also lower than the average caries rate for middle adult males at Pacatnamú during the Moche Period (Verano 1997a). It is possible that the low caries rate for HSC14 may indicate a different diet than that of HSC13, and for that matter the other individuals from the Virú Period samples at Huaca Gallinazo and Huaca Santa Clara. As noted by Gagnon
and Wiesen’s (2013), males may have had a different diet than females in the Early Intermediate Period on the north coast of Peru (comprised of less cariogenic foods such as meat, non-domesticates and marine resources) which led to these differences in caries rates. However, differences in the caries rates between males and females can also be explained by differences related to salivary flow and consistency (Gagnon and Wiesen 2013; Lukacs 2011).

HSC14 lacked evidence of trauma, whereas HSC13 had several fractures in a variety of stages of healing: a fully healed fracture to the right clavicle indicating a fall, a healed middle rib fracture, indicating a force applied to the back, a Monteggia fracture to the left ulna that had begun to heal (possibly a defensive wound or the result of falling onto a sharp object), and a compound fracture to the right distal tibia. HSC13 also showed evidence of blunt force trauma (that had begun to heal) to the facial region. The injuries sustained by HSC13 over her lifetime indicate that she likely had a more rough lifestyle than the average individual and also that she was the recipient of violence on at least one occasion (if the Monteggia fracture and BFT to the skull were sustained at the same time).

Despite the fact that these two burials were found inside the same general burial context (Sector 4), the present evidence suggests that they originally held very different social status among the Huaca Santa Clara community, as indicated by the different burial contexts and grave goods, as well as the presence versus absence of cranial modification, trauma, and the differing degrees of systemic stress. This seems to parallel the social differentiation noted earlier between HSC7 and HSC9. However, while it is possible that HSC13 represented a retainer burial and HSC14 a principal individual burial, they were not directly associated with each other, so this cannot be stated with as much confidence as the HSC7 and HSC9 context.

6.1.7 Discussion

Members of Moche society were typically buried in an extended and supine position with their arms along their sides and wrapped in one or more shrouds. They were sometimes also placed in a cane coffin or cane tube. Grave goods usually consisted of textiles, ceramic vessels, gourd containers, and food. The grave context varied from huacas to cemeteries to habitation rooms (Millaire 2002; Millaire 2004). From a review of the literature of Virú Valley burials (see Chapter 2), this was also the case in the
contemporaneous Virú Period in the Virú Valley, although cane coffins and cane tubes were not introduced until the Huancaco Period. Some burials from Huaca Gallinazo (HG1 and HG3) and Huaca Santa Clara (HSC7, HSC8 and HSC14) conformed to this pattern, while others did not (HG2, HG4-HG6, HSC9 and HSC13).

Millaire’s (2002) analysis of Moche burial patterns along the north coast of Peru revealed that the manner by which individuals were interred reflected their status (and sometimes their occupation) in life. This is something that may hold true in regards to some of the burials in this sample from the Virú Period. HSC7 (a young adult female) and HSC14 (a middle adult male) both had more elaborate burials, particularly based on a review of the literature for Virú Valley burials in this period (see Chapter 2). Some of these burial features appear in the later Huancaco Period (the cane coffin burial for HSC14 and the dog in the burial of HSC7), and given that the radiocarbon date for HSC14 at least is rather late in the Virú Period, it may be that some of these features reflect influences from Huacas de Moche that became prominent in the Huancaco Period (Millaire 2015a). What is more, these potential elite individuals (as well as HG1, who may have been an elite individual) were the only individuals in Virú Period samples with modified crania. They additionally all had the same form of modification (Form C fronto-occipital), perhaps indicating that, at least in this valley, cranial modification may have been more common among the elite. Conversely, HSC9 (young adult female) and HSC13 (middle adult female) both showed evidence of systemic stress and severe trauma and were interred in burial positions that were, for this period, deviations from normal burial treatment, perhaps indicating some level of ritual violence. These two individuals may indeed be retainers (although this is more uncertain in the case of HSC13 who is not directly associated with a principal individual), a burial practice also seen among Moche interments during the EIP (Millaire 2002). Furthermore, each of these groupings (as well as the grouping of subadult individuals on the Southern Platform) seems to conform with the “like with like” patterning of burials common in the Andean region, which, “involves the inclusion of offerings that in some way mimic or parallel the human

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48 Cane fragments from HSC14 gave a radiocarbon date of 1,330 +/- 60 B.P. (Cal. A.D. 610 – 780, 2 sigma calibration).
with whom they are included” (Gaither et al. 2008: 115-116), whereby individuals of a similar age and/or the same sex are often interred together.

Interestingly, HSC8, while being the only individual with perimortem cutmarks from this period, was placed in a standard extended and supine position. It is possible that this individual sustained the perimortem cutmark in an act of ritual violence, however, and his burial treatment (although from a disturbed context), seems to reflect this more than a retainer burial scenario, it is also possible that he sustained this injury in combat.

In regards to the burials uncovered on top of the Southern Platform at Huaca Gallinazo, it seems doubtful that they were buried in this context in celebration of their elite status (or social persona), considering their age, their uncommon burial positions (HG6 appeared to have been almost shoved into a pit too small for the body and was placed on his or her side and HG4 and HG5 were both secondary burials), and their associated pathologies indicative of systemic stress during life. As mentioned earlier, it seems more likely is that they were buried on the Southern Platform as dedicatory offerings during the last construction phase of the building. Burial HG2 may also have been a dedicatory offering, buried below the floor of a large patio in Architectural Compound 1.

6.2 Tomaval Period Burials from Huaca Santa Clara

6.2.1 Tomaval Period (Middle Horizon)

Compared to the Virú Period (Early Intermediate Period) funerary contexts mentioned above, the Tomaval Period (Middle Horizon) burials from Huaca Santa Clara show evidence of a shift in burial patterns. This seems to support Millaire’s (2015a) contention that this period was a time of increased influence from the highlands and the central coast and that it marked the advent of a new ethos in ritual practice.

The Tomaval Period burials at Huaca Santa Clara include six children (HSC3 through HSC6, HSC10 and HSC11) buried with twenty-seven juvenile camelids showing evidence of perimortem trauma, during a single funerary ceremony that took place

49 Similar rituals in the Middle Horizon and Late Intermediate Period involving the burials of juvenile camelids on top of abandoned buildings have been documented in the Virú Valley at Huancaco, Huaca Negra, and Cerro de Huarpe (Millaire 2015b).
centuries after the Early Intermediate Period settlement was abandoned (the burials pits were excavated through Virú Period vestiges). According to Millaire, “the concentration of remains and the uniformity observed in the treatment of the human and animal remains suggest that it was part of a unique, carefully planned ritual” (Millaire 2015b:9).

HSC3, HSC4, and HSC6 were buried in a relatively tight cluster (with the greatest number of camelid remains) in the northwest corner of room A-105. HSC3 (4 years +/- 15 months) was interred on top of a llama in a supine position with the limbs flexed. HSC4 (12 years +/- 21 months) was interred with a llama and a ceramic vessel and was placed in a flexed position on his/her side. HSC6 (10 years +/- 14 months) was interred in the deepest pit in this context wrapped in textiles (two sleeveless shirts, one mantle, one large shroud and a shawl wrapped around the head) in a seated and flexed position with a gourd vessel, textiles, a llama, and a sling placed around the neck (used also to close the textile bundle).

Interestingly, of this cluster of burials, two individuals (HSC6 and HSC4) showed evidence of an annular form cranial modification (Form G) which is common in the Peruvian highlands (Allison et al. 1981a; Dembo and Imbelloni 1938; Dingwall 1931; Imbelloni 1950; Stewart 1950). HSC3 had Form D fronto-occipital modification, which also incorporated superior flattening. HSC3 also showed evidence of perimortem cutmarks (on two ribs and a sternal body).

Three more Tomaval Period burials were uncovered nearby. HSC5 (7 years +/- 20 months) was buried in a flexed position on his/her side with a llama above room A-106. HSC10 (7 years +/- 20 months) and HSC11 (12 years +/- 21 months) were interred nearby, within the fill of that same room. HSC10 was interred in a prone position with textiles and HSC11 was interred with textiles (at least three) in a supine position with the limbs flexed (Millaire and La Torre Calvera 2003; Millaire 2015b).

HSC5 had a Form E fronto-occipital cranial modification, a process by which elongated the skull and created a “pooching” in the nuchal area whereas HSC11 had a very pronounced Form F fronto-occipital cranial modification (also known as

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50 The radiocarbon dates for this series of interments were obtained from a sample of the cotton shroud that was wrapped around HSC6 (780 +/- 60 B.P.; Cal. A.D. 1,160 – 1,300, 2 sigma calibration) and a sample from a femur of Llama 21 (980 +/- 40 B.P.; Cal. A.D. 990 – 1,160, 2 sigma calibration) (Millaire 2015b).
symmetrical bilobate occipital flattening), which creates a heart-shaped profile superiorly. HSC10 also presented a Form F fronto-occipital cranial modification, although much less pronounced and (likely unintentionally) asymmetrical.

HSC11 had no evidence of trauma, while HSC5 and HSC10 presented perimortem cutmarks (on one rib fragment for HSC5; and on four left middle ribs, the manubrium and a sternal body for HSC10). HSC10 also had a previously fractured right clavicle (which was likely the result of a fall) and perimortem fractures to four right middle ribs.

Among the Huaca Santa Clara Tomaval Period burials, HSC3 and HSC6 showed signs of anemia, based on the presence of active porotic hyperostosis and/or cribra orbitalia. HSC10 and HSC11 also had active cribra orbitalia and/or porotic hyperostosis indicating anemia. As discussed previously, this would have likely impacted the lives of these individuals in noticeable ways. HSC11 additionally had one period of childhood growth arrest, indicated by enamel hypoplasia reflecting that this individual had some form of systemic stress at this period (2 – 2.5 years).

HSC3 had a fairly high caries rate given his or her age (50%). The other individuals from this burial context had lower caries rates (HSC4 with 25%, HSC5 with 35%, HSC10 with 6% and HSC11 with 13%), although these were still very high for their ages. When comparing the carious tooth count of this subadult Tomaval sample from Huaca Santa Clara with the subadult sample from the Late Intermediate Period at Túcume (Toyne 2008), individuals were found to have a much higher percentage of carious teeth (24%, as opposed to 4% for Túcume), indicating a highly cariogenic diet. Given the predominance of maize at Huaca Santa Clara compared to other plant remains (Masur 2012), this is not surprising. Compared to the carious tooth count for the subadult individuals at Huaca Gallinazo during the Virú Period (33%), it is possible that there was less reliance on maize over time in the Virú Valley (from the Virú to Tomaval Periods), however, without a larger sample this remains conjecture.

6.2.2 Discussion

When considering the Tomaval Period burials from Huaca Santa Clara, it seems clear that they represent a very complex ritual event that likely involved the sacrifice of children and juvenile camelids as part of the funerary ritual for HSC6, an important
member of the local community whose body was wrapped inside several layers of textiles (which were of a similar style to Chimú textiles) and who was placed in a seated position which common for this time period, but that was indicative of links to the highlands. The other individuals in this context were placed in positions that disregarded normal burial treatment. This denial of proper burial treatment for these individuals could be interpreted as a statement about the social status they held during life or the social persona conferred to them upon death or after death occurred (Verano 2005). Based on the burial positions and the presence of evidence of ritual violence (perimortem cutmarks and fractures on some individuals indicative of stabbing and possible blood-letting), it seems likely that these individuals acted as a group of retainers accompanying in death a member of the elite (HSC6), an individual who was very visibly differentiated from the others by means of a very prominent annular form of cranial modification51, indicating yet another association with the highlands.

Similar burial contexts have been documented elsewhere along the north coast of Peru. For example, excavations at the site of Santa Rita B in the Chao Valley led to the discovery of a number of Late Intermediate Period burials inside Architectural Complex 3 (Gaither et al. 2008). Most individuals were subadults and some showed signs of perimortem cutmarks and blunt force trauma to the skull. According to the authors, these individuals were laid out in positions indicative of human sacrifice in the pan-Andean tradition; their corpses were laid out in a manner consistent with having fallen or being flung down, with arms and legs flexed in random positions and some individuals buried face down. Two individuals appeared to be principal individuals. One was a child of 5 – 9 years buried in extended and supine position with a camelid and with no evidence of perimortem trauma. Another (an adult male) was also buried in extended and supine position. Both individuals had a symmetrical bilobate occipital flattening cranial modification (the same kind as HSC11, and possibly HSC10). The presence of Spondylus shells and other camelid remains, as well as the potentially sacrificed individuals suggest this was an area of highly specialized activity (Gaither et al. 2008).

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51 While HSC4 did show signs of an attempt at an annular modification, it was not nearly as pronounced as the modification to HSC6’s cranium.
Other similar Middle Horizon and Late Intermediate Period contexts identified by Millaire (Millaire 2015b) include Huacas de Moche and Huanchaco in the Moche Valley and Huambacho in the Nepeña Valley, all of which indicate a widespread ritual practice appearing in the Middle Horizon.

### 6.3 Summary: A New Form of Ritual Violence

The Middle Horizon in the Andean region was a time of great transition with the shifting of power structures following a period of several El Niño events and major drought, which led to famine especially on the coast. It ultimately resulted in the Huari influence being felt in the Andean highlands (south and central) and the coast (Cook 2004; Moseley 2001). Towards the end of the Middle Horizon (A.D. 900 – 1,000), Chimor emerged on the north coast of Peru, slightly after the Lambayeque (further to the north), again at the time of drought. The core of Chimor was the Moche Valley, with the capital at Chan Chan, very close to the Virú Valley, although it spread as far north as Tumbez and as far south as Carabayllo (Conlee et al. 2004; Moseley 2001). Burials in this period were seated, which reflected influence from the highlands, that was likely brought to Chimor through contact with the Lambayeque and Pachacamac (Conlee et al. 2004).

What seems evident, based on a bioarchaeological analysis of these burials from the Virú and Tomaval Periods, is that with the advent of the Tomaval Period, there was the introduction of a new practice in the Virú Valley (as well as at other sites along the north coast). The ritual interment of juvenile llamas and humans differs from practices of ritual violence from earlier periods. For instance, during the Early Intermediate Period among the Moche, the target group for ritual violence was young adult and adolescent male warriors, a ritual that likely functioned as a show of power from the Moche elite (Arkush and Tung 2013). The interment of juvenile humans and llamas in this context, some of whom show physical signs of ritual violence in the form of perimortem cutmarks, shows a very different form of elite strategy.

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52 The drought was a result of a decline in rainfall (25 – 30% decline) from A.D. 562 – 594, although the sociopolitical repercussions of this were felt long afterwards (Moseley 2001).
53 Again, a result of a decline in rainfall beginning around A.D. 1,100 and ending around A.D. 1,500 (Moseley 2001).
The Virú Period burials from the Southern Platform at Huaca Gallinazo also differ from the contemporaneous Moche contexts of multiple sacrificed young adult male warriors. They differ too from the Tomaval Period context at Huaca Santa Clara, even though both contexts seem similar at the outset, consisting of subadult burials in the civic-ceremonial area at the top of *huacas*. The Virú Period subadults from the Southern Platform, unlike the Tomaval Period subadults, do not show evidence of ritual violence in the form of perimortem cutmarks, nor do they show evidence of the same degree of deviation from standard burial treatment, as with HSC3 – HSC5 and HSC10 – HSC11 (who, with their limbs splayed, appeared to have been thrown down and buried where they fell). The Virú Period subadults, while they did deviate to a degree from standard burial positions (HSC6 being extended, but on his or her side, and HSC4 and HSC5 being delayed burials), did not deviate in a way that implied a violent intention, as was the case with the Tomaval Period subadults. The differences between these two contexts seem to reflect a difference in intent, the Virú Period burials perhaps representing dedicatory offerings for the last phase of construction and the Tomaval Period burials, with ritual violence being a central aspect and occurring at a previously important site after it had been abandoned, perhaps representing a form of ancestor worship, as well as an elite strategy for reaffirming power in a time of significant change (Millaire 2015b). With the intention of reaffirming ties of ancestry and place, and imbuing the elite with the power from these ties, this ritual could have served to legitimize the changes occurring. As Millaire states about this ritual, “the fact that cult specialists chose to perform those ceremonies on former settlements suggests that they were trying to establish at least some form of connection with material vestiges from the past and those who had built, lived and died on those settlements. As such, one could argue that the reuse of abandoned buildings was a form of ancestor worship” (2015b:19–20).

The presence of annular cranial modification and a seated burial (HSC6) in this Tomaval Period context, furthermore reflects the increasing influence of the highlands during this period (Millaire 2015a). It should also be noted, however, that there was an overall increase in variability in ACM in the Tomaval Period sample compared to the Virú Period, perhaps indicating increasing contact with other societies beyond the highlands as well.
The burial position of HSC6 in this context suggests that this individual was a principal individual and central to the ritual. Placing someone with such a visible marker of outside influence (cranial modification) appears as though it is a very deliberate statement promoting the ties with other cultures, and the accompanying socio-political changes. At the same time, the placement of this burial context at an abandoned site that was an important part of the former administrative network indicates that in order for these changes to be accepted, the elite needed to legitimize their power over the population, in this case by tying themselves to the former elite, and the power that they had held.
7 CONCLUSION

This study supports the hypothesis that a new form of ritual violence was introduced in the Tomaval Period (A.D. 750 – 1,150) in the Virú Valley, Peru (Millaire 2015b). This ritual was characterized by the burial of children and juvenile camelids in burial positions suggestive of a pan-Andean pattern of ritual violence (Gaither et al. 2008), in the abandoned civic-ceremonial space at the top of the huaca that would have been reserved for the elite. Additionally, some of these children had evidence of perimortem cutmarks and fractures, another sign of ritual violence.

The Middle Horizon (A.D. 800 – 1,100) in the Andean region was a time of significant socio-political change. During this time, after the collapse of the Moche (A.D. 800), and a period of drought and famine, the Huari and Tiwanaku expanded their spheres of influence, and at the end of the Middle Horizon, Chimor and Lambayeque (Sicán) were being established on the north coast of Peru (Moseley 2001). This time of transition would have created instability, at least for the local elite in the Virú Valley, who had ties with Huacas de Moche. Perhaps it was for this reason that the occupants of the Virú Valley during this period seemed to strengthen their ties with the highlands, in particular (Millaire 2015a), as they may have needed the support from their neighbours. This association is evidenced additionally by the presence of a subadult individual from the Tomaval Period context at Huaca Santa Clara with an annular form a cranial modification who was placed in a seated position, which is typical of the highlands (an individual, what is more, who was central to the ritual described from this context).

During the Virú Period (200 B.C. – A.D. 600) in the Virú Valley, patterns of ritual violence were quite different, and seemed to consist of dedicatory offerings (as was the case with the subadults from the Southern Platform at Huaca Gallinazo), or retainer burials (as was the case with HSC9 and possibly HSC13), rather than the ritual killing and/or mutilation of children and llamas, as was the case with the Tomaval Period context at Huaca Santa Clara. While it is possible that the infants and children from the Huaca Gallinazo context were killed ritually (just without archaeological evidence of it), the manner in which they were interred also showed less overt “violence”.


The subadult individuals from Huaca Gallinazo were interred as either secondary burials or in a manner that deviated slightly from “typical” burial patterns at this time (in an extended position, but placed on the side, as opposed to supine). Both of these forms, while they were examples of “atypical” burials, did not deviate from the norm as much as did the interments from the Tomaval Period context at Huaca Santa Clara, where individuals seem to have been thrown haphazardly onto the ground, sometimes with llamas. This, taken with the perimortem fracture evidence, as well as the perimortem cutmark evidence (possibly indicating blood-letting as well as stabbing) from the individuals from the Tomaval Period context indicates a different intent, and one that was likely more overt.

It is possible that this time of transition spurred the local elite from the Virú Valley into action (or, perhaps, a new elite was introduced that needed to affirm their power in the eyes of the populace). By performing a ritual of violence, on the ruins of a previously powerful site (from the Virú Period), they may have been asserting their power at the same time as they were drawing upon the power and legitimacy that the ruins would have given them in the eyes of the people. Rituals involving the mass killing and/or mutilation of llamas and/or children on the ruins of a previous site have been documented in other sites along the north coast during this period (Millaire 2015b), seeming to strengthen the notion that this type of ritual was used in order to legitimize power, and to legitimize new influences coming from elsewhere along the coast and the highlands.

7.1 Future Research

These results have demonstrated that more work needs to be done in terms of the bioarchaeology of the Virú Valley. Particularly, baseline population, paleogenetic and paleoepidemiological studies for this valley are necessary if we are to get a better understanding of the overall “health” of these populations, which can then be used to assess more individual contexts, such as this one. Hopefully, this study has made a start in this direction.
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Appendix A: Results of the Burial Pattern Analysis in Chart Form

Burial Positions in the Puerto Moorin Period

<table>
<thead>
<tr>
<th>Category of Individual</th>
<th>Subadult</th>
<th>Adult</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Undetermined</th>
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<tr>
<td>Number of Individuals</td>
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<td></td>
<td></td>
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<tr>
<td>Undetermined Position</td>
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<tr>
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</tr>
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<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Extended and on side</td>
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<td>0</td>
</tr>
<tr>
<td>Extended and supine</td>
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<td>0</td>
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<tr>
<td>Flexed</td>
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</tr>
<tr>
<td>Seated and flexed</td>
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Burial Positions in the Viru Period

<table>
<thead>
<tr>
<th>Category of Individual</th>
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<th>Adult</th>
<th>Male Adult</th>
<th>Female Adult</th>
<th>Undetermined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Individuals</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undetermined Position</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cane Bundle</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cane Coffin</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Extended</td>
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<tr>
<td>Extended and supine</td>
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</tr>
<tr>
<td>Flexed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Seated and flexed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flexed and on side</td>
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</table>
Burial Positions by Time Period

- Undetermined Position
- Jumbled Bones
- Burial in a Jar
- Cane Bundle
- Cane Coffin
- Extended
- Extended and on side
- Extended and supine
- Flexed
- Seated and Flexed
- Flexed and on side
Appendix B: List of Acronyms

ACM: Artificial Cranial Modification
BFT: Blunt Force Trauma
CEJ: Cemento-Enamel Junction
DDE Index: Developmental Defects of Dental Enamel Index
EIP: Early Intermediate Period
HG: Huaca Gallinazo (if followed by a number, then it refers to a specific burial)
HSC: Huaca Santa Clara (if followed by a number, then it refers to a specific burial)
LEH: Linear Enamel Hypoplasia
LIP: Late Intermediate Period
MH: Middle Horizon
TP: Tomaval Period
VP: Virú Period

Dentition:
- Lowercase refers to deciduous dentition.
- Uppercase refers to permanent dentition.
- Numbers refer to the tooth number and letters refer to the type of tooth: “I” for incisor, “C” for canine, “P” for premolar, and “M” for molar.
- Superscript number refers to maxillary dentition and subscript numbers refer to mandibular dentition.
- “L” refers to the left side of the dental arcade and “R” refers to the right side.
- Example: lm² means the left second maxillary molar (deciduous).

Vertebrae:
- Vertebrae are labelled according to the vertebra number and according to the type of vertebra: “C” refers to cervical, “T” refers to thoracic, and “L” refers to lumbar.
- Example: C7 means cervical vertebra number 7.
Appendix C: Burial Descriptions and Images from Huaca Santa Clara and Huaca Gallinazo


### Huaca Gallinazo (Virú Period)

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age and Sex</th>
<th>Context</th>
<th>Position</th>
<th>Grave Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG1</td>
<td>Young Adult Female</td>
<td>Sector B, CA1-A1; 66cm depth; loose soil; buried within the last floor of the patio of Architectural Complex 1.</td>
<td>Semi-flexed and on side</td>
<td>Textiles, gourd vessels.</td>
</tr>
<tr>
<td>HG2</td>
<td>Infant</td>
<td>Sector B, CA1-A1; 88cm depth; loose soil; buried within the last floor of the patio of Architectural Complex 1.</td>
<td>Jumbled bones (likely secondary burial).</td>
<td>Textiles, gourd vessel, llama, food stuffs.</td>
</tr>
<tr>
<td>HG3</td>
<td>Child</td>
<td>Sector A, Southern Platform; 1.6m below the current surface; loose soil, ash and household waste fill; covered by a block of hatched bricks from the last phase of occupation.</td>
<td>Extended and supine.</td>
<td>Textiles, 3 gourd vessels, 3 ceramic vessels.</td>
</tr>
<tr>
<td>HG4</td>
<td>Infant</td>
<td>Sector A, Southern Platform; 2.2m below the current surface; rubble and bits of earth was placed within for the construction of the floor; buried within the second floor 8cm deep.</td>
<td>Jumbled bones (likely secondary burial).</td>
<td>Textiles.</td>
</tr>
<tr>
<td>HG5</td>
<td>Infant</td>
<td>Sector A, Southern Platform (southwest corner); 2.16m below the current surface; rubble and bits of earth was placed within for the construction of the floor; buried within the second floor 5cm deep.</td>
<td>Jumbled bones (likely secondary burial).</td>
<td>Textiles.</td>
</tr>
<tr>
<td>HG6</td>
<td>Child</td>
<td>Sector A, Southern Platform; 2.2m below the current surface; rubble and chunks of earth from the construction of the floor; buried within the second floor 5cm deep.</td>
<td>Extended and on side.</td>
<td>Textiles, gourd vessel.</td>
</tr>
</tbody>
</table>

### Huaca Santa Clara (Virú Period)

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age and Sex</th>
<th>Context</th>
<th>Position</th>
<th>Grave Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSC7</td>
<td>Young Adult Female</td>
<td>Sector VI, Room A-102; +/- 1m 80cm;; ash with organic material; disturbed burial; pit dug into a ramp at the side of the west wall of A-102</td>
<td>Extended and supine.</td>
<td>Textiles, gourd vessel, dog, possible human offering (HSC9).</td>
</tr>
<tr>
<td>HSC8</td>
<td>Young Adult Male</td>
<td>Sector VI; +/- 10cm; compact earth with debris; disturbed burial</td>
<td>Extended and supine.</td>
<td>Textiles.</td>
</tr>
<tr>
<td>HSC9</td>
<td>Young Adult Female</td>
<td>Sector VI, Room A-102; +/- 2m 25cm; ash with organic material; disturbed burial; pit dug into a ramp at the side of the west wall</td>
<td>Extended and on side.</td>
<td>Textiles, gourd vessel.</td>
</tr>
<tr>
<td>HSC13</td>
<td>Middle Adult, Probably Female</td>
<td>Sector IV; +/- 50cm; compact earth covered by maize straw; disturbed burial</td>
<td>Flexed and on side.</td>
<td>Textiles.</td>
</tr>
<tr>
<td>HSC14</td>
<td>Middle Adult Male</td>
<td>Sector IV, Room A-122; +/- 70cm; loose earth; disturbed burial; pit dug into two floors</td>
<td>Extended and supine in cane coffin.</td>
<td>Textiles, 3 gourd vessels, copper pieces in mouth, in each hand and below feet (2+</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>HSC3</td>
<td>Child</td>
<td>Sector VI, Room A-105; +/- 20cm; loose and ashy earth; disturbed burial; body buried above the north wall (?); accompanying Burial 6 (?)</td>
<td>Supine with limbs flexed.</td>
<td>Llama.</td>
</tr>
<tr>
<td>HSC4</td>
<td>Child</td>
<td>Sector VI, Room A-105; +/- 30cm; loose earth; disturbed burial; body placed in a bench</td>
<td>Flexed and on side.</td>
<td>Llama, ceramic vessel.</td>
</tr>
<tr>
<td>HSC5</td>
<td>Child</td>
<td>Sector VI, Room A-106; +/- 10cm; loose earth; disturbed burial</td>
<td>Flexed and on side.</td>
<td>Llama.</td>
</tr>
<tr>
<td>HSC6</td>
<td>Child</td>
<td>Sector VI, Room A-105; +/- 1m; ash; disturbed burial; pit dug into the floor</td>
<td>Seated and flexed (in bundle).</td>
<td>Rope around neck, textiles, gourd vessel, llamas, possible human offerings (HSC3 and HSC4).</td>
</tr>
<tr>
<td>HSC10</td>
<td>Child</td>
<td>Sector VI, Room A-106; +/- 10cm; compact earth; disturbed burial</td>
<td>Prone.</td>
<td>Textiles.</td>
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<tr>
<td>HSC11</td>
<td>Child</td>
<td>Sector VI, Room A-106; +/- 15cm; compact earth; disturbed burial; interred in the north-west corner of the room</td>
<td>Supine with limbs flexed.</td>
<td>Textiles.</td>
</tr>
</tbody>
</table>

_Huaca Santa Clara (Tomaval Period)_
Huaca Gallinazo Burial #1 (HG1)
Huaca Gallinazo Burial #2 (HG2)
Huaca Gallinazo Burial #3 (HG3)
Huaca Gallinazo Burial #4 (HG4)

Huaca Gallinazo Burial #5 (HG5)
Huaca Gallinazo Burial #6 (HG6)
Huaca Santa Clara Burial #4 (HSC4)
Huaca Santa Clara Burial #5 (HSC5)
Huaca Santa Clara Burial #6 (HSC6)
Huaca Santa Clara Burial #7 (HSC7)
Huaca Santa Clara Burial #8 (HSC8)
Huaca Santa Clara Burial #9 (HSC9)
Huaca Santa Clara Burial #10 (HSC10)
Huaca Santa Clara Burial #11 (HSC11)
Huaca Santa Clara Burial #13 (HSC13)
Huaca Santa Clara Burial #14 (HSC14)
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>GG1</td>
<td>over 15 yrs. +/- 36 mos.</td>
<td>over 15 yrs.</td>
<td>N/A</td>
<td>24-30 years (Men); 30-35 years (Max.)</td>
<td>19 years +</td>
<td>30.7 years (21-53)</td>
<td>30-34 years</td>
<td>F</td>
</tr>
<tr>
<td>GG2</td>
<td>18 mos. +/- 6 mos.</td>
<td>1 yr. +/- 4 mos.</td>
<td>N/A</td>
<td>2-4 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>GG3</td>
<td>3 yrs. +/- 12 mos.</td>
<td>3 yrs. +/- 11 mos.</td>
<td>6.1 years (4.8-7.5 years, 2SD, if male); 4.9 years (3.9-6.1 years, 2SD, if female)</td>
<td>N/A</td>
<td>4-6 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>GG4</td>
<td>birth +/- 2 mos.</td>
<td>birth +/- 2 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>fetal-2 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>GG5</td>
<td>birth +/- 2 mos.</td>
<td>3 mos.</td>
<td>N/A</td>
<td>3 mos. (birth-5 mos., 2SD)</td>
<td>N/A</td>
<td>fetal-1 year</td>
<td>N/A</td>
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<tr>
<td>GG6</td>
<td>6 yrs. +/- 24 mos.</td>
<td>5 yrs. +/- 20 mos.</td>
<td>5.4 years (4.3-6.6 years, 2SD, if male); 4.9 years (3.8-6.1 years, 2SD, if female)</td>
<td>N/A</td>
<td>2-6 years</td>
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<td>HSC3</td>
<td>5 yrs. +/- 16 mos.</td>
<td>4 yrs. +/- 15 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>3-4 years</td>
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<tr>
<td>HSC4</td>
<td>12 yrs. +/- 36 mos.</td>
<td>12 yrs. +/- 21 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>6.5-9 or 11 years</td>
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</tr>
<tr>
<td>HSC5</td>
<td>8 yrs. +/- 24 mos.</td>
<td>7 yrs. +/- 20 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>4-6 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>HSC6</td>
<td>over 15 yrs. +/- 36 mos.*</td>
<td>over 15 yrs.*</td>
<td>10 years (8-12 years, 2SD, if male)- P1 (man.), 11.5 years (9.5-13 years, 2SD, if male)- P2 (man.)</td>
<td>N/A</td>
<td>17-23 years (male); 15-21 years (female)**</td>
<td>N/A</td>
<td>N/A</td>
<td>F?</td>
</tr>
<tr>
<td>HSC7</td>
<td>15 yrs. +/- 36 mos.</td>
<td>15 yrs.</td>
<td>N/A</td>
<td>N/A</td>
<td>17.5-19.5 years</td>
<td>19.4 years (15-24 years, 2SD, if female); 18.5 years (15-23 years, 2SD, if male)</td>
<td>20-24 years</td>
<td>F?</td>
</tr>
<tr>
<td>HSC8</td>
<td>over 15 yrs. +/- 36 mos.</td>
<td>over 15 yrs.</td>
<td>N/A</td>
<td>30-35 years (Man.); 24-30 years (Max.)</td>
<td>30 years +</td>
<td>28.7 years (21-46 years, 2SD, male)</td>
<td>35-39 years</td>
<td>M</td>
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<tr>
<td>HSC9</td>
<td>over 15 yrs. +/- 36 mos.</td>
<td>over 15 yrs.</td>
<td>N/A</td>
<td>18-22 years (Man.); 16-20 years (Max.)</td>
<td>18.5 years +</td>
<td>19.4 years (15-24 years, 2SD, if female); 18.5 years (15-23 years, 2SD, if male)</td>
<td>25-29 years</td>
<td>F</td>
</tr>
<tr>
<td>HSC10</td>
<td>10 yrs. +/- 30 mos.</td>
<td>7 yrs. +/- 20 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>6.5-9 or 11 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>HSC11</td>
<td>12 yrs. +/- 36 mos.</td>
<td>12 yrs. +/- 12 mos.</td>
<td>N/A</td>
<td>N/A</td>
<td>6.5-9 or 11 years</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>HSC13</td>
<td>over 15 yrs. +/- 36 mos.</td>
<td>over 15 yrs.</td>
<td>N/A</td>
<td>35-40 years (Man.); 35-40 years (Max.)</td>
<td>30 years +</td>
<td>48.1 years (25-83 years, 2SD, female)</td>
<td>50-59 years</td>
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<tr>
<td>HSC14</td>
<td>over 15 yrs. +/- 36 mos.</td>
<td>over 15 yrs.</td>
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<td>35-40 years (Man.); 35-40 years (Max.)</td>
<td>30 years +</td>
<td>28.7 years (21-46 years, 2SD, male)</td>
<td>40-44 years (L); 35-39 (R)</td>
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</table>

*M3 agenesis likely
### Appendix E: Cranial Modification Typology

<table>
<thead>
<tr>
<th>Description</th>
<th>Lateral View</th>
<th>Superior View</th>
</tr>
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<tr>
<td><strong>Form A</strong></td>
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<td></td>
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<tr>
<td>Non-Modified</td>
<td><img src="image" alt="Lateral View" /></td>
<td><img src="image" alt="Superior View" /></td>
</tr>
<tr>
<td><em>Cranial Index: 80-95</em></td>
<td><img src="image" alt="Lateral View" /></td>
<td><img src="image" alt="Superior View" /></td>
</tr>
</tbody>
</table>

**Form B**

Asymmetrical Occipital Flattening

- Likely the accidental result of cradle boarding. Can be asymmetrical on the right or left side.
- *Cranial Index: high 70s to low 80s*

**Form C**

Fronto-Occipital Type 1

- Varying degrees of frontal and occipital flattening.
- *Cranial Index: high 80s to low 90s*

---

*The normal range for unmodified cranias for coastal pre-Columbian Peruvian populations (Nelson et al. 2000).*
<table>
<thead>
<tr>
<th><strong>Form D</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fronto-occipital Type 2</strong></td>
</tr>
<tr>
<td>Trapezoidal with flattening superiorly, frontally and occipitally.</td>
</tr>
<tr>
<td><em>Cranial Index: 95</em>[^1]</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Form E</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fronto-occipital Type 3</strong></td>
</tr>
<tr>
<td>Lengthened skull, flattening on the frontal and occipital flattening positioned at an acute angle, ‘pouching’ at the back.</td>
</tr>
<tr>
<td><em>Cranial Index: low 70s</em>[^2]</td>
</tr>
</tbody>
</table>

[^1]: This type of modification shows similarities to Nelson’s Form E, however with a different cranial index (95, as opposed to low 80s). This means that with this individual, there was more foreshortening of the cranium involved (more fronto-occipital flattening, as opposed to more of an emphasis on superior flattening), although the flattening involved was the same (Andrew Nelson, personal communication 2014).

[^2]: This type of modification shows similarities with Nelson’s Form F, however, in this case the positioning of the occipital beard is higher on the occipital squamous portion and it produced a longer skull, with a lower cranial index (Andrew Nelson, personal communication 2014).
<table>
<thead>
<tr>
<th>Form F</th>
<th>Form G</th>
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<tbody>
<tr>
<td>Fronto-occipital Type 4</td>
<td>Annular</td>
</tr>
<tr>
<td>Frontal and occipital flattening in erect or slightly oblique position. Creates a heart-shaped profile superiorly. Short and broad.</td>
<td>Elongated and narrow skull produced by wrapping the cranium.</td>
</tr>
<tr>
<td><em>Cranial Index: mid 90s to 120s</em></td>
<td><em>Cranial Index: high 60s to 70s</em></td>
</tr>
</tbody>
</table>

* This type of modification is equivalent to Nelson’s Form C modification (Andrew Nelson, personal communication 2014).
* This type of modification is equivalent to Nelson’s Form G modification (Andrew Nelson, personal communication 2014).
Appendix F: Images of Trauma and Paleopathological Lesions

Note: Photos taken by author.

*Antemortem Fractures*

HG1: antemortem fractures to the sternal rib ends of the left 3rd and 4th ribs.

HG1: antemortem fracture to the left 5th proximal foot phalange.
HG6: antemortem right 1\textsuperscript{st} rib fracture to the sternal end.

HG6: antemortem fracture to the 2\textsuperscript{nd} right rib, sternal end.
HG6: antemortem fracture of a right middle rib (possibly the 3rd), near the sternal end.

HG6: antemortem fracture to the midshaft of a right middle rib (possibly the 4th).

HSC4: antemortem midshaft fracture to the left 3rd rib.
HSC4: possible antemortem fracture a right middle rib, near the sternal end.

HSC4: distal epiphyses of the right ulna and radius showing possible Colles fracture.

HSC4: distal end of the right ulna showing possible Colles fracture.
HSC4: distal end of the right radius showing possible Colles fracture.

HSC10: clavicles, right clavicle (pictured on the left) showing previous fracture at the scapular end, foreshortening it.

HSC13: clavicles, right clavicle (pictured on the left) showing previous fracture at the sternal end, foreshortening it.
HSC13: antemortem fracture to the 4\textsuperscript{th} right rib, at the rib neck.

HSC13: left ulna with a midshaft fracture.

HSC13: left tibia with compound fracture (and evidence of osteomyelitis).
HSC13: fractured nasal bones.

HSC13: fractured frontal bone.
**Perimortem Fractures**

HSC9: radiating perimortem fractures on the occipital and right parietal.

HSC9: left view of the skull with perimortem radiating fractures.
HSC9: frontal view of skull with perimortem fractures.

HSC10: perimortem fracture to a right middle rib.

HSC10: perimortem fracture to a right middle rib.
HSC10: perimortem fracture to a right middle rib.
Perimortem Cutmarks

HSC8: sternal end of the left 4th rib with a perimortem cutmark.

HSC3: sternal end of the right 3rd rib showing perimortem cutmarks.
HSC3: sternal end of the left 3rd rib showing a perimortem cutmark.

HSC3: perimortem cutmarks to a sternal body of HSC3.

HSC5: unidentified rib fragment showing a perimortem cutmark.
HSC10: manubrium showing perimortem cutmarks.

HSC10: sternal body showing perimortem cutmarks.

HSC10: 3rd left rib showing a perimortem cutmark.
HSC10: sternal end of the 4th left rib showing perimortem cutmarks.

HSC10: 5th left rib showing perimortem cutmarks (near the sternal end).

HSC10: 6th left rib showing a perimortem cutmark on the superior surface.
Other Pathology

HG1: fused C5 and C6, posterior/superior view.

HG1: fused C5 and C6, anterior/superior view.

HG1: fused C5 and C6, anterior/inferior view.
HG2: second ribs, showing rib fusion error of the right rib (placed on the left).

HG3: Endocranial surface of the frontal bone with Beaten-Copper cranium and endocranial lesions.
HG4: Portion of the parietal bone showing endocranial lesions.

HG5: Hard palate showing signs of scurvy.
HG5: maxilla showing signs of scurvy.

HG5: mandible showing signs of scurvy.
HG5: endocranial surface of the occiput (cruciform eminence) showing signs of scurvy.

HG5: endocranial surface of a portion of a parietal showing signs of scurvy.
HG5: ectocranial surface of a parietal showing signs of scurvy.

HG5: zygomatic showing signs of scurvy on the orbital surface.
HG6: endocranial surface of the occiput (cruciform eminence) showing “hair-on-end” lesions.

HSC6: anterior crest of a tibia with localized osteoperiostitis indicative of trauma or infection.
HSC9: right maxillary dentition showing pits on the occlusal surface of the molars.

HSC13: ectocranial lesions on the occiput, posterior view.
HSC13: ectocranial lesion on the inferior surface of the occiput.

HSC8: inferior surface of T11.
HSC13: superior surface of L5.

HSC14: anterior view of L4 and L5.
### Number of Teeth with Caries by Tooth Class

<table>
<thead>
<tr>
<th></th>
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### Number of Teeth with Caries by Tooth Class

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Note: max. refers to maxillary dentition and man. refers to mandibular dentition. VP refers to Virú Period and TP refers to Tomaval Period. HG refers to Huaca Gallinazo and HSC refers to Huaca Santa Clara.
### Number of Teeth with Caries by Location

<table>
<thead>
<tr>
<th>Location of Caries</th>
<th>HG1</th>
<th>HG3</th>
<th>HG6</th>
<th>HG (VP) Total</th>
<th>HSC8</th>
<th>HSC9</th>
<th>HSC13</th>
<th>HSC14</th>
<th>HSC (VP) Total</th>
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<td>%</td>
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### Number of Teeth with Caries by Location

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<thead>
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<th>Location of Caries</th>
<th>HSC3</th>
<th>HSC4</th>
<th>HSC5</th>
<th>HSC6</th>
<th>HSC10</th>
<th>HSC11</th>
<th>HSC (TP) Total</th>
<th>All Sites and Periods Total</th>
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<td></td>
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<td></td>
<td>No.</td>
<td>%</td>
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<tr>
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<td>0</td>
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<tr>
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Note: VP refers to Virú Period and TP refers to Tomaval Period. HG refers to Huaca Gallinazo and HSC refers to Huaca Santa Clara.
### Classification of the Severity of Calculus

<table>
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<th>Slight</th>
<th>Moderate</th>
<th>Heavy</th>
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<tr>
<td><img src="image1" alt="Slight Calculus" /></td>
<td><img src="image2" alt="Moderate Calculus" /></td>
<td><img src="image3" alt="Heavy Calculus" /></td>
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*Photos taken of the dentition of HSC14.

### Classification of Severity of Alveolar Resorption

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<th>Slight</th>
<th>Moderate</th>
<th>Severe</th>
<th>Complete</th>
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<tr>
<td><img src="image4" alt="Slight Alveolar Resorption" /></td>
<td><img src="image5" alt="Moderate Alveolar Resorption" /></td>
<td><img src="image6" alt="Severe Alveolar Resorption" /></td>
<td><img src="image7" alt="Complete Alveolar Resorption" /></td>
</tr>
</tbody>
</table>

*Photos taken of the dentition of HG1.*
CURRICULUM VITAE

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Post-secondary Education and Degrees:
The University of Western Ontario
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2008 – 2012, Honours Specialization in Anthropology

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(Master’s Awards Competition)
2013 – 2014

The University of Western Ontario
Gold Medal Award
2011 – 2012

The University of Western Ontario
Dean’s Honour List

The University of Western Ontario
Faculty Association Scholarship
2009 – 2010

Relevant Work Experience:
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The University of Western Ontario
2013

Research Assistant
The University of Western Ontario
2012