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In Society's Shadow: Identifying Structural Violence in MUNA, a Burial Community from Late Intermediate Period (1100 - 1470 CE) Pachacamac, Peru.

Ashley C. Ward, *Western University*

Supervisor: Nelson. Andrew J., *The University of Western Ontario*

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Abstract

Structural violence (SV) highlights how social structures harm communities via inequities in health, risk of trauma, and post-mortem treatment, however its applicability outside of Euroamerican capitalist contexts is unclear. Fifty-nine individuals from the MUNA cemetery (Pachacamac, Perú) from the Late Intermediate to Late Horizon Periods (1100-1532 CE) were analysed for evidence of SV. Nonspecific stress markers, osteoarthritis, pathological dental conditions, and physical trauma were recorded and compared as they related to age, sex and/or status and then contextualised using the Spanish Chronicles, ethnographic, and archaeological research. Inequities in resource or labour distribution but not amount to SV, but SV did operate through physical trauma; two nonadults were victims of human sacrifice and *tinku*. Analytically, SV is useful in non-Euromerican contexts, but its effectiveness will be negatively impacted by the amount and type of contextual evidence available, and social complexity will determine where SV will develop.

Keywords

Structural Violence, Health, Trauma, Pachacamac, Central Coast, Ychsma, Late Intermediate Period (LIP), Perú, Bioarchaeology

Resumen

La violencia estructural (VS) pone de relieve cómo las estructuras sociales perjudican a las comunidades a través de las desigualdades en la salud, el riesgo de trauma y el tratamiento post mortem, sin embargo, su aplicabilidad fuera de los contextos capitalistas Euroamericanos no está clara. Se analizaron 59 individuos del cementerio MUNA (Pachacamac, Perú) de los periodos Intermedio Tardío a Horizonte Tardío (1100-1532 EC) en busca de evidencias de SV. Se registraron y compararon marcadores inespecíficos de estrés, osteoartritis, condiciones dentales patológicas y trauma físico en relación con la edad, el sexo y/o el estatus, y luego se contextualizaron utilizando las Crónicas Españolas, la investigación etnográfica y arqueológica. Las desigualdades en la distribución de recursos o mano de obra no equivalen a SV, pero el SV sí operaba a través de traumas físicos; dos no adultos fueron víctimas de sacrificios humanos y *tinku*. Analíticamente, el SV es útil en contextos no Euromericanos, pero su eficacia se verá afectada negativamente por la cantidad y el tipo de pruebas contextuales disponibles, y la complejidad social determinará dónde se desarrollará el SV.

Palabras Clave

Violencia estructural, Salud, Trauma, Pachacamac, Costa Central, Ychsma, Período Intermedio Tardío (PIT), Perú, Bioarqueología

Summary for Lay Audience

‘Violence’ encompasses more than just physical trauma, and can include the inequitable distribution of resources, labour, and treatment of the dead. Structural Violence is a useful framework for analysing these other forms of harm, as well as physical trauma, as it exposes how mundane social structures prevent particular groups from accessing fundamental resources or increase their risk of experiencing trauma. Presently the framework has primarily been employed in Western, capitalistic political economies (or those entangled with them) thus the true applicability of the framework for understanding violence more broadly is unclear. To explore the true applicability of SV as an analytical framework in a non-Western bioarchaeological context, 59 individuals (34 adults, 25 nonadults) from the MUNA cemetery, outside the monumental site of Pachacamac, Perú, who died during Late Intermediate to Late Horizon Periods (1100-1534 CE) were analysed for evidence of structural violence. Contextual evidence was gathered from the Spanish Chronicles, ethnographic research, and archaeological data and was used to identify aspects of identity that may have increased the group’s risk of violence. Analysis included identifying and comparing rates various markers of general health (physical and dental), labour intensity through markers of osteoarthritis, and the prevalence and type of physical trauma, as they related to age, sex, and status. Inequities in resource and labour distribution did not amount to SV. However, two nonadults were subject to SV, operating via physical trauma. Reflecting on this research, SV is a framework that can be applied effectively outside of Euroamerican contexts; however, its efficacy will decrease as contextual evidence becomes more limited. Furthermore, the degree of social complexity, i.e., how many layers of social strata exist between the leader and the victims, will determine whether SV will develop.

Resumen para público no especializado

La "violencia" abarca algo más que el trauma físico, y puede incluir la distribución desigual de los recursos, el trabajo y el trato a los muertos. La violencia estructural es un marco útil para analizar estas otras formas de daño, así como el trauma físico, ya que expone cómo las estructuras sociales mundanas impiden que determinados grupos accedan a recursos fundamentales o aumentan su riesgo de sufrir traumas. En la actualidad, el marco se ha empleado principalmente en las economías políticas capitalistas occidentales (o en las que están vinculadas a ellas), por lo que no está clara su verdadera aplicabilidad para comprender la violencia en un sentido más amplio. Para explorar la verdadera aplicabilidad del SV como marco analítico en un contexto bioarqueológico no occidental, se analizaron 59 individuos (34 adultos, 25 no adultos) del cementerio MUNA, fuera del sitio monumental de Pachacamac, Perú, que murieron durante los periodos Intermedio Tardío a Horizonte Tardío (1100-1534 EC) en busca de evidencia de violencia estructural. La evidencia contextual se obtuvo de las Crónicas Españolas, la investigación etnográfica y los datos arqueológicos, y se utilizó para identificar los aspectos de la identidad que pueden haber aumentado el riesgo de violencia del grupo. El análisis incluyó la identificación y comparación de las tasas de diversos marcadores de salud general (física y dental), la intensidad del trabajo a través de marcadores de osteoartritis, y la prevalencia y el tipo de trauma físico, en relación con la edad, el sexo y el estatus. Las desigualdades en la distribución de los recursos y del trabajo no alcanzaron el SV. Sin embargo, dos personas no adultas sufrieron SV a través de traumatismos físicos. Reflexionando sobre esta investigación, la VS es un marco que puede aplicarse eficazmente fuera de los contextos euroamericanos; sin embargo, su eficacia disminuirá a medida que las pruebas contextuales sean más limitadas. Además, el grado de complejidad social, es decir, cuántas capas de estratos sociales existen entre el líder y las víctimas, determinará si se desarrollará la VS.

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Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter 1

1 Introduction

Violence, as a physical phenomenon and as a focus of research, is complex and sometimes paradoxical (Farmer, 2003; Klaus & Toyne, 2016b; R. G. Nelson, 2021). It is part of the larger repertoire of human behaviour, embedded in mundane and historical processes, and both shapes and is shaped by interpersonal relationships and institutional structures (Martin & Harrod, 2015). Understanding the nuances of violence – the actors, ideologies and mechanisms at play as well as the nature of violence itself – is thus a key part of understanding cultural continuity and change as well as the roots of our present landscapes of inequality (Farmer, 2003; Martin et al., 2012).

Structural violence (SV) is an analytical framework through which violence can be investigated. It highlights the mechanisms of harm embedded in a community's social fabric, and allows researchers to more fully grasp violence's complexity than more narrow conceptions of violence (Galtung, 1969). Unfortunately, SV's use has largely been restricted to historical western contexts so presently we do not know the extent of SV's efficacy in bioarchaeological contexts.

This thesis represents two critical contributions to the scholarship on violence. Firstly, I will use SV to analyse the presence and nature around Pachacamac during the Late Intermediate Period (LIP, c.1100-1470 CE) and its connection to cultural continuity and change within the context of the project *Mummies as Microcosms*. Secondly, I will use traditional, non-destructive analytical methods to record and compare rates and patterns of trauma and pathological conditions within the burial community discovered prior to the construction of the *Museo Nacional de Arqueología* (MUNA), henceforth known as the "MUNA cemetery." Through this analysis, I will contribute to the growing body of bioarchaeological research using SV as an analytical framework by critically evaluating the methodological limitations of the framework's employ.

1.1 Project Context: Pachacamac, MUNA, and Mummies as Microcosms

The MUNA cemetery is just outside of the sanctuary of the archaeological site Pachacamc which is located on Perú's central coast, 25km southeast of Lima, on a sand covered pediment overlooking the Pacific Ocean, the Urpi Kocha Lagoon, and the mouth of the Lurín River (Takigami et al., 2014). In the Andes site occupation and abandonment are fairly commonplace so Pachacamac represents a unique site in the region; it was continuously occupied from c. 200-300 AD up to Spanish conquest in the 1500s by four successive cultures: Lima, Wari, Ychsma and Inca. (Eeckhout, 2013). Eeckhout (2013) concludes that the transitions between these four cultures were relatively 'seamless,' which is interesting as cultural transitions often can be characterised by physical violence. Alongside its unique occupation history, Pachacamac had political and religious importance. During the LIP Pachacamac was the center of the Ychsma polity and, as the seat of the god Pachacamac and his oracle, was the focus of local pilgrimage. Later, during the Late Horizon (1470-1534 CE) the site became the focus of pan-Andean pilgrimage. Together, Pachacamac's occupation history and role as a political and religious center place an emphasis on describing the mechanisms of social continuity and change at the site (Eeckhout & López-Hurtado, 2018; Eeckhout & Owens, 2008). Describing these mechanisms may help researchers gain a better understanding of life on the central coast, particularly the interplay between the violent and non-violent relationships within and between communities.

Individuals from the MUNA cemetery, the "MUNA burial community" were recovered during a rescue archaeology project that was undertaken prior to the construction of MUNA. Led by John Baldeos, the project aimed to recover, document and preserve all cultural material in the area including human, animal and fish remains, ceramic, textiles, metal and lithics (Baldeos, 2015). Between March 4th and May 30th 2015, excavations were carried out in 'sector 3,' an area outside the main temple complex and 300m north of the sanctuary on the site's western border (Baldeos, 2015). Baldeos (2015) noted that the area's topography had been altered due to sand mining conducted in the latter half of

the 20th Century. Discussed later, these activities have affected the preservation of the burial community I am studying. Further excavations were carried out between 2016-2019 during construction monitoring at the site as more *fardos* (mummy bundles) were exposed (García & Baldeos, 2020).

One hundred and thirty-eight *entierros* (funerary contexts) were recovered during excavations in 2015 and a further 22 were recovered between 2016 and 2019. Most individuals recovered were from disturbed *fardos* and thus were disarticulated skeletons, but many of the *fardos* were intact (Baldeos, 2015; García & Baldeos, 2020). Initially, it was unclear if the disturbed and intact bundles represented two populations with different burial practices, or if they were from the same group but taphonomic processes had resulted in different states of preservation. Use of the cemetery as a sand quarry and the similarity of burial goods, ceramics, and textiles within the disturbed and intact *fardos* suggested that the latter scenario was more likely (Baldeos, 2015). This was confirmed by Nakahodo's (2023) analysis of cranial modification and dental health amongst 85 individuals (62 skeletonised crania and 23 from *fardos*) from the MUNA cemetery. She found that there were no significant quantitative or qualitative differences between the two groups (Nakahodo, 2023). Consequently, the disturbed and intact *fardos* will be treated as a single population henceforth.

The intact MUNA *fardos* have been the focus of the joint Peruvian-Canadian project Mummies as Microcosms which began in 2019. The project's goal has been to employ paleoradiological methods – namely x-ray and computed tomography (CT) scanning – to prevent the destruction, via unwrapping, of the unique biological and cultural forces encapsulated in each *fardo* (A. J. Nelson et al., 2021). Using paleoradiological methods preserves the relationship between the elements of the bundle which allows researchers to create both an 'osteobiography' and assess processes and variation in funerary treatment within the community, and over time (A. J. Nelson et al., 2021). Prior to June 2022 the disturbed *fardos* had not been analysed by the project (See Owens, 2017; and Owens & Vlémincq, 2015 for analysis of skeletonised individuals from MUNA, see Nakahodo et al., 2022 for further debate on analysis of E67 and E83). My research represents an

extension of the project via the integration of data from the disturbed *fardos* with the intact ones and illumination of aspects of the larger 'microcosm' of the cemetery.

1.2 Violence

1.2.1 The Past and Present Conception of Violence: How Has This Patterned Research?

Why focus on violence to study continuity and change at Pachacamac, a site with seemingly non-violent transitions between culture? On this point, I call back to the complex and paradoxical nature of violence which will be discussed in greater detail in Chapter 2. The *de facto*, narrow, conception of violence is that it is an unique, intentional, and physical action done intentionally by one person towards another (Galtung, 1969). In bioarchaeology, this conception manifests itself as a focus on physical violence. Lethal trauma is not always straightforward to identify, but because it manifests more readily in skeletons it is easier to measure, quantify and contextualise than something such as health deprivation. However, such a narrow focus results in the powerful impacts of violence's more subtle forms being missed or ignored and thus denies the complexity of the phenomenon (Gutmann et al., 2021; R. G. Nelson, 2021). In reality, violence is the product of ideology, inequality and power. Symbolic of dominance, and proxy for hatred and embedded with biological and cultural meanings, violence is prismatic and hard to define as its nature shifts with who is witnessing it, their lived experiences, history and ideology (Martin et al., 2012).

Tinku (discussed in detail in section 3.1), a highly circumscribed form of warfare commonly described as "ritual battle" – or more aptly "festive combat" – and human sacrifice are forms of violence that are both relevant to the Andean region and demonstrative of violence's paradoxical nature (Arkush and Stanish, 2005; Klaus and Tyone, 2016). Both activities involve physical trauma, however, because the negative, destructive element usually associated with violence is absent, *tinku* and sacrifice are instead points of cultural renewal and regeneration (Klaus & Toyne, 2016b). Thus, to

capture this complexity and paradoxical nature require that we use frameworks that can capture and wrestle with myriad forms of harm as well as their broader social consequences, the relationship between the subtle and overt forms, and the ideas that underpin them. Structural violence is a useful framework to do this.

1.2.2 Structural Violence

SV is process, a pattern of collective action that deprives particular groups of their ability to reach their full potential – physically, intellectually, emotionally and/or socially – by limiting their access to fundamental resources (Galtung, 1969; Lee, 2019). The concept is underpinned by an expanded definition of violence that allows researchers to identify unintentional and indirect actions as violent and the slowly-manifesting and non-physical impacts of these action as examples of harm (Galtung, 1969).

This expanded definition facilitates the consideration of how other forms of harm – that are not physical, direct, purposeful or have immediate consequences – affect broader cultural change and people's realities in both life and death (Galtung, 1969; Halling & Seidemann, 2017; A. J. Nelson et al., 2021; Watkins, 2018). The nature of bioarchaeological evidence largely limits our inquiries to physical and, in cases, social manifestations of violence. But, the larger benefit of this framework is that it explicitly considers how negative social conditions, and small, consistent doses of everyday interpersonal violence become embodied in patterns of trauma, differential health outcomes, and differential burial practices (Galtung, 1990; R. G. Nelson, 2021; Singer & Rylko-Bauer, 2021). Simultaneously, contextualising these outcomes within a 'historically deep' understanding of the social landscape helps to unveil the mechanisms producing and sustaining violence. In short, SV should help capture and explain the relationship between overt and subtle forms of harms, their production and maintenance, and their broader societal consequences.

SV has been used by bioarchaeologists since the early 2010s with the first critical piece by published by Klaus (2012). Since then, SV has proven to be a flexible framework – methodologically and in terms of the breadth of research interests. To the former, authors

consistently draw on historical documents, iconography and ethnography to provide that 'historically deep' context, but the osteological methods they have employed, and data gathered reflect their specific research interests (See Chapter 2, Fig. 2.2 for a detailed overview). The interests of researchers using SV had been broad. Their research toppics have ranged from the health effects that industrialisation and colonisation have had to the negative impacts on community building labelling groups as 'appropriate' for scientific research has had (R. Gowland, 2018; Klaus, 2012; Watkins, 2018). In recognition of the role bioarchaeologists can have in perpetuating SV through the subjectification of deceased individuals, I have sought to underscore that I am working with people, not data, throughout my thesis. I have consciously avoided using "subject," "population," or "sample" to describe those I analysed, and instead have used descriptions such as "burial community" (recognising that the burial location may be the only experience these individuals shared).

While SV is diverse, there is a lack of variability in the geographic and societal focus of research with the majority of authors focused on historic, industrial periods in England, the United States, Europe and Scandinavia. While Klaus (2012) is working with an Andean community, he is looking at the effects of Spanish colonial regimes on the population. Only Tung (2021), Stone (2012), Kieffer Nail (2018), and Van Derwalker and Wilson (2016) work outside the Western or Western-adjacent historical trajectories. This situation drives the need to further evaluate the predictions made by Klaus (2012) regarding the use of SV in bioarchaeology. He postulated:

1. **As SV is a historically contingent process, the framework may be most applicable for analysing Western contexts and capitalist-style political economies,**
2. **SV may only occur in rigidly hierarchal societies,**
3. SV must be analysed in tandem with other forms of violence,
4. Victims should not be portrayed as passive recipients, but as exercising as much agency as possible, and,

5. Research must involve critical engagement with the community's historical and archaeological context .

Points one and two (in bold, added here) require analysis. The narrow geographical, temporal and societal focus of present research suggests that the supposed contextual specificity of SV from point one may reflect the distribution of research rather than the actual distribution of structurally violent systems. Pachacamac is a non-Euroamerican, non-capitalist style political economy, facilitating the evaluation of this point.

It is the certainty of point two which is questionable. I suggest that inequality may manifest more readily skeletally in rigid hierarchies because people have less agency to subvert harm. So, in less rigid hierarchies inequity can manifest skeletally, but it may be more subtle and easily missed as it will develop more slowly. The *allyu*-based sociopolitical structure at Pachacamac distributed power more widely throughout the community, this structure lends itself to assessing whether point two should instead be couched as a matter of degree, i.e., SV may be more readily observed in rigidly hierarchical societies (Eeckhout, 2004a; Espinoza Soriano, 2015; Pechenkina & Delgado, 2006; Rostworowski, 2016, 2022).

1.3 Research Purpose, Questions and Aims

As noted, this research's purpose is two-fold. As a contribution to the larger project 'Mummies as Microcosms,' my first research question aims to identify and elucidate the nature of violence those in the MUNA cemetery may have experienced using SV as my analytical framework. My first research question is:

1. **Can SV identify and explain, if present, the nature, and mechanisms of violence experienced during life and after death by those buried in the MUNA cemetery during the LIP?**

To answer this question, it will be necessary to establish:

- What was the baseline level of stress and trauma people living on the central coast during the LIP experienced,
- What axes of identity would increase or decreased an individual's risk of experiencing violence,
- What the levels of stress and trauma experienced by those buried in the MUNA community were, and if there were patterns to stress and/or trauma based on the axes of identity established previously
- Whether the levels of stress and trauma identified could be explained by SV as an analytical framework. I.e., can the contextualisation undertaken during analysis explain the nature and mechanisms of violence present regardless of its type, or can it explain the absence of violence.

My second research question will address the applicability of SV in a broader range of cultural contexts:

2. **Via this exploration of violence amongst the MUNA burial community, can any of the claims made by Klaus (2012) regarding the specificity of analysing SV in the bioarchaeological record be addressed?**

To critically evaluate the applicability of SV for bioarchaeology I will reflect on the limitations that arose during the process of answering question 1 and discuss how the pattern of violence apparent in the MUNA cemetery is a reflection of how power is distributed in less rigidly hierarchical societies.

1.4 Chapter Outline

My thesis is structured as follows:

Chapter One: Introduction. This chapter provided a brief overview of concept of violence. I will discuss the various definitions of violence, outline structural violence, and my research context. Shaped by this discussion, I will also outline the purpose, aims and questions organising the thesis.

Chapter Two: Literature Review I – Violence. Chapter two focuses on definitions and conceptualisations of violence and outlines the framework of structural violence. In the latter discussion I will outline how SV has been used an analytical framework by bioarchaeologists and the potential limitations of the SV that must be kept in mind throughout research.

Chapter Three: Literature View – Cultural Context. Achieving historical depth is the aim of this chapter. The history of the MUNA cemetery, including the modern industrial activites conducted there, will be discussed. Ethnohistorical sources will be used to outline social identity at the site and identify potential axes of identity linked to potential experiences of violence.

Chapter Four: Ethics. In this chapter I will discuss the ethical principles and considerations guiding this research.

Chapter Five: Burial Community and Methods. This chapter will discuss the MUNA burial community, and the methods used to analyse violence within it. The specification of CT scanning and use of Dragonfly to gather data for the *fardos* is discussed.

Chapter Six: Results. Chapter six details the results of analysing the levels and patterns of stress and trauma amongst those in MUNA, and how this compares to Ancón (another site on the central coast occupied during the LIP).

Chapter Seven: Discussion. In this chapter I will explore whether or not the results in the previous chapter are indicative that those in MUNA burial community experienced

violence, and the nature of that violence if present. In this chapter I will also discuss the factors that limited the applicability of SV.

Chapter Eight: Conclusion. Finally, in chapter eight, I will synthesise the broad aims of my research and recap the important theoretical and methodological aspects of my thesis. I will also summarise my results and discussion and lay out future research directions.

Chapter 2

2 Literature Review I – Violence

An interest in violence, its genesis, causes, consequences, and relation to human nature permeates both academia and popular culture (Martin & Harrod, 2015). This interest is unsurprising; violence is a complex phenomenon that has affected the relationships between individuals, social structures, and the lived environment since at least the Paleolithic (Martin & Harrod, 2015).

Violence is at once hard to define, yet important to understand because of its roots in ideology, inequality, and power. It is symbolic of dominance, a proxy for hatred, and has biological and cultural meanings. Violence is prismatic – its nature shifts with who witnesses it, their lived experiences, history, and ideology (Martin et al., 2012). This means that violence is one potential way for ideology – part of a culture's bedrock – to be realised through power relations and affect the experienced reality of both the living and the dead. The phenomenon is embedded in both quotidian and historical processes, operates within social relationships and institutionalised structures, and results in not only physical trauma, but also negative impacts to health and nutrition. Paradoxically violence may also contribute to cultural regeneration on both the community and individual levels (Galtung, 1969; Klaus & Toyne, 2016b; Martin & Harrod, 2015; J. R. Topic & Topic, 1997; Watkins, 2018). Thus, through research investigating the nature and full variability of violence, we gain a fuller understanding of its place in the larger repertoire of human behaviour (Martin et al., 2012).

Violence is a difficult subject to analyse because the phenomenon is amorphous, also, examining it can be 'profoundly troubling' experience for researchers and their participants (Galtung, 1969; Wells & Montgomery, 2014). Because of its amorphousness, researchers must use a definition of violence that is broad enough to allow researchers to capture the most significant forms of harm in their research context, but also specific enough to craft concrete explanations and actions (Galtung, 1969).

How broad the definition of violence is changes how researchers characterise the relationships between the aspects of violence (Table 2.1), and how these aspects shape both the violent event or process, and the harm resulting from that event or process.

Table 2.1 Definitions of the Aspects of Violence. From Galtung (1969).

Aspect of Violence	Definition
Visibility	The ease with which a witness could identify an action as 'violent.' Visibility is related to tempo and stability.
Tempo	The length of time between the action and the manifestation of harm.
Stability	The relationship a violent action has to the larger social system.
Mechanisms	Tools of violence, includes things that crush, tear, pierce and deny basics needs such as air, food, water, movement, and life.
Harm	The consequence of violence, the deficit between a person(s) actual ability (physical, mental, emotional, etc.) relative to their ability without the injurious circumstances.

The goal of the subsequent section is to outline how anthropologists have defined violence previously and will discuss how this definition is too narrow and insensitive to capture violence's true complexity. I suggest that structural violence (Galtung, 1969, 1990), which is underpinned by an expanded definition of violence, is a suitable alternative to analytical frameworks designed upon the traditional definition.

2.1 Defining and Characterising Violence

The narrow definition of violence is "*an action – ranging from incapacitation or health deprivation to killing – done by one person to another with the intention to harm the latter" (Galtung, 1969, p. 168).* Under this definition violent actions involve a direct connection between an identifiable perpetrator and their victim, the perpetrator must have intent to cause the victim harm, and the violence must result in an immediate physical, somatic, consequence (Galtung, 1969).

Regarding the visibility, tempo, stability and mechanisms of violence, violence is thus characterised as highly visible, quick in tempo, lacking stability (it tends to be a stochastic or unusual burst of conflict), and relies on tools or circumstances that visibly change the physical body. In short, violence is pictured as a dynamic, attention-grabbing force, it is like a sudden noise cutting through the background buzz of the quotidian, first by disrupting the status quo, and then through physical changes to the body (Galtung, 1969, 1990).

This understanding of violence impacts research. The physical nature of harm serves to reinforce mind-body dualism, which separates the tangible aspects of the body from the intangible ones of the mind (Scheper-Hughes & Lock, 1987). This means that the emotional and psychological effects resulting from violent actions are not classified as 'violent' despite having real and impactful effects, and the tools that cause such trauma are excluded from the mechanisms of violence (Galtung, 1969; R. G. Nelson, 2021). Also, focusing only quickly manifesting physical harm supports the notion that violence is intrinsically gendered, i.e., that men are perpetrators of violence and women are their victims (Gutmann et al., 2021; R. G. Nelson, 2021). This deprives both parties of their agency, as their actions are reduced to innate biological traits rather than being understood as people's responses to their immediate and larger social context (Galtung, 1990; Gutmann et al., 2021). While men are the primary perpetrators of physical violence, violence is not just physical and men are not the only aggressors (Gutmann et al., 2021). In publications between 1992-2006, it was found that women committing intimate partner violence were more likely to use emotional, followed by physical and sexual violence against their partner, suggesting that men and women perpetuate different patterns of harm (Joseph-Edwards & Wallace, 2021; J. R. Williams et al., 2008). Research has also highlighted that men's experiences of violence have slowly manifesting and lasting physical consequences including higher rates of depression, psychosomatic symptoms, cardiovascular disease and poorer overall health (Joseph-Edwards & Wallace, 2021; Machado et al., 2020; Wells & Montgomery, 2014; J. R. Williams et al., 2008). In all, the narrowness of this notion of violence denies its true complexity. This results in a skewed understanding about whose lives are impacted by

violence and how they are impacted. It also leads to other more subtle forms of harm being at best missed and at worst ignored (Gutmann et al., 2021; R. G. Nelson, 2021).

Recognising the limitations of the narrow conceptualisation of violence, Francis Galtung (1969) expanded the definition of violence with the aim to capture both overt harms as well as those embedded in the social structure. He defined violence as '*an action or circumstance, in control of a person or persons, that prevents another person or persons from achieving their full physical, intellectual, emotional and/or societal potential'* (Galtung, 1969, p. 168). This expansion changes the fundamental characteristics of violence. Firstly, the link between the perpetrator and the victim may be indirect, secondly, harm may manifest slowly and be non-physical so the mechanisms of harm may include social processes and the manipulation of resource access, and finally, perpetrators may, but are not required to, have the intent to harm their victims because, here, 'in control' refers to whether or not the harm was avoidable rather than the aggressor's intention to cause harm (Galtung, 1969). That violent circumstances are 'avoidable' is an important caveat as it prevents the exponential and incomprehensible growth of the number of actions that could be labelled as 'violent' (Galtung, 1969; Lee, 2019). With these changes, violence thus encompasses both physical phenomena and social relations, and means that actions causing mental distress, poverty, social exclusion, and differential access to resources are recognised as tools of harm (Dilts et al., 2012; Galtung, 1969; Vorobej, 2008).

Even with this caveat, the expanded definition of violence is unwieldy as a unit of analysis. To utilise the full potential of the expanded definition, visibility, tempo, stability, and mechanisms (Table 2.1) are used to delineating violence in to its two principal forms, physical (PV) and structural violence (SV) and formulate methods that allow researchers to investigate and compare the two forms effectively.

Physical violence encompasses the intentional, physical, dynamic actions and harms discussed under the narrow definition of violence and structural violence is a process, a pattern of collection action that systematically deprives particular groups of their ability to reach their full potential – physically, intellectually, emotionally or socially – by

limiting their access to fundamental resources (Galtung, 1969; Lee, 2019). In contrast to PV, SV's tempo is much slower and more stable as is it embedded in the larger social structure itself and utilises mundane economic, political, and cultural processes to systematic deprive its victims of resources. Because of these factors, SV's manifestation is far more subtle, in fact, the mundane nature of SV renders it largely invisible to those it does not affect while simultaneously it is explained away as 'just the way it is' by its victims (Galtung, 1969, 1990; Lee, 2019).

There are three other distinguishing characteristics of structural violence. Firstly, as SV is embedded in the social structure, its production and longevity is tied to how and where power is located and the nature of inequity. This contrasts to PV which tends to be a reaction to contemporary events (Galtung, 1969). Also, the embeddedness of SV means that its mechanisms are relational and context specific, varying over time and space (Galtung, 1969). Secondly, SV tends to lack an easily identifiable perpetrator, meaning those "at fault" are obscured by the cumulative historical forces and processes that produce and sustain inequity. This process of obfuscation is also critical in rendering SV invisible (Galtung, 1969, 1990; Vorobej, 2008). Lastly, alongside expanding what is considered harm, who, or what, can be considered the subject of violence is also expanded to include the physical environment and the dead (Nixon, 2011; Watkins, 2018). Watkins (2018) articulates how the dead can be the victim of violence as well as used as a mechanism of it. Anatomy laws from early 20th century allowed the requisition of the bodies of marginalised peoples while the use of their remains in teaching and experiments perpetuated the dehumanisation and redesignation of these individuals as teaching and research "materials" (Watkins, 2018). In doing so, individual and community identities have been erased, separating the dead their own historical context and their descendant communities, and denying descendant communities the knowledge of their history (Cardoso et al., 2019; Halling & Seidemann, 2017; Nystrom, 2014; Nystrom et al., 2017; Watkins, 2018).

The distinction between PV and SV is fraught as the two forms of violence are inextricably linked, they exist on a continuum so there is an area where physical violence and structural violence are one in the same (Galtung, 1969; Vorobej, 2008). As a result of

the relationship between PV and SV, Galtung (1969) also concludes that: both forms of violence can co-exist, the primacy of one type of violence cannot lead to the other's elimination, there does not need to be a prehistory of one type of violence for the other to form, and, the manifest presence of SV or PV does not presuppose the latency of the other. In short, there is no essential way in which violence develops or changes over time, its evolution will be contextually specific, and the co-existence of PV and SV require that researchers study the two simultaneously, although one may be more prevalent than the other in any given period (Galtung, 1969; Klaus, 2012).

On a final note about In later work, Galtung (1990) outlined his concept of **'**cultural violence,' and defined it as the aspects of a culture which legitimises physical and structural violence by making them look right, or at least not wrong (see Stone's (2012) article about foot binding, corseting and the wearing of neck rings for an example). Overall, Galtung's (1990) discussion explains how culture, structural violence, and physical violence articulate with one another. This synthesis is important; however, I argue that "cultural violence" is an inappropriate label for what Galtung (1990) is describing.

Galtung (1969) specifies that violence is the mechanism that creates the deficit in actual versus potential. Physical and structural violence create a deficit because they directly impact a person's somatic reality and ability to access fundamental resources, respectively. In contrast, culture does not cause a deficit, it patterns and strengthens the structural and physical mechanisms that do. Galtung (1990) identifies the "domains" of culture to include religion, art, language, formal science, empirical science, and ideology. None of these "domains" interact with people directly, rather, they produce harm in the ways they are read, interpreted and then incorporated into the behaviours of various institutions (Galtung, 1990). In short, 'cultural violence' is an inappropriate label because culture itself cannot cause harm. Because of this while I will discuss the role culture has had in shaping experiences of violence and nonviolence amongst the MUNA burial community, I will not use the term "cultural violence" to do so.

As noted, culture has an important role making an act that would normally be taboo acceptable and in doing so it shapes both structural and physical violence (Galtung, 1990). The moral colour of an act is changed from red (wrong) to yellow (acceptable) or green (good) through a process of internalisation wherein actions are not seen as real or violent because the harm they produce is normalised and thus obscured from most people's consciousnesses (Galtung, 1990).

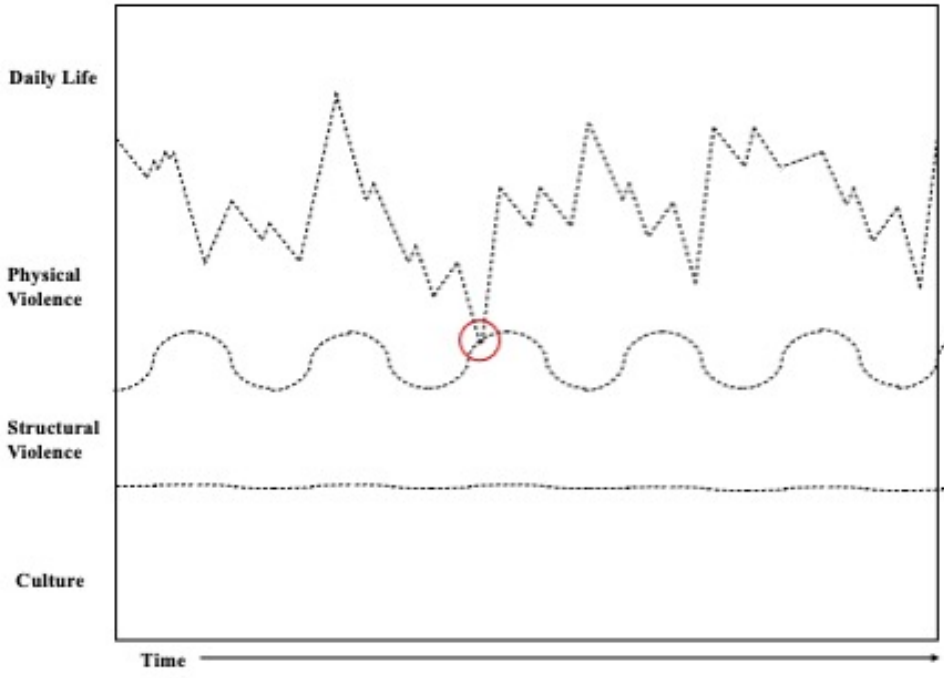

Figure 2.1 The Relationship Between Physical Violence, Structural Violence, and Culture.

Note. **The borders between strata are dashed lines denoting they are permeable, i.e., actions and events in the layer above can filter down to and change the layer below. The gradient/curve of the lines indicates the tempo of change for the layer below the line. The red circle is showing where contemporary events directly interact with and expose structural violence.**

The articulation of culture with SV and PV is illustrated in the 'strata model' (Fig. 2.1). Culture is the bedrock, providing nutrients (justification and legitimation) primarily for structural, but also physical violence. The border between the strata is permeable which means that contemporary events can change culture, however, as culture is buffered from contemporary events by physical and structural violence, its tempo of change is much

slower than the strata of physical or structural violence. Structural violence lies above culture, fluctuating more regularly but retaining a degree of stability as it is buffered from daily life by physical violence and is in direct contact with culture. While generally obscured from people's consciousness by physical violence, structural violence can be exposed by actions that fall outside of what is deemed as culturally acceptable. Finally, at the top, in direct contact with contemporary events, is physical violence which, while influenced by structural violence, is largely responsive to contemporary events. This is an important nuance as it implies that not all violence can be traced back to the influence of culture, and as noted before, it is in this space – where violent actions fall outside of the pattern set by culture – that structural violence is exposed (Galtung, 1990).

The nature of violence changes over time due to negotiations between present circumstances and the cultural bedrock. Contradictions arise between the two because, going down, strata are increasingly conservative as their pace of change decreases. This is to say that the deeper the strata the more they will reflect the lived experiences of the older or past generations. Resultingly, there are ample opportunities for contradictions to arise between the lived experiences of the younger generations and their cultural reality – a reality patterned by those more conservative strata. The domains of culture discussed by (Galtung, 1990) explain and legitimise observed differences among people and thus solve these contradictions. A closer examination of the production of ideology demonstrates this process. Ideology is produced through a dialectic social process wich goes as follows; descriptive just-so statements (an ideology) that define what exists, what is good, and what is possible are used to construct meaning from the observed world and shape people's identities, desires, aspirations, hopes, and fears (Brown, 1986; Therborn, 1999). Simultaneously, the truth of an ideological statement is assessed by examining how well it stands up to people's social experiences (Brown, 1986; Therborn, 1999). Contradictions and tensions arise from this latter part of the process because, as discussed previously, people's lived experiences within and between generations vary, thus there will be many who find a disjunction between their experience and the logic used to explain it (Brown, 1986). In explaining differences between the ideal and reality, people craft new ideological statements, this may lead to the cessation of specific forms of violence and the transformation of others (Brown, 1986; Galtung, 1990; Therborn, 1999).

This discussion has underscored that harm is not a static feature of a socio-political context, but the product of a specific set of modern and historical dialectic social relations (Farmer, 2003, 2009; Galtung, 1969). Methodologically, this requires that when operationalising SV, we need to employ methods that will help us get a historically deep and geographically broad understanding of a community's context (Farmer, 2003). Anthropologists employing SV analytically have used ethnographic methods and historical analysis to gain that rich contextualisation, and highlight the ideological underpinnings shaping violence, and the processes of its normalisation (Farmer, 2003; McCarry & Lombard, 2016; Stone, 2012).

2.1.1 The Impacts of Expanding Violence on Research

How the expansion of violence and its delineation impacts research is exemplified by the work of Paul Farmer (2003, 2004, 2009). A medial anthropologist and doctor, Farmer operationalised SV, using ethnographic methods to tease apart and expose the local and global threads of inequality shaping individual's experiences of violence, particularly those of whom he worked with in Haiti (Farmer 2003, 2004, 2009). The stories of Chouchou Louis and Acéphie Joseph are poignant, but they also highlight how using SV as an analytical framework adds nuance and depth to our understanding of violence.

Chouchou Louis

Growing up in the steep infertile highlands of Haiti's Central Plateau, Chouchou Louis' life largely revolved around farming, listening to the radio and going to church. Like many Haitians, Chouchou welcomed the election of Father Jean Baptiste Astride who was seen as a welcome representation of rural voices after the Duvalier dictatorship and subsequent military rule, and he was dismayed when he was deposed by a coup d'état in September 1991. While travelling in a truck to Hinche in October 1991, Chouchou made comments about the state of the roads, which was coded language deploring the coup, in the presence of an ununiformed soldier. This resulted in a group of soldiers and their

attachés assaulting Chouchou first at the nearest checkpoint and then again for several days at the Hinche barracks. Blacklisted for his scrape with the military, Chouchou constantly feared being arrested, a fear that was realised in January 1992 when he was arrested, without being given a reason, while visiting his sister. Taken to the nearest checkpoint, Chouchou was physically tortured for three days and then left in a ditch to die. He did so three days later, likely from slow, and then catastrophic internal bleeding (Farmer, 2003).

Acéphie Joseph

The Joseph family were 'water refugees,' a group of mainly peasant farmers displaced with the construction of Haiti's largest dam in 1954. In 1984, at nineteen, Acéphie was forced to stop her primary education to help support her family. She did this by carrying produce to the local market which took her through Pèligre where the local barracks were. There, soldiers would watch the women "parade" to the market, sometime taxing them with fines and other time with flirtatious banter, and Acéphie caught the eye of Captain Jacques Honorat (who was known to have a wife, children, and several other sexual partners). The two were sexual partners for a month before Honorat returned to his family, ill with unexplained fevers. For the next three years Acéphie worked as a housekeeper in Port-au-Prince for a meagre wage (USD $30 per month) and she began a relationship with the chauffer Blanco Nerette, another 'water refugee.' Acéphie fell pregnant leading to the end of her and Blanco's relationship as well as her employment and pregnant servants were deemed "unsightly." Returning to Kay, and her family, Acéphie suffered through a difficult pregnancy and then repeated infections following the birth of her daughter. The next months were consumed by Acéphie caring for her daughter while simultaneously dealing with her own night sweats, chronic diarreha and persistent lassitude, an experience that was worsened by a lack of medical support as political violence had hampered the opening of a local clinic. Honorat had had AIDS and Acéphie died from the condition in 1991. Her daughter was infected with the virus as were Honorat's wife and two of his children. Acéphie's father, unable to overcome his grief, hung himself shortly after his daughter's death (Farmer, 2003).

Chouchou's experience can easily be understood through the narrow definition of violence; the soldiers intended to cause Chouchou's fatal injuries as a show of force to those who did not support the coup. However, analysisng Chouchou's beating as a unique event ignores how it was embedded in a larger network of sociopolitical relationships (Farmer, 2003, 2004). In operationalising SV, Farmer (2003, 2004) advocated for the use of, and himself took, a "historically deep" and "geographically broad" perspective in order to expose the aforementioned networks. In an extended account of Chouchou's story, it becomes clear that his beating was, in the end, the product of sociopolitical relations between Haiti and the United States (Farmer, 2003). The latter, through the provisioning and withholding of aid, was intimately involved in the removal of popularly-elected democratic regimes, the installation and maintenance of militaristic ones, and the entrenchment and normalisation of government-perpetrated physical violence being used as an acceptable means of control (Farmer, 2003, 2004).

In juxtaposition, Acéphie's experience, also a product of Haitian-US relations, would not be considered violent under the narrow defintion of the concept, as none of the injuries she suffered were intentional, they manifested slowly, and some were non-phyiscal in their manifestation. The poverty faced by the water refugees was a consequence of the dam's construction, infrastructure that was designed in Washington D.C. with a mind for economic 'progress' but with a lack of concern or redress for those whose livelihoods were destroyed in its creation (Farmer, 2003). As financial security was elusive for the community, many women found it impossible to refuse the advances of soldiers as they were the only salaried, i.e. financially secure, men in the area. As Farmer (2003, p.39) recorded; *"the women I interviewed were straightforward about the nonvoluntary aspect of their sexual activity: in their opinions, poverty had forced them into unfavourable unions. Under such conditions, one wonders what to make of the notion of 'consensual sex'."*

Overall, operationalising the broader definition of violence (particularly the concept of SV) was able to identify Acéphie's experience as violent because it required an examination of power differentials and their contextualisation in broader social relations (Farmer, 2003, 2009; Galtung, 1969). It exposed the economic power Honorat had over

women like Acéphie, the violent aspect of their relationship, and the violence intrinsic to her contracting the AIDS virus (Farmer, 2003, 2004). Acéphie's story also underscored the true breadth of trauma that can result from violence. Poverty, nonconsent, and an increased risk of contracting and suffering from a disease are the clearest examples of trauma within her story, but also we must recognise the emotional trauma Acéphie's farther endured as a result of becoming a water refugee and then experiencing his daughter's death (Farmer, 2003).

In taking a step back and looking at Chouchou and Acéphie's experiences as consequences of larger sociopolitical relations between Haiti and the Western powers, we can also examine how violence has changed over time (Farmer, 2009). During the 18th Century there was a shift in the ideologies structuring how the Western powers acted towards Haiti (Farmer, 2009). Prior to the Haitian Revolution (1971-1803), France was able to justify their enslavement of and use of PV on the Haitian people via Eurocentric, racist, and imperialist ideologies. Haiti's declaration of independence which was coincident with an ideological shift in the West to ideas of neoliberalism and scientific rationalism (Farmer, 2004, 2009; Schmidt, 1995). During this period use of PV was no longer seen as acceptable so violence was then perpetrated by the West through economic means, ie., through SV. France penalised Haiti with an extortionate reparations bill while international entities such as the World Bank, who loaned Haiti money so that they could rebuild infrastructure destroyed during the war, imposed on Haiti a loan repayment plan that was physically impossible for the country to fulfil. This situation was used as evidence that Haiti's inability to self-govern and was thus used as justification for the physical occupation of Haiti by the United States (1915-1934) and denial of Haitian sovereignty (Farmer, 2004; Schmidt, 1995).

Using SV to examine the experiences of Chouchou and Acéphie, we have been able to explore the nature of violence on several scales and overtime, this is only possible because of way violence is conceptualised, as something that operates on various time scales and changes overtime. Farmer's (2003) use of ethnographic methods and historical research was sensitive to different visibilities, tempo, stability, and mechanisms PV and

SV entail, which facilitated his ability to tease apart these more transparent threads of harm and craft a more rich and nuanced understanding of violence.

Bioarchaeologists have adapted the method used by Farmer (2003, 2004, 2009), utilising ethnohistorical and archaeological data to contextualise osteological manifestations of violence gathered using traditional osteological methods (Klaus, 2012). The analytical framework used by bioarchaeologists, and its foundational ideas will be the focus of the rest of this chapter and, more broadly, research question two of this thesis.

2.2 Employing Structural Violence in Bioarchaeological Contexts

Analysing the impacts of the colonial regime on Indigenous Perúvians, Klaus (2012) was the first to employ SV systematically in a bioarchaeological context, adapting the methods used by Farmer to fit the constraints of the bioarchaeological record. Like Farmer (2003, 2004, 2009), Klaus (2012) focused on health and gained a rich understanding of context through ethnohistorical records to explain the violence and agency experienced and exercised by those buried at Chapel of San Pedro de Mórrope, the site of one of the first forced resettlements (*reducciónes)* after Spanish colonisation.

2.2.1 Manifestations "Markers" of Violence; Health and Beyond

In expanding the definition of violence and operationalising SV, the impact of violence on people's health, particularly physical health, was bioarchaeologists' first interest and continues to be one of the main focuses (Klaus, 2012). The concept of health encompasses myriad intrinsic and external factors including freedom from disease, a person's ability to carry out daily activities, to have the freedom to grow intellectually

and spiritually, their equilibrium with the natural environment, and their ability to adapt (Charlier et al., 2017; Levin & Browner, 2005; Souza et al., 2003; Waldron & Willoughby, 2016). While 'health' is a broad concept, bioarchaeological research is limited by what manifests skeletally, the nature of skeletal manifestation and skeletal samples themselves. This results in a focus on disease, signs of nutritional stress and trauma i.e. physical health (Goodman & Martin, 2002; Jackes, 2011; Souza et al., 2003; Weiss-Krejci, 2011; Wood et al., 1992). Conditions such as osteoarthritis and markers of dental attrition (caries, antemortem tooth loss, and abscesses) may also be examined. The mere presence of these conditions does not mean an individual's quality of life has been impacted, the conditions serve as proxies for understanding differences in, for example, the types and intensity of labour and the quality of diet or access to dental care, aspects of lifestyle that will impact quality of life in the long-term (e.g., Alioto, 2020; Beatrice et al., 2021; Harrod et al., 2012; Soler et al., 2019, 2022).

The understanding that health as a manifestation of violence is underpinned by concept of Embodiment (Scheper-Hughes & Lock, 1987). Embodiment sees the living body as located and embedded within a social system, so that it is both the 'subject' and 'existential grounds' of culture, i.e. the body is simultaneously shaped by, and necessary for, producing a particular social system, thus can be understood as the manifestation of an individual's life experiences (Csordas, 1990; Martin et al., 2012). The embodied self is tripartite, consisting of:

- The individual self: how a person conceives of their self as a unique embodied person among other embodied people,
- The social body: how people use the body as a symbol, a metaphor, for thinking about and understanding nature, society, and culture, and,
- The body politic: the regulation, surveillance and control of bodies both individual and the collective through metaphors and common representations of the natural and cultural. (Scheper-Hughes & Lock, 1987).

When looking at health SV focuses on the body politic as our perceptions, responses and experiences of illness are shaped by social context, and change how we participate, and interact with others in our community, as well as how communities interact with each other as part of the larger social fabric connecting neighbouring and distant settlements (Boldsen & Milner, 2012; Milner & Boldsen, 2017; Ortner, 2009; Souza et al., 2003). In short, health is the embodiment of the interactions we, and previous generations, have had with our social context. Thus, the manifestations of ill-health can be used a proxy for violence a under circumstances of inequality, our cultural context acts an agent of, rather than buffer to, chronic physical stress (Boldsen & Milner, 2012; Gravlee, 2020; Klaus, 2012; Singer, 2000).

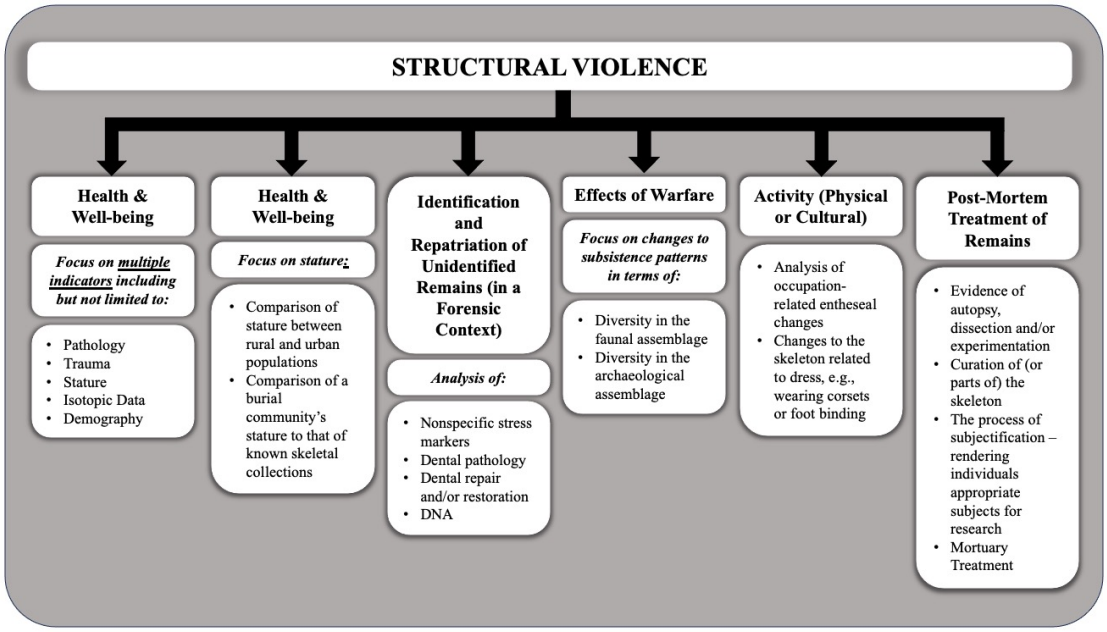

Figure 2.2 Summary of the Research Interests (Bolded), Methodologies (Italicised), and Data Types Employed by Bioarchaeologists using Structural Violence.
***Note*. Information is summarised from the references in Table 2.3.**

In the wake of Klaus' (2012) chapter, researchers have expanded their focus (Fig. 2.2) to include treatment of the dead (in forensic and academic contexts) and the effects of warfare on resource acquisition (e.g., Halling & Seidemann, 2017; Nystrom et al., 2017; Soler & Beatrice, 2018; VanDewarker & Wilson, 2016; Watkins, 2018). The concept of Disembodiment (Scheper-Hughes, 2011) is the foundation of this expansion as, like

Embodiment, Disembodiment problematize the physical body as socially enmeshed. However, its focus is on the dead rather than living body (Scheper-Hughes, 2011; Scheper-Hughes & Lock,1987). Disembodiment argues that death does not erase a person's connection to their still-living community, rather the process of grieving and healing, and the role the deceased's remains have in those processes often cements and strengthens their identity as a person (Scheper-Hughes, 2011). Consequently, the post-mortem treatment of remains, the subjectification, curation, and identification of human remains can be (and have been) examined as evidence of violence alongside manifestations of ill-health, activity patterns, and physical trauma.

2.2.2 Methodology

While there is some variation in the methods used by researcher employing SV based on their data and research question, most researchers follow Klaus' (2012) process. As noted, Klaus (2012) was looking that the impact of colonial regimes on the health and well-being of Indigenous Perúvians at Chapel of San Pedro de Mórrope. To do this he used a process (Fig. 2.3) of (a) osteological analysis, (b) basic contextual analysis, (c) comprehensive contextual analysis, and finally (d) explanation (Klaus, 2012; Martin & Harrod, 2015)

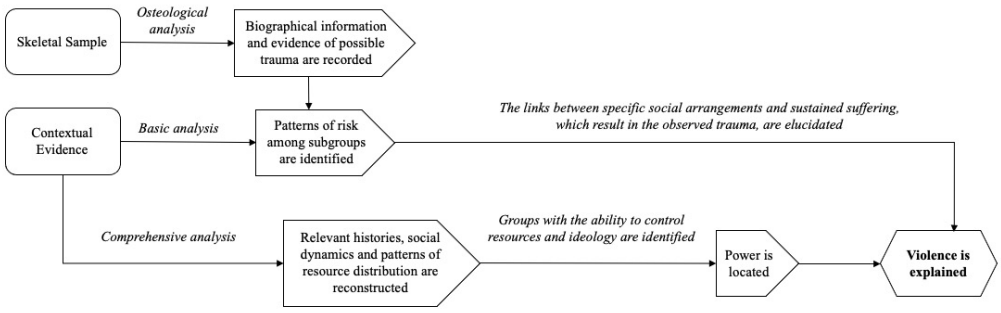

Figure 2.3 Synthesis of Process Klaus (2012) Used to Analyse Structural Violence at Chapel of San Pedro de Mórrope. Adapted from Martin and Harrod (2015, p.134).

In part a) Klaus (2012) recorded biographical information and various markers of health and lifestyle for the burial community from Mórrope and for a socially representative sample of pre-Hispanic Peruvians dating from 900-1532 CE. Health and lifestyle data include non-specific stress markers (NSSMs – cribra orbitalia, porotic hyperostosis, and periosteal new bone), stature, female fertility, activity markers, dietary isotope data, markers of dental attrition, and physical trauma (Klaus, 2012). Demographic data like female fertility has not been used by bioarchaeologists after Klaus (2012), most health-focused research has looked at NSSMs and/or specific conditions (e.g., Gowland, 2018 looked at evidence of "phossy jaw"), activity markers (e.g., Alioto, 2020), stature (e.g., Cardoso et al., 2019) and diet (e.g., Tung, 2021). Part b) involved the identification of groups at risk of violence through the examination of ethnohistorical records, and the comparison of these groups with the osteological data. In the comprehensive analysis (part c) dynamics of power were reconstructed to identify those with power and the mechanism through which they exercised their power. Also, the mechanisms through which victims of violence exercised agency were identified here. In the final part (d) results of the comprehensive analysis were combined with the osteological analysis to explain how violence was carried out, who was impacted and to what degree they were able to subvert the effects of (in Klaus' case) colonial economic and labour structures (Klaus, 2012; Martin & Harrod, 2015).

This is the process that has successfully and effectively been employed by bioarchaeologists over the last decade, however, it does not account for situations where violence (structural or otherwise) does not exist, nor situations where the nature of the osteological or archaeological record prevent analysis. The situation in the former will be accounted for in the methodology for this thesis and discussed in Chapter 5. The latter is an ever-present reality of bioarchaeological research that must be accounted for in both study design and explanations.

2.2.3 Potential Limiting Factors to Account for in Study Design and Explanations

The Osteological Paradox (Wood et al., 1992) will have to be considered when seeking to explain the presence, or lack thereof, of violence. It describes the population-level factors (heterogenous frailty, selective mortality, and demographic non-stationarity) which bias the burial community make-up and representation of pathological conditions in the osteological record making it more difficult to assess changes in disease patterns (Wood et al., 1992). The definitions of these factors are in Table 2.2. Overall, it means that the mortality profile of a burial community will represent the culmination of several different, large-scale, processes. Also, that the burial community we are studying will be enriched by the sickest and those partaking in hazardous lifestyles. This may lead to an overestimation of prevalence of ill-health and traumatic injury in the living population (Buikstra & DeWitte, 2019).

Table 2.2 Definitions of the Factors in the Osteological Paradox

Factor	Definition
Heterogenous Frailty	The presence of hidden biological factors and cultural factors which cause differential risks of contracting, displaying and dying from a disease or condition within a community (Grauer, 2018; Ortner, 2011).
Selective Mortality	Influenced by heterogenous frailty, the 'selection' of the weakest – biological or socially – to enter the burial population over 'stronger' individuals. Selective mortality does always affect who dies, this includes who dies in sudden mass tragedies e.g., natural disasters or genocides (Buikstra & DeWitte, 2019).
Demographic Nonstationarity	Influences the demographic structure of the burial record by influencing the population structure through changes to changing fertility rates and migration (Buikstra & DeWitte, 2019; Jackes, 2011)

As a concept, SV is not without critique and these critiques must be actively engaged with throughout the entire research process. Those critical of SV argue that the concept is

too broad to be analytically useful as it labels all social inequality as 'violent.' Furthermore, in this capaciousness, SV collapses historically and specifically nuanced forms and relationships of injustice into one category and conflates social disparity with 'full-fledged domination' (Boulding, 1977; Dilts et al., 2012; Farmer, 2004). Finally, it is argued that in the collapse of these historical and specific nuances, SV assumes that particular behaviours or actions are universally violent, and that all things labelled violent are intrinsically negative (Boulding, 1977; Derriennic, 1972).

So, methodologically, when employing SV there are steps that must be taken to ensure these critiques do not become limitations of our research. The potential risk of imposing one's ideas about what constitutes violence onto the past increases as the amount of contextual evidence available decreases. Preventing this requires being critically aware of the context one is working in and one's own positionality (Watkins, 2018). To reduce the likelihood of projection, there are three interrelated practices which should be explored prior labelling an action violent (Korbin, 1977, 2003; Wells & Montgomery, 2014). These three practices are: *cultural practices* – actions that may be considered harsh and unnecessary by outsiders but are deemed culturally necessary and have community-wide acceptance – *idiosyncratic mistreatment* – actions that deviate from cultural norms and are recognised as such – and finally, *social or structural abuse* – circumstances where the regular social structure results in a particular group having inadequate access to basic necessities (Korbin, 1977, 2003). To untangle these three practices, researchers must critically analyse their own cultural context and how that may bias their interpretation and the cultural context they are working in. It is only through this critical understanding, and being explicit about our own context and biases, will we be able to lessen the potential of projection (Farmer, 2003, 2004; Wells & Montgomery, 2014). This last point is also important for combatting the fact that characterising all violent things as 'negative' continues to deny violence's complexity especially in regard to socially regenerative roles of practices such as *tinku* – a highly circumscribed form of combat that involves the entire community – and human sacrifice (Arkush & Stanish, 2005; Boulding, 1977; Klaus & Toyne, 2016b). Finally, as discussed, the requirement that violence circumstances must be avoidable is something that is meant to curb the exponential growth of actions and circumstances being labeled as violent. To this end, during

analysis, it is necessary that things are only labeled as violent when there is a significant difference between whatever marker[1] of violence under examination.

2.3 Questions Arising from the Use of Structural Violence in Bioarchaeology.

In reflection on his analysis at Mórrope Klaus (2012) identified potential limitations of employing SV in bioarchaeological contexts postulating:

- As structural violence is a historically contingent process, the framework may be most applicable for analysing Euroamerican contexts and capitalist-style political economies,
- Structural violence may only occur in rigidly hierarchical societies,
- Structural violence must be analysed in tandem with other forms of violence,
- Victims should not be portrayed as passive recipients, but as exercising as much agency as possible, and,
- Research must involve critical engagement with the community's historical and archaeological context.

The first two require examination further examination. Table 2.3 lists the contexts of bioarchaeological research using structural violence analytically. Only Stone (2012), Vanderwarker and Wilson (2016), Kieffer Nail (2018), and Tung (2021) conduct research outside of Euro-American contexts. While Klaus (2012) is working in Perú, he is concerned with the impact of the Spanish colonial regime and is therefore studying a context entangled with the Euroamerican context (Fig. 2.4). This focus on European and

[1] "Marker of violence" refers to the osseous manifestations of violence systems. These can include, but are not limited to nonspecific stress markers, oral pathological conditions, osteoarthritis, and trauma.

American contexts suggests that the supposed contextual specificity of structural violence is more likely a reflection of research distribution rather than the real distribution of structurally violent systems.

Table 2.3 List of Bioarchaeological Research using Structural Violence and their Research Contexts

Author (Publication Year)	Context
Agostini (2020)	20th Century Portugal
Alioto (2020)	Early 20th Century United States
Beatrice et al. (2021)	21st Century United State-Mexico Border (Pima County, Arizona)
Cardoso et al. (2019)	15th – 17th Century Portugal
Goad (2020)	21st Century United States
Gowland (2018)	19th Century England
Halling and Seidman (2017)	19th – 20th Century England
Harrod et al. (2012)	19th – 20th Century United States
Hughes et al. (2017)	Late 20th – 21st Century United States-Mexico Border (Pima County, Arizona)
Kieffer Nail (2018 - PhD Thesis)	1000 BC – 1000 CE Midnight Terror Cave, Belize
Klaus (2012)	Pre- and Post-Spanish Conquest, Perú
Lans (2020)	19th – 20th Century United States
Madden and Drew (2020)	19th Century Norway
Mathena-Allen and Zuckerman (2020)	18th – 19th Century England
McGuire (2020)	18th – 19th Century England
Nystrom (2014)	19th Century United States
Nystrom et al. (2017)	19th – 20th Century United States
Reineke and Anderson (2016)	21st Century United States-Mexico Border (Pima County, Arizona)
Soler and Beatrice (2018), Soler et al. (2019), and Soler et al. (2022)	21st Century United States-Mexico Border (Pima County, Arizona)
Stone (2012)	Foot binding – Sung dynasty (960 – 1279 CE) to 1911 CE China, corseting - Victorian England, and the wearing of neck rings – present day Myanmar
Tung (2021)	The Andean region from the Archaic Period (8340 – c.1500 BCE) to Spanish Colonisation (1532 CE)
VanDerwarker and Wilson (2016)	12th – 14th Century Illinois River Valley
Watkins (2018)	20th Century United States

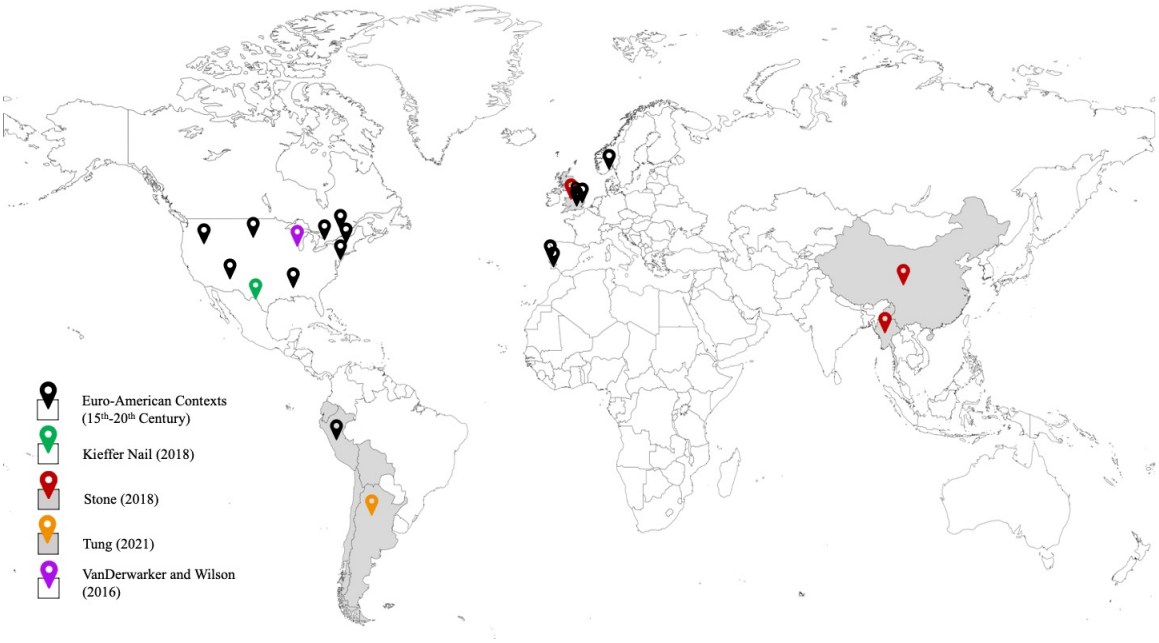

Figure 2.4 Locations of Bioarchaeological Studies using Structural Violence

Note. **The black pins represent research done in Euro-American contexts (15-20th Century) While the other coloured pins represent mainly non-Euroamerican contexts. All research presented here is in Table 2.3. Klaus (2012) is included in the black pins as his focus on the effects of the Spanish colonial regime on health.**

As to the second point, it is the certainty of Klaus's claim that is questionable. In rigid hierarchies, inequity may be manifested more readily in skeletons because its victims have fewer opportunities to exercise agency and subvert the consequences of structural violence (Chakrapani et al., 2007; Farmer, 2003, 2009; Gravlee, 2020; Singer, 2000, 2009; Singer et al., 2011, 2017; Singer & Rylko-Bauer, 2021; Tester et al., 2013; Whittle et al., 2015; Zvonareva et al., 2019). While less rigidity should allow for more agency, agency and inequity are not mutually exclusive. Therefore, in less rigid hierarchies, inequity can be manifested skeletally, but the manifestation may be more subtle and easily missed. This begs the question whether this second point should rather be couched as a matter of degree, i.e., SV may be more readily observed in rigidly hierarchical societies.

2.4 Conclusion

Violence is muddy – complex in terms of its meanings, causes and consequences, and paradoxical in that it can be both destructive and regenerative (Klaus & Toyne, 2016b; Martin et al., 2012; Martin & Harrod, 2015; R. G. Nelson, 2021; Watkins, 2018). This complexity requires researchers to use analytical frameworks that are robust – they can account for the grand-scale relationships between violence and cultural change – yet are sensitive enough to capture historical and cultural nuances (Farmer, 2003; Galtung, 1969; Martin et al., 2012; Martin & Harrod, 2015). The traditional definition of violence, which restricted researchers to harms that were physical, purposeful, and manifested immediately, is not up to this task as it misses impactful forms of non-physical trauma and genders violence so that it is an innate biological trait of men rather than a cultural patterned response (Galtung, 1990; Gutmann et al., 2021).

As is evident in the critical examination the stories of Chouchou Louis and Acéphie Joseph (Farmer, 2003, 2004, 2009), expanding the definition of violence and operationalising structural violence allows researchers to look at other forms of harm including health and well-being, and the post-mortem treatment of the dead (Galtung, 1969; Harrod et al., 2012; Klaus, 2012; Nystrom, 2014; Watkins, 2018). But is SV up to the task of being both robust and sensitive? Bioarchaeological research employing SV analytically would suggest yes. Because SV is a process where one group is systematically deprived of their fundamental resources, researchers' focus should automatically be drawn to those harms that are slow to manifest or are not traditionally thought of as harm, e.g., markers of ill-health and patterns of dissection and experimentation (Galtung, 1969; Klaus, 2012; Nystrom, 2014; Watkins, 2018). Furthermore, as the violence SV seeks to explain is inextricably tied to the community's social structure, contextual analysis must be historically deep and geographic broad, thus capturing broader historical trends and community-specific nuances, as demonstrated by Farmer (2009).

However, suggestions are not conclusions, and questions about the efficacy of SV as an analytical framework remain. These questions are synthesised in conclusions drawn by Klaus (2012) with his analysis of the impact of Spanish colonisation on the community at Chapel of San Pedro de Mórrope. Of particular interest are his conclusions that SV will be most applicable in Euroamerican and capitalist-style political economies, and that SV may only occur in rigidly hierarchal societies (Klaus, 2012). The former must be examined as bioarchaeological research using SV has primarily been done in Euroamerican contexts, while examination of the latter will indicate if the statement should be couched as a matter of degrees rather than with such certainty.

Chapter 3

3 Literature Review II – Cultural Context

3.1 Landscapes of the Central Coast

The landscape a community lives within and creates has physical, cultural, and historical components. This chapter will address the landscapes of the central coast. I will discuss the physical, historical, and cultural landscape, as well as the landscape of violence focusing particularly on the Middle Horizon to Late Horizons (c. 600-1532 CE). Overall, the aim of this chapter is to identify the aspects of identity that contribute to or mitigate an individual or group's risk of experience violence, and to gain that deep historical and broad geographical understanding required to fully explain the nature of violence (or absence of) experienced by the MUNA burial community.

Characterised by a 'long period of shared cultural trajectory' the central coast has been variously defined by archaeologists as extending from the Huara to the Cañete Valley (Marcone, 2022b) to only including the Chillón, Rímac and Lurín valleys (Rostworowski, 2016, 2022). The broader definition of the central coast has been used for this thesis (following Marcone, 2022b) but contextualisation and analysis has focused on the Chancay, Chillón, Rímac and Lurín valleys as they are more relevant life at MUNA – the latter three valleys make up the 'core' of the Ychsma territory (Díaz, 2008). Ancón, the community which will provide a comparative local "baseline" for those in the MUNA cemetery, is located in between the Chancay and Chillón valleys.

3.1.1 The Physical Landscape

"*The view from the platform, where the temple [of the Sun] once stood, is exceedingly striking. Half the horizon is occupied by the ocean, and the other half is divided into two widely different scenes. One is an arid desert, with no object on which the eye can rest save the ruined city; the other is a lovely valley, covered with fields of maize and sugar cane, and dotted with houses half hidden by the encircling fruit gardens. The little town of Lurín stands in its centre. A narrow stream separates this enchanting valley from the dreary expanse of sand, while the glorious Andes bound the inland view"* (Cieza de Leon, 1553/1864, p. 234).

Figure 3.1 View from the Temple of the Sun looking north to the Old Pan-American Highway (Photo taken by author June 2022).

Perú's physical landscape is one of extremes. While proximal to the equator, the environment is conditioned by the Pacific Ocean, specifically the Humboldt Current, in

the west and the verticality of the Andean Mountain range (hereby referred to as 'the Andes') running north to south. Tropical air is rapidly cooled by the Humboldt, forming a warm air mass over the water that, moving inland, produces rain in the highlands during the austral summer (November-March), dense fogs which sit in the Andean foothills during the winter, and prevents rainfall on the thin coastal plain (Lanning, 1976; Pulgar Vidal, 2014). The Andes are formed by the parallel Corderillas Negra and Blanca which are separated by a series of highland basins such as the *Callejón de Huaylas* through which the Santa River runs.

Table 3.1 List of Agricultural Products Grown in the Valleys of the central coast. Information from Lanning (1976).

Crop Type	Crops Cultivated on the central coast
Grains	Maize
Legumes	Common bean, Lima bean, Jack bean, Peanuts
Cucurbits	Squash (three types: *Cucurbita maxima, C, moschata, and C. ficifolia*), Gourds[a]
Roots	Achira (2 types: *Canna edulis,* and *C. indica*), Jíquima, Manioc, Sweet potato
Fruits	Pineapple, Soursop, Chirimoya, Avocado, Pacae, Guava, Lúcuma, Pepino
Other	Cotton[a], Ají (chili pepper)

[a] These crops are not consumed, but used in various other contexts, e.g., gourds are used as plates etc., and cotton is used for textile manufacture.

Elevation changes rapidly from the coast to the Andean peaks, producing horizontal bands of diverse yet defined environments across the region which are crosscut by many river valleys, fed by water from the highland areas of the Andes (cf. Pulgar Vidal, 2014). These bands are the coastal plain, which is one of the driest deserts in the world but can be cultivated because of the river valleys. Moving inland, in the Lurín valley (where Pachacamac is located) the lower and middle portions of the valley are the *chala* region (0-500m asl), which has a temperate and humid climate. Here, sterile desert gives way to uncultivated ravines and then flat, irrigated, productive land. The presence of fogs allows for the development of *lomas* which are rich in plant and animal life. The upper valley is

within the *yunga* zone (500-2300m asl) which has a warm-dry climate with seasonal fluctuations. This area has only small pockets of arable land, however, terracing and irrigation systems allow communities to exponentially increase the area of the productive zone (Bueno Mendoza, 2012; Pulgar Vidal, 2014). Marine resources are rich as the Humboldt Current supports a large plankton population which in turn draws in fish and larger marine animals (Lanning, 1976) This resources are supplemented by various agricultural products, those cultivated on the central coast are summarised in Table 3.1.

An El Niño Southern Oscillation Event (ENSO) can have drastic effects on the coast's ecology and people's lives. ENSOs involve a complex array of oceanic and atmospheric changes including the reduction or cessation in the flow of the HC and the intensity of the South Pacific anticyclone (Caviedes, 2001). With the collapse of that high-pressure mass, easterly trade winds slacken, and westerly winds replace them in the tropical belt. This impacts the superficial circulation of the sea and warm waters from the equator move south in the form of Kelvin waves (pulsating advances of warm water), increasing sea levels and the thermocline (the depth of water heated by the sun). Humid equatorial air masses accompany the equatorial waters and release torrential rains over the usually arid equatorial islands, the coast of Ecuador, and northern Perú, while the Andes and Bolivian Altiplano experience severe droughts (Caviedes, 2001; Kluger et al., 2019; Takahashi et al., 2018; Timmermann et al., 2018). For example, in February-March of the 2017 ENSO event Piura, on the North Coast received 723mm of rainfall, almost 7 times their average of 106mm (Takahashi et al., 2018). Marine resources were also affected by the oceanic changes. Populations of benthic organisms (e.g., scallops) were decimated as water temperature rose from 16-17°C to 28°C, hypoxic conditions developed, and salinity dropped on the north coast (Kluger et al., 2019).

Finally, Perú is geologically active because the Nasca and Antarctic plates are subducting under the South American plate. This subduction has and will continue to cause uplift of the coast, changing the central coast's marine ecology in the long-term. Simultaneously, relatively frequent earthquakes can have drastic consequences which may be worsened by subsequent disasters e.g., tsunamis (Quilter, 2014; Shimada et al., 2022; Winsborough et al., 2012).

3.1.2 The Historical Landscape: A (Rather) Brief Summary of…

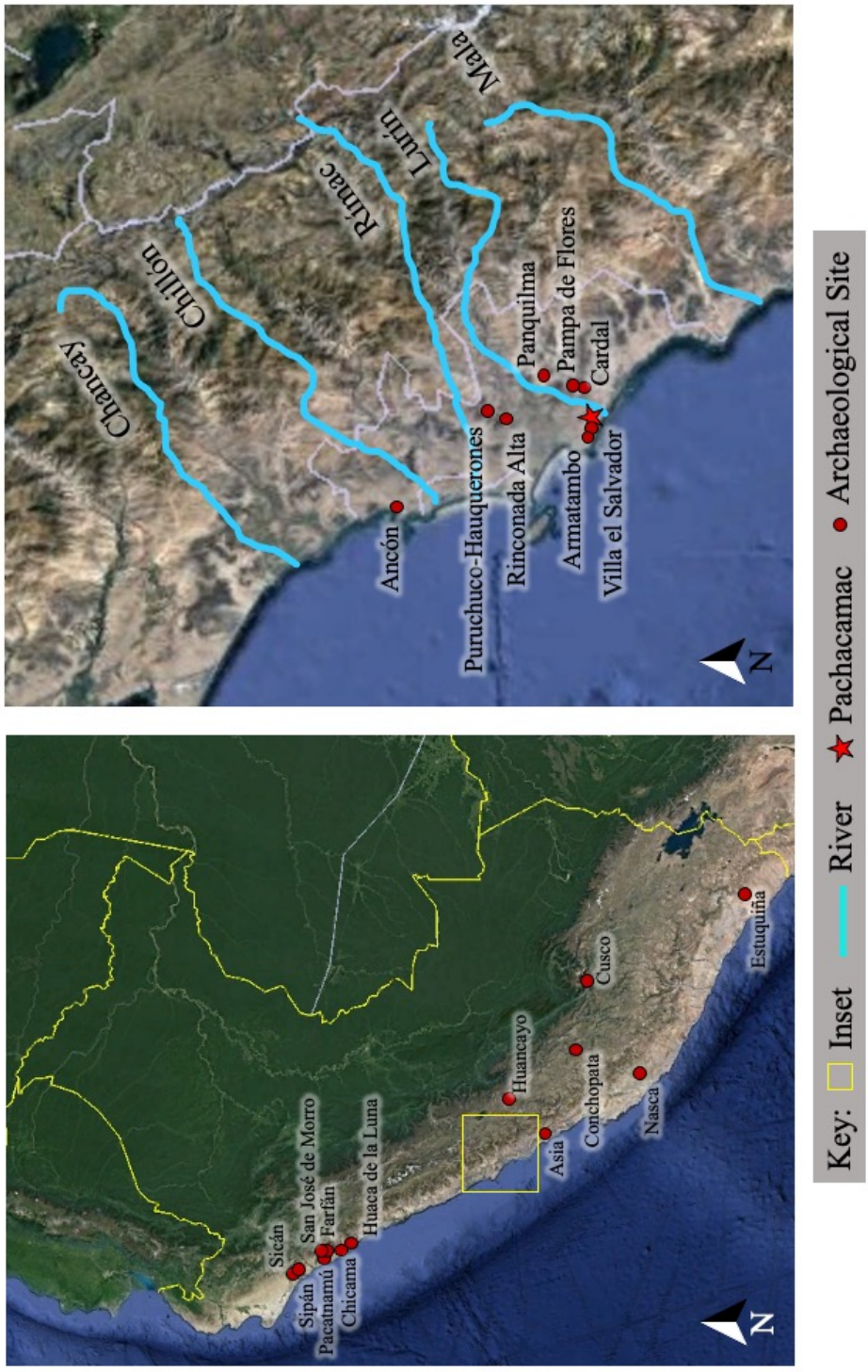

Figure 3.2 Map of Archaeological Sites Discussed in Sections 3.1.2 and 3.1.3.

Note. **Map made using information from *Mapa de Cuencas Hidrográficas del Perú* (2003).**

Table 3.2 Summary of Aspects of Perú's Preceramic to Early Intermediate Periods.

The Preceramic Periods (c.10,000-c.1,800 BCE)

c.10,000 BCE people first moved into the coast, living in small, highly mobile groups. In the Middle Preceramic (c.6,000-2,500 BCE) sedentism increased and wild foods (especially marine resources) were supplemented with some cultivated crops. Irrigation facilitated maize cultivation on the central coast during the Late Preceramic (c.2,500-1,800 BCE). Monumental architecture arose in the Lambayeque to Chillión valleys but there is no evidence of such activity in the Lurín valley. Burials suggest that there was a low degree of social hierarchy during this period, at Asia individuals were wrapped in reed mats, buried in a seated flexed position with utilitarian burial goods.

(Burger & Salazar, 2022; Lanning, 1976; Marcone, 2022b; Quilter, 2014; Rostworowski, 2016, 2022).

The Initial Period (c.1800-800 BCE)

Occupation of the Lurín valley began. Subsistence was based on irrigation agriculture and supplemented by semi-domesticated fruits and marine resources. Pottery and the heddle loom were developed, and cotton was domesticated. The latter two allowed for textile production to commence. Monumental architecture was characterised by 'u-shaped' temples. Excavation at sites such as Caral suggest that temple complexes acted as central nodes for civic and ceremonial activities while agriculturalists lived in small hamlets among the fields or in nearby rocky ravines. Variability in architectural elements, building techniques, and ceramic styles suggests sites during this period were largely autonomous but linked by shared religious ideology and culture. The ubiquity of simple textiles and utilitarian ceramics in mortuary contexts suggests a low level of social hierarchy existed.

(Burger & Salazar, 2022; Marcone, 2022b; Quilter, 2014).

The Early Horizon (c.850-200 BCE)

In the Lurín valley political power was decentralised while Chavín de Huantar (a group from the highlands) exerted influence over the Andes more generally. Abandonment of Initial period temples begins c.900 BCE and was finished by the end of the Early Horizon. The presence of negative painted, red on white pottery, low platforms and large courtyards are indicative of influence cultures from the southern coast on the central coast. Platforms provided a space for reaffirming a shared cultural identity through feasting and ancestor worship while limiting the amount of manpower that was mobilised in their construction and maintenance. Maize was the staple crop and the consumption of domesticated camelid increased (possibly due to the presence or influence of highland groups). On the South Coast individuals were interred in *fardos*.

(Burger & Salazar, 2022; Quilter, 2014)

Table 3.2 Continued

The Early Intermediate Period (200 BCE - 600 CE)

The Lima culture (c. 200-750 CE) emerged as a centralising force on the central coast amongst the dissolution of pan-Andean interactions, although various cultural styles did co-exist with the Lima culture. Lima culture was characterised by the prominence of an interlocking (bi-headed serpent) design, the use of *adobitos* (mudbricks stacked vertically) in construction, and the burying of the dead in an extended position regardless of age. Lima ceramics first appeared in the Chancay and Chillón valleys before they spread south into the Rímac and Lurín valleys. During the period the agricultural frontier was expanded and intensified through canals and irrigation projects. Monumental construction began at Pachacamac c.400 CE which increased in scale and pace throughout the period. Construction included the Old Temple, the Urpi Wachak (Urpiwachac) Temple, and the Complex of the *Adobitos*, their locations possibly reflected the importance of water in the Lima culture. At Villa El Salvador and Pachacamac individuals were interred in an extended position and the richness of burial goods for individuals varied by gender and age; men had more elaborate burial goods at a younger age than females and nonadults had less elaborate burials overall.

(Eeckhout, 2013; Marcone, 2022a, 2022b; Marsteller & Marcone, 2012; Pechenkina & Delgado, 2006; Shimada et al., 2022)

The sites discussed in this section are recorded in Figure 3.2, the Preceramic through to the Early Intermediate Periods are summarised in Table 3.2. Characteristics of the Middle Horizon, Late Intermediate Period and Late Horizon are discussed in more detail below. The ceramic period is divided into series of Horizons, where a particular ceramic style e.g., Wari or Inca, is widespread throughout the Andes, and Intermediate Periods where local styles become more influential (Marcone, 2022b; originally set out by Rowe, 1962). This schema is useful for placing ourselves in time but it cannot be used as more than a general guide for the degree centralisation and decentralisation occurring in the Andes writ large as there was variation and nuance in the relationships between regions.

The Middle Horizon (MH, 600-1100 CE)

The MH was characterised by the rise of the Tiahuanaco and Wari states, centered on the sites of Tiahuanaco and Wari respectively. In the Lurín valley, centralisation increased during the latter years of the Lima culture, Wari and Wari-influenced ceramics appeared,

and then in the latter half of the MH, domestic sites were abandoned and the construction of monumental architecture ceased (Marcone, 2022b; Owens & Eeckhout, 2022; Quilter, 2014). Archaeologists debate the nature of the Wari presence on the central coast and Pachacamac's role during this period. According to Rostworowsksi (2016, 2022), Pachacamac's influence peaked during the MH due to the fame of the oracle and its prophecies something which likely served Pachacamac's priests in their campaigns to extend Pachacamac influence. People's fear of Pachacamac as the god of earthquakes may have also contributed to the spread of his cult (Rostworowski, 2016). Archaeological evidence supporting the spread of Pachacamac's influence include the presence of Pachacamac B ceramics in Chicama, Nasca and Huancayo (Rostworowski, 2016, 2022). Water is a central motif of several Andean myths so that the Wari would have an affinity for Pachacamac and exercise control there through religious structures would be unsurprising. This is because Pachacamac has a viewshed of water that in unparalleled in the Andes as it is at the confluence of three major bodies of water and there were several *pukios* (subterranean aqueducts) within the site itself (Glowacki & Malpass, 2004; Shimada et al., 2022).

There were appreciable cultural changes at Pachacamac during this period; Nievría style ceramics which blend local and Wari elements appeared, the Old Temple was ritually abandoned, and in the Painted Temple, offering terraces were constructed and the temple itself was painted (Eeckhout, 2013; Glowacki & Malpass, 2004; Quilter, 2014). Regardless of the cultural changes that occurred, ceramic and genetic evidence suggest that there was no extensive or intensive Wari occupation at Pachacamac, nor was there a large influx of Wari individuals during the MH to the central coast. There was a dearth of Wari or Wari-influenced ceramic sherds among the assemblage recovered from Pilgrims Plaza at Pachacamac. At Huaca Pucllana (a site also located on the central coast) ancient DNA tests found that changes to the community's genetic diversity from the Early to Late Intermediate periods were limited, indicating that the Wari influence at the site did not result in large-scale demographic turnover (Segura Llanos & Shimada, 2010; Valverde et al., 2016).

Several things likely contributed to the decline of Wari influence on the central coast. Because of the centrality bonds of reciprocity (discussed more fully in section 3.1.3) the dispersed distribution of the population and the indirect nature of Wari control may have made ties of reciprocity between the two groups weaker than if a foreign power had exerted direct control over the population (Segura Llanos & Shimada, 2010). The central coast also experienced a period of severe drought followed by a flood event around 940 CE (Winsborough et al., 2012). Archaeological evidence suggests locals were aware of and prepared for such events which would have aided their ability to adapt to the changed environment. Evidence of this includes the construction of a dam separating Urpi Kocha from the sea recorded by Uhle, and the construction of the temple along the southern edge of the Pamplona Formation which would have protected the site from tsunamis (Shimada et al., 2022; Uhle, 1903/1991). Overall however, the environment instability during this period was likely not conducive to indirect control strategies (Owens & Eeckhout, 2022; Shimada et al., 2022).

The Late Intermediate (LIP, 1100-1470 CE)

In the wake of the Wari decline, life in the highlands was marked by political decentralisation and the existence of autonomous antagonistic states. Meanwhile, on the coast, the degree of political integration varied (integration decreased as one moved south) with the emergence of more complex hierarchical political formations (Dulanto, 2008; Krzanowski, 2016). Rates of physical violence were high on the coast, and the highest rates of cranial trauma in the Andes were recorded on the central coast (Vega Dulanto, 2016). At Cemetery I inside Pachacamac, the number of burials rose as did nonadult mortality. Amongst adults the rates of periosteal new bone (PNB) increased, and enamel hypoplasia decreased, but when present, the severity of both conditions increased. The range of infectious and congenital disease also increased but their prevalence remained low, and in contrast to the rest of the coast rates of cranial and post-cranial physical trauma decreased amongst the adult burial population (Owens & Eeckhout, 2022; Vega Dulanto, 2016). The number of ceramic forms, the colours used and quality

of decorations during the late Early Ychsma was drastically reduced from the previous period and began to diversify again from the late Middle Ychsma into the early Late Ychsma. During the Late Ychsma incorporation of non-local elements into local designs increased (Vallejo, 2004).

Socially, people, land, and resources were organised in nested units. A region was split into *señorio* (lordships), which were subdivided into *curacazgos* or *allyus*. Each *curacazgo* was controlled by a *curaca* (chief) collected and redistributed land, resources, and labour from those within their *curacazgo*, although the *curaca* did not own the land under their control. A community's boundaries were defined either by an irrigation canal, or by the extent of land the canal watered (Espinoza Soriano, 2015; Rostworowski, 2016; Villacorta, 2004). Ethnographic research and the distribution of ceramics suggests that the Huauara and Chancay valleys were part of the Chancay *señorio* and that their influence extended north to the Supe Valley and south to the Ancón area. The presence of spondylus shells and macaw feathers amongst burial goods indicate Chancay trade networks extended to the north coast and the Amazon. Collíque was an autonomous polity which controlled the lower Chillón valley and acted as a buffer between the Chancay and Ychsma *señorios*. Lastly, the Ychsma *señorio* encompassed the mouths of the Rímac and Lurín valleys up to the *chaupiyunga* (middle valley), and their influence extended south to Mala. Pachacamac is in the Lurín valley and it, as well as the Lurín valley more broadly, are thought to have been the "seat" of the Yschma polity. In ethnohistories the Rímac valley was generally split into six *curacazgos*: Surco, Guacta, Lima, Maranga, Gualcay, and Callao, and the Lurín valley into four *curacazgos*: Ychsma, Manchay, Quilcay, and Caringa (Díaz, 2008; Eeckhout, 2004a, 2008; Espinoza Soriano, 2015; Rostworowski, 2016, 2022; Vallejo, 2004; van Dalen Luna, 2004; Villacorta, 2004). Pachacamac is located within the Ychsma *señorio*.

As alluded to by the role of *curaca*, Ychsma society was stratified at several levels. Within a site, status was manifested through sumptuary burial goods including spondylus shells and metal, and mortuary practices (Díaz, 2015; Díaz & Vallejo, 2005; Watson, 2016). Within a *curacazgo*, status manifested was through the presence, size and structure of pyramids with ramps (PWR) at different sites (Díaz, 2015; Eeckhout, 1999;

Villacorta, 2004). Prior to the LIP, status was conferred on the basis of kinship, however it has been suggested by researchers that this was replaced by or co-existed with political, economic, or religious based forms of social organisation on the central coast (Covey, 2008).

Pyramids with ramps (PWR) were the characteristic form of Ychsma monumental architecture, although not all sites occupied during the LIP have PWRs. They are defined by the presence of a courtyard, a platform and a ramp (Dulanto, 2008; Eeckhout, 1999, 2004a). There are two main hypotheses regarding the function of PWRs. The embassy model (Bueno Mendoza, 1974; Jiménez Borja & Bueno Mendoza, 1970) argues that Pachacamac, as the seat of elites who followed the god Pachacamac, was the civic-ceremonial center of the Ychsma *señorio*, and PWRs at the site were embassies for the lesser gods, the 'family members' of Pachacamac, in the Ychsma's pantheon (Eeckhout, 1999, 2008). This model has been challenged due to the lack of archaeological evidence and criticized for its reliance on ethnohistories as they tend to project the pan-Andean nature of pilgrimage to Pachacamac taking place during the LH on to previous periods (Eeckhout, 2008). Recent research has shown that during the LIP, pilgrimage to Pachacamac was likely restricted to local communities as there was only a small amount of non-local ceramics and textile found at the site which is more congruent with contact between elites rather than pan-Andean pilgrimage (Eeckhout, 2008). It was not until the LH that Pilgrim's Plaza was expanded, the north-south street (which funneled people towards the plaza) was constructed, and PWRs 4 and 5 were remodeled so that sidewalks and entrances were replaced with altars with stairs (Eeckhout, 1999, 2008; Owens & Eeckhout, 2022). Excavations at Pachacamac have also revealed that PWRs were constructed and used in successive fashion rather than simultaneously (Eeckhout, 2008).

The second hypothesis is the palace model (Díaz, 2008; Eeckhout, 1999, 2004a; Villacorta, 2004). This model argues that PWRs were palaces for the *curaca*, and were used as centers for the production, collection, and redistribution of resources until their death when the subsequent *curaca* would build and use their own palace. Pachacamac was under the control of priest-elites, and as the cultural, economic, and religious center of the Lurín valley, would be sent tribute by the communities within its sphere of

influence (Díaz, 2008; Eeckhout, 1999, 2004a; Villacorta, 2004). There is precedent for this model of sociopolitical organisation during the LIP; this is similar to the model described for Chan Chan on the North Coast (Kolata, 1990). Also supporting this model is the use pattern of PWRs, evidence of feasting at Pachacamac, the presence of domestic spaces, outbuildings for the storage or production/processing of resources (i.e., structures which imply the centralised control of the production and redistribution of resources), and the association of elite burials with the structure's abandonment (Eeckhout, 1999, 2004a, 2008; Owens & Eeckhout, 2022).

There is variation in the size, structural components, and use of the spaces in PWRs. At sites including Pachacamac, Pampa de Flores, and Huaquerones, PWRs either do not have residential spaces or they are too small to be considered elite residences, suggesting they were used on a seasonal or cyclical basis (Villacorta, 2004). It has been suggested that the variability in the structure of PWRs reflecting that sites were organised hierarchically, either in relation to Pachacamac, or within *curacazgos* more generally (Villacorta, 2004). This is because it has been noted that PWRs in the Rímac valley are simplified versions of those at Pachacamac and hypothesised that at Huaquerones smaller outbuildings were storage rooms or areas for craft production (Villacorta, 2014). Work at Panquilma complicates this picture; evidence of Late Ychsma ceramics in two PWRs indicate they were used simultaneously rather than successively. Furthermore, there is no evidence of feasting, but buried offerings in the public sector at Panquilma suggest there were ritual activities conducted there (López-Hurtado, 2016; López-Hurtado, Enrique & Gonzales Lombardi, 2022). Excavations in the domestic area of the site also found evidence of ritual activity and that some storage rooms were alternatively used as funerary structures, indicating that ritual activities were not restricted to sacred spaces. Also, researchers concluded that individuals at Panquilma did not have direct political or economic dependency on Pachacamac, thus the configuration of the site more likely reflected Panquilma's internal politics (López-Hurtado, Enrique & Gonzales Lombardi, 2022).

According to ethnohistorical research the rich ecology of the coast facilitated economic specialisation wherein each *curacazgo* exploited the resources within their ecological

band – the littoral, lower and middle valleys, and the *lomas* – and then traded any surplus for the necessary resources and goods they could not produce themselves. Under this model, Ychsma and Manchay were agriculturalists, people from Quilcay were fishers, and those from Caringa undertook camelid pastoralism and crop cultivation in the *lomas* (Bueno Mendoza, 1974; Rostworowski, 2016, 2022). Isotope analysis comparing ratios of dietary $\delta^{15}N$ and $\delta^{13}C$ at Armatambo (fishers) and Rinconda Alta (agriculturalists) found that diets at Armatambo were enriched in $\delta^{15}N$ relative to those at Rinconda Alta, as the later consumed less or lower trophic level marine resources, and that both communities consumed a mixture of C3 and C4 plants (Marsteller, Zolotova, et al., 2017). This supports the model of economic specialisation with trade between groups.

The relationship between groups living in the lower valley (*Yungas*) and those living in the middle/upper valley (*Yauyos*) was complex. It was thought to have been marked by periods of relative peace and intense trade interspersed with conflict, possibly including *tinku,* as the *Yauyos* groups controlled the irrigation system intakes that fed the *Yunga* agricultural lands, and land for coca (*Erythroxylum coca*) cultivation – a plant with social and religious significance (Rostworowski, 2016).

During the LIP individuals were interred in *fardos* (funerary bundles)*,* the construction of which reflected various aspects of an individual's identity including age, gender, occupation, and status (Table 3.3) (Díaz, 2004, 2015; Díaz & Vallejo, 2005). There changes in Ychsma mortuary practices; individuals were sat on *mate* (gourd) bowls or plates, filled with ash (in the Middle Ychsma period), and there was a shift from individual interments to multiple burials per grave (often associated with adobe architecture) during the Late Ychsma B phase (Díaz, 2004, 2015). Finally there was a shift in where cemeteries were located; during the Early to Middle Ychsma period they were away from monumental architecture, however, cemeteries were created near to, and burials sometimes intruded on, monumental architecture in the Late Ychsma period (Díaz, 2004; Díaz & Vallejo, 2005).

Table 3.3 Summary of relationship between identity and *fardo* construction (Covey, 2008; Díaz, 2004, 2015; Díaz & Vallejo, 2005; Eeckhout, 2020; Prieto, 2014; Watson, 2016).

Aspect of Identity		Description of Elements of F*ardo* Construction
Age	Flexed Position	Adults and some nonadults
	Extended Position	The youngest nonadults
Status (indicators of high status[1])	Burial Goods	*Spondylus sp.* shells, maize cobs, coca bags, metal, ear spools, standards, feather fans and ceremonials canes.
	Fardo Construction	presence of *falsa cabezas*[2] and/or funerary masks, (possibly) the presence of *junco* (rushes) structure
Gender	Women	Wore tunics, carried spindles (with/without thread attached), when present irregular-shaped metal strip was placed on hand
	Men	Wore short tunics and loin cloths, carried tweezers, and had sling wrapped around head, when present metal strip was placed in mouth
	Women and Men	Necklaces

[1] This includes ritually significant goods as they cannot be separated from prestige goods during this period (L. Watson, personal communication, 10 September 2023).
[2] Falsa cabezas and funerary masks are often conflated in the literature, in this thesis *falsa cabezas* refers to the 'bump' of textiles that were part of, or added to the top of, the *fardo* to represent the head. A 'funerary mask' refers to a wooden mask that may be placed on the *falsa cabeza* or the front the *fardo* to represent the individual's face (Díaz & Vallejo, 2005; Eeckhout, 2020).

The Late Horizon (LH, 1470-1532 CE)

Beginning in the 1440s, the *Sapa Inca* (Inca king) Pachacuti Inca Yupanqui, began a campaign that extended the territory administered by the Inca State from the southern tip of Ecuador to the Lurín Valley (Lanning, 1976; Quilter, 2014). Ethnohistorical sources suggest that the annexation of the Chillón, Rímac and Lurín valleys by the Inca was fairly peaceful, although this was not always the case (Rostworowski, 2022, 2022; J. S. Williams & Murphy, 2013). The Inca used a mosaic of control strategies, including: the adoption of pre-existing governing systems (as at Pachacamac), the use of *mitmaqs* or *mitmaes* which saw entire communities move from their home to a different region, or the use of militant tactics (Eeckhout, 2013; Eeckhout & López-Hurtado, 2018; Quilter,

2014; Rostworowski, 2022; Tantaleán, 2021). Rostworowski (2022) notes that generally, communities unwilling to submit to the Inca were punished, and their *curaca* disposed of. At Puruchuco-Huaquerones, researchers found that Incan control did not substantively change people's living conditions and did not result in a decline in overall health (J. S. Williams & Murphy, 2013). Furthermore, rates of physical violence on the central coast dropped during the LH and remained low compared to the previous period which supports the idea that the annexation of the region was fairly peaceful (Vega Dulanto, 2016).

As the Inca were able to co-opt pre-existing social structures the influence Cusco had on aspects of culture, e.g., ceramics, architecture and site layout, and mortuary customs, was gradual and tended towards the hybridisation of local and Inca styles (Díaz & Vallejo, 2004; Villacorta, 2004). For example, Vallejo (2004) notes that Ychsma, Inca, Cusco, and regional Inca styles converged and interacted in various archaeological contexts. At Pachacamac, the god Pachacamac was incorporated into the Inca pantheon, and the oracle continued to play a central function in Andean life ways as the site became the focus of pan-Andean pilgrimage (Eeckhout, 2008; Rostworowski, 2022). There were major changes to the public architecture and layout of the site. PWR 1 was abandoned in the Early LH, the Temple of the Sun, *Taurichumpi* (the *curaca's* residence), and the *acllawasi* were built – the latter over architecture from the Lima period (Eeckhout, 2013; Eeckhout & López-Hurtado, 2018; Owens & Eeckhout, 2015, 2022). As discussed previously, several PWRs were remodelled, Pilgrims' Plaza expanded and there were further changes to the North-South Road aiding in the restriction and control of the flow of people into the plaza (Eeckhout, 1999, 2008; Owens & Eeckhout, 2022).

Concerning mortuary practices, people continued to be interred in *fardos* in a seated flexed position although *fardos* tended to be more elaborate compared to the LIP, and Inca goods such as *quipus* (a knotted accounting device) and Inca ceramics were included amongst individuals' burial goods (Díaz & Vallejo, 2002; Eeckhout & López-Hurtado, 2018). At La Rinconada and Armatambo the prevalence of burials intruding on Ychsma and Inca constructions increased, as did the crowding of burials as seen in Cemetery I at Pachacamac (Díaz & Vallejo, 2002, 2004, 2005; Owens & Eeckhout, 2015, 2022).

Eeckhout and Owens (2008) investigated the presence of human sacrifice inside the sanctuary at Pachacamac and found that five of six individuals who were identified as sacrificial victims or probably a sacrificial victim were from the LH, only one sacrificial victim was dated to the LIP-LH transition. All of these individuals were associated with the construction or abandonment of structures inside the sanctuary (Eeckhout & Owens, 2008).

With the arrival of the Spanish in 1532 CE, the precipitous decline of populations on the central coast began. The Spanish used Inca tribute structures to extract labour to build cities, and the implementation of *La Gasca Tax,* which demanded an excessive amount of tribute from *encomenderos* and missionary *doctineros*, broke the cohesion of coastal communities (Rostworowski, 2022). Furthermore, Indigenous groups were used by both the Spaniards and the Incas in the subsequent civil wars and agricultural fields and infrastructure were abandoned as people were displaced by armies. In all, a situation was produced where coastal communities were decimated by hunger, abandonment and epidemics causing them to disappear seemingly 'without a trace' (Rostworowski, 2022, p. 198).

3.1.3 The Cultural Landscape

This section focuses on the aspects of identity that can contribute to or mitigate an individual's risk of experiencing violence. Evidence was gathered from a variety of sources, including the Spanish Chronicles, archaeological material, ethnohistorical work and contemporary anthropological research. These sources are imperfect, and as a product of various agendas, subjectivities, and biases (for the latter two I include those of the researchers, authors and those inherent to the archaeological and skeletal records), they must be approached with a great degree of skepticism and critical thinking. The sketch of the cultural landscape I offer below is exactly that, a sketch. I draw on sources focused on cultures that are geographically and temporally outside of the LIP and/or the central coast on the assumption that there are cultural threads that run throughout and

connect the Andean region more broadly but with the expectation that I will have to interrogate my sketches as regional or valley-specific nuances are manifested in the MUNA burial community.

Gender

Asymmetric duality (the separation of a whole into two complimentary but unequal parts) is a feature of Andean cosmology and evident in ideas and manifestation of gender (Quilter, 2014). Prior to and during the Inca period, the Andes were split into gendered spheres (male and female) the participation and success of both which was necessary for cultural reproduction (Dean, 2001; Rostworowski, 2022; Silverblatt, 1987).

Gender was manifest in a strict division of labour, although in practice, this division may have broken down from time to time (Vogel & Cutright, 2013). Women performed household duties including cooking and serving food and chicha, as well as weaving, aiding cultivation, tending fields, building houses, and carrying loads. Men fished, tended herds, plowed fields using *tacllas* and conducted metallurgy; they were also involved in conflict – both war and *tinku* (Cobo, 1653/1990; Gero, 2001; Rostworowski, 2016, 2022; J. R. Topic & Topic, 1997; Tung, 2021; Vogel & Cutright, 2013). Both men and women held important ceremonial roles as there were male- and female-controlled cults, and bilateral inheritance provided women with control over land and production through matrilineal inheritance (Gero, 2001; Rostworowski, 2022; Silverblatt, 1987). Drawing on Inca cosmology, political and religious structures Silverblatt (1987) argued that there was an implied equality to this division. Iconographical and bioarchaeological evidence supports this conclusion to an extent, however it also indicates that political participation by women decreased relative to men when power became more centralised as traditional lines of authority and power were challenged by new regimes e.g., status via military prowess, squarely centered in the masculine sphere (Silverblatt, 1987; Tung, 2021; Vogel & Cutright, 2013).

Campuzano (2008) and Horswell (2020) argued that the Western, Christian lens used by the chroniclers to understand and describe pre-Hispanic Perú was fixated on sex-based

gender binaries and thus obscured the nuances of gender existing at the time. They argued that Andean gender was not dichotomous, pointing to an account of a ritual in Cieza de Leon's work where men, dressed in women's attire, would have sex, *"with the chiefs and headmen"*(Cieza de Leon, 1959, p. 314), and also commented that several works from the late 16th and early 17th centuries illustrate that gender in the Andes was negotiated and mediated (Horswell, 2020). The presence of two individuals from LIP Estuquiña (Moquequa Valley) wearing clothes associated with the opposite sex lends some support to Campuzano and Horswell's arguments. It also suggests there may be a more complicated relationship between sex and gender in the Andes, and that other gender identities were recognised and affirmed by the deceased' community. Guaman Poma de Alaya's (1615/2009) life stages also indicate that gender was fairly fluid. In his illustrations, individuals moved from androgenous to gendered and back to androgenous over their lifetime (Dean, 2001).

Age

Age is more than just a number; it is a multidimensional construct that reflects the progression of individual's physical development (biological age), the time since their birth (chronological age), the changing roles, responsibilities and expectation an individual has in the wider community (social age) over their lifetime, and the means through which they will transition through those stages (Bogin, 2012; Bogin & Smith, 1996; Sofaer, 2011; van Gennep, 1909/1960).

Biological age can be understood and categorised through life history theory, a theory which looks at the evolution of an organism's life cycle via the variable investment in growth, reproduction and survivorship (Bogin, 2012; Bogin & Smith, 1996). Age categories are defined by changes to an individual's physical and mental capabilities, energy use, and mortality risks over time (Bogin, 2012; Bogin & Smith, 1996). Social age can also be pictured as a continuum from birth to death but is characterised by culturally constructed, rather than biologically defined, stages. Each stage is characterised by the individual's place within the larger community, i.e., their relationship with others within

and between communities, their role within the Group and their responsibilities to the group (Sofaer, 2011; van Gennep, 1909/1960). While not guaranteed, there does tend to be overlap between biological and social age. Thus, when reconciled, these stages are useful for researchers to synthesise the expectations a person is subject to, their roles, and their relationships to other community members in relation to biological changes throughout a person's lifetime.

The relationship between biological and social age in the Andes is articulated in Figure 3.3, although it should be noted that the Inca *"[did] not count their age in years; neither did they measure the duration of their acts in years"* (Cobo, 1653/1990, p. 252). Consequently, the numerical ages recorded in the Chronicles were assigned by Guaman Poma de Ayala (1615/2009) for a colonial audience. There are some aspects of Andean social age which require comment. Firstly, nonadults do not have personhood until an age where they can physically contribute to the household, the basic unit of the *allyu* (Guaman Poma de Ayala, 1615/2009). Secondly, around 9 years old, there is a shift in what level of the community a nonadult participated in. Prior to 9, boys' and girls' lives revolve around the household, their responsibilities were to, and education by, their parents, whereas from 9 years old it was to wider community as nonadult's responsibilities and instruction came from community leaders (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). Thirdly, discrepancies between the chroniclers may suggest that individuals had an extended liminal period (van Gennep, 1909/1960), prior to taking on new, more demanding social expectations. Guaman Poma de Alaya (1615/2009) puts 'adulthood' and marriageable age at 33 years whereas Cobo (1653/1990) discussed how boys got their permanent names at 14 years old, girls 13-14 years old, and could marry at 15-20 years. For Cieza de Leon (1553/1864, 1883), permanent names were given earlier at 11 to 12 years old. Interestingly, Cobo (1653/1990) recorded that a prospective bridegroom had to prove to their in-laws that they were capable of 'being an adult' prior to being allowed to marry. Thus, it is possible that while they could marry sooner, people tended to marry at an age closer to that in the Inca census as that was when they could 'prove their worth'.

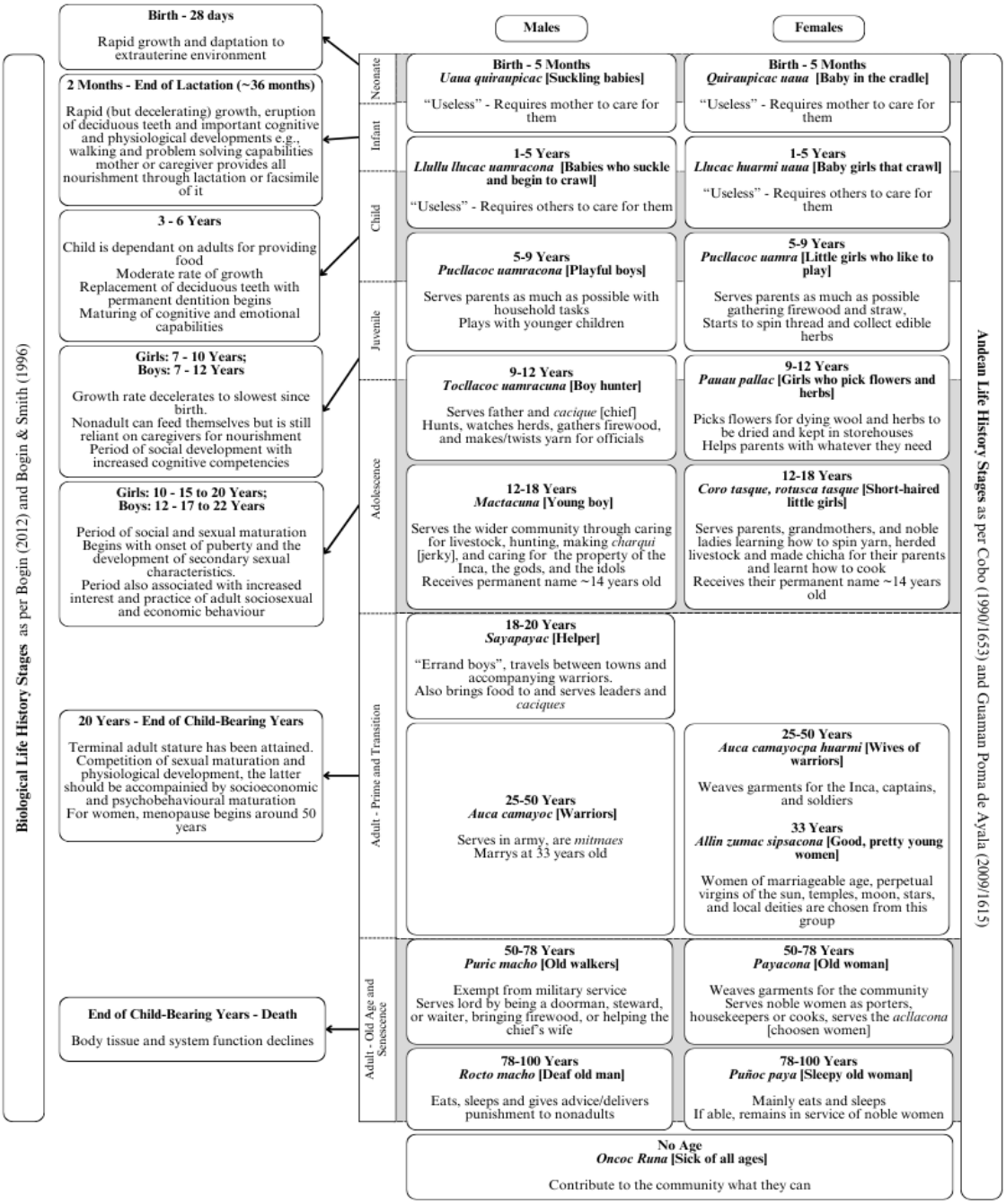

Figure 3.3 Comparison of Biological and Andean Life History Stages.

***Note*. Biological age categories are from Bogin and Smith (1996) and Bogin (2012), Andean age categories are taken from the Spanish Chronicles by Cobo (1653/1990) and Guaman Poma de Ayala (1615/2009).**
Dashed lines separating categories indicate how biological life history stages correspond to Andean ones.
Discontinuities of age in between categories in the Andean life history stages reflect what was recorded in the chronicles.

While an in-depth investigation is beyond the scope of this thesis, it could be possible the purpose of these liminal periods was protective; the first of nonadults reaching adulthood, allowing them to mature physically, mentally, and emotionally, prior to taking on adult expectations, and the later period protected the *allyu* itself from new adults too immature to fully and effectively become reproductive household units themselves (physically and culturally). Finally, it is evident that age influences the expression of gender, but also that disability influences the expression of social age. Those with disabilities or physical differences that would affect their ability to contribute to community task were considered 'ageless' (Guaman Poma de Ayala, 1615/2009). This 'ageless-ness' is evident in the burial of and old adult female (G11) from Inca-period Farfán. Differential diagnosis indicated that G11 likely had cerebral palsy, she was buried in an extended position, a position generally reserved for the youngest nonadults, but had an exceptionally rich burial including a likely human and retainer sacrifice, this was notable as nonadults are likely to have no burial goods (Poeta & Nelson, 2021). Guaman Poma de Ayala (1615/2009) wrote that individuals in this cohort contributed what they could to the *allyu*, the implication of this is that these individuals did not 'age' because they could not fulfill what would normally be expected of them throughout, but as they still contributed to community in a substantial way, thus could not be considered 'useless' like *infant*s.

Socioeconomic Status

An individual's or group's status was manifest in various ways. Through burial goods, elite status was reflected by the presence of goods that had to be traded for, such as *Spondylus sp*. shells or Macaw feathers, metal, or more detailed elaborate ceramics (see Table 3.2) (Díaz, 2015; van Dalen Luna, 2004; Watson, 2016). Consumption patterns also reflected status. Elites consumed greater quantities of preferential types or cuts of meat and marine resources, as well as *chicha* (Lockhard, 2013; Prieto, 2014; Tung, 2021). At Galindo during the EIP, only the elite chewed coca (Lockhard, 2013). Finally, status was also communicated through differences in access to particular architectural spaces (Eeckhout, 1999, 2008; Pacifico, 2021). At the LIP site of El Purgatorio, the residences of high-status urban commoners were allusions to monumental architecture at

the site and had spaces where the communal production of *chicha* could take place. Middle class urban commoners had a communal patio but their rooms where smaller than the ones of high-status individuals and low status individuals did not have communal spaces (Pacifico, 2021). These spaces were important as they signified the ability of the household to produce surplus resources and control of the labour producing those resources which could then be used in feasting contexts at varying scales (Pacifico, 2021).

Local vs. Non-Local

As discussed previously, Pachacamac likely was not the focus of pan-Andean pilgrimage until the LH (Eeckhout, 2008), however a few comments are warranted on whether an individual's status as local or non-local would have contributed to their risk of experiencing violence. At this time it would appear that an individual's non-local status did not necessarily increase their risk of experiencing violence. For example, from elevated strontium (Sr) levels in their 3rd molar, Marsteller, Knudson and colleagues (2017) identified an individual at La Rinconda Alta who had spent part of their life outside of the Lima/Huarochi region. The female's peculiar burial context – she was flexed on her right side, a position only shared by one other person at the site – further suggests she may have been considered a 'foreigner' during her lifetime. In this case, it does not appear that the women's non-local status impacted her experience of violence; her diet was consistent with the larger community's and the authors did not mention that she experienced physical violence (Marsteller, Knudson, et al., 2017). In juxtaposition, research on the life histories of wari-period individuals from Conchopata (southern highlands) found that the majority of individuals who were identified as non-locals (via Sr levels in teeth and bones) and a non-local female had an unusual burial location which authors suggested may indicate she was a victim of sacrifice (Tung & Knudson, 2011). At Ancón, Sr levels from 35 individuals in MH tombs were analysed. One young female had Sr levels consistent with the Ayacucho Basin indicating she may have had non-local status. While non-local she was afforded an elaborate burial including Wari ceramics, and

had no evidence of violence (structural or physical). Finally, during the LH, the Inca would transport groups of people to environmentally similar, but distant, regions of the empire (*mitmaes, mitmaqs*) to aid in the 'civilising' or newly conquered territories, to form garrisons and defend the frontiers of the empire, or to populate uninhabited fertile lands (Cieza de Leon, 1883). While Cieza de Leon does not extrapolate much on the experiences of mitmaes he does allude to them being complex and variable. *Mitmaes* were closely connected to Cuzco, thus could have received some material recompense from the state, but they also lived in potentially hostile situations where they had an elevated risk of experiencing physical violence (Cieza de Leon, 1883; Rostworowski, 2016). These investigations indicate that the importance of 'foreign-ness' in determining someone's risk of experiencing violence (particularly structural violence) fluctuated with the degree of political centralisation. During periods of increased centralisation, being foreign (depending their relationship to the central power) may have been a more important factor in determining someone's risk of experiencing violence than during periods of decentralisation (Marsteller, Knudson, et al., 2017).

Cranial modification is a process where a constant pressure is exerted on the malleable cranial bones of an *infant* (until around 3 years of age) using various devices including: cloth wrapping, cords, sticks, and boards, to obtain a specific cranial shape (Allison et al., 1981; L. Gowland & Thompson, 2013; Tiesler, 2014; Weiss, 1961). There is a multitude of reasons for cranial modification, but it is generally associated with marking group membership – this could be based on kinship, social status, or occupation – depending on the context (Blom, 2005; L. Gowland & Thompson, 2013; Lozada, 2011; Tiesler, 2014). Modification is not considered here to be a mechanism of violence as the process does not negatively impact long term health (Allison et al., 1981; Jimenez et al., 2012; Okumura, 2014; Ortner & Putschar, 1985; Tiesler, 2014 but see Guillen et al., 2008 or Mendonça De Souza et al., 2008), but as a permanent marker of group membership, where there is variability in the cranial modification within a burial community, how markers of violence differ between the different modification types should be examined.

3.1.4 Landscapes of Violence

Discussed in Chapter 2, explaining violence in cross-cultural contexts requires understanding what actions are deemed cultural practice, idiosyncratic mistreatment, or social/structural abuse (Korbin, 1977, 2003). For this section I will take a brief look at socially sanctioned forms of violence on the central coast.

Punishment

The Chronicles can provide insight into behaviour deemed socially unacceptable and the responses to such behaviours, however, and as always, caution must be taken transposing the ideas of the Inca (and the chroniclers themselves) onto communities from earlier periods (Rostworowski, 2016). The Chronicles placed emphasis on punishing sexual impropriety (rape and adultery), social impropriety (drunkenness, gambling, and lying), thievery, and insurrection (Cieza de Leon, 1553/1864, 1883; Cobo, 1653/1990; Dean, 2001; Guaman Poma de Ayala, 1615/2009). Overall, punishments for these offences were usually physical and harsh, death in many cases, via hanging by one's hair or by stoning, but the severity of punishment was determined by the transgression (Cieza de Leon, 1553/1864, 1883; Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009; Rostworowski, 2016). The repertoire of sanctioned punishments also included: whipping, forced labour, exile, incarceration, the cutting of hair which used by authorities for severe crimes (at least in Cusco), and finally, fasting. Fasting could be as simple as not using salt, or chili but could also include not eating meat, not drinking chicha, or not having sex (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). Guaman Poma de Ayala (1615/2009) recorded that spanking, whipping, and ear pulling, were punishments for bad behaviour by nonadults, but there is no further discussion about what types of corporal punishment were considered excessive. The denial of proper burial rights, including exposure of the body or by its disposal in a river, was also used as punishments (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). Stigma associated with crime was also attached to

the perpetrator's kin and in cases of poisoning, all immediate relatives, except for infants, were sentenced to death (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009).

Tinku

Tinku and human sacrifice epitomise the paradoxical nature of violence as both are "destructive" via injury and/or death, yet both are integral components of sustaining and rejuvenating cultural identity (Arkush & Stanish, 2005; Gelles, 1995; Martin et al., 2012; Urton, 1993). 'Ritual' is not synonymous with 'trivial,' rather, it denotes a set of defined circumstances where actions that are otherwise taboo, are acceptable or at least justified (Arkush & Stanish, 2005). As ritualised activities (in this case violence) are highly circumscribed, their physical consequences are likely to have a limited demographic or political scope, but these consequences are real and are central to the formation and rejuvenation of community (Allen, 2002; Arkush & Stanish, 2005; Gelles, 1995; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009).

Tinku is usually translated as 'ritual battle,' although 'ritual festive combat' better captures the essence of it. In *tinku,* combat is only one part of a larger event where food, drinking, music and dancing are just as important (Allen, 2002; Arkush & Stanish, 2005). *Tinku* is directly related to the cosmological concepts of reciprocity, and the movement of *sami* (lifeforce). Combat is usually between the *hanan* (upper) and *hurin* (lower) moieties (kin groups) from the same ayllu, but *tinku* can involve any two structurally opposed groups (Arkush & Stanish, 2005; Hastorf, 1993; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009). What specifically constitutes *tinku* is highly variable; ethnographic accounts generally situate *tinku* as part of a broader festival, e.g. Carnivale, but Hastorf (1993) noted, *tinkus* could be held irregularly i.e., not in association with a festival. Combat ranges from an all-out brawl (e.g., the *tima de la plaza* (taking of the plaza) recorded by Chacon et al. (2007), capturing a fortress (e.g. (T. L. Topic & Topic, 2009), and throwing spears or unripe fruit at one another (e.g. like in *yawar mayu* in Chiliihuani, located in the *punas* of southern Perú recorded by Bolin (1998)), to sports such as the hockey-like game *ch-iwka* which is played presently in villages in the Rio Vilconta valley

(Orlove, 1994). These accounts suggest that injuries sustained during combat should be focused on the anterior of the body but how erratic the injury pattern may be will depend on the nature of combat. Regardless of type, all combat is accompanied by breaks for music, dancing, and in earlier periods possibly sex (Arkush & Stanish, 2005; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009). Weaponry also varies greatly; commonly recorded ones include slings and unripe fruits, clubs, whips, wooden sticks, sand-filled llama hides, maize stalks, and bare fists (Allen, 2002; Arkush & Stanish, 2005; Hastorf, 1993; Orlove, 1994; Urton, 1993).

Combatants are primarily men, but women are also involved in *tinku*, in some cases fighting but more regularly preparing and serving food and drink, as spectators, or being "captured" for marriage (Arkush & Stanish, 2005; Hastorf, 1993; Urton, 1993). It is harder to pin down the age at which people began participating in *tinku*. According to Guaman Poma de Alaya (1615/2009), Inca male 'warriors' were 33 years old, their service starting at 25 years and ending at 50 years old, and women of marriageable age were also 33 years old. However, boys came of age, being given their permanent name and armed with a *huaraca* (sling), for war, around 14 years old, and girls were given their permanent names around puberty (Cobo, 1653/1990; de Molina, 1873). Most ethnographic accounts record that either adults or 'young men' were combatants, but there are hints that younger nonadults were involved; in the late 18th century a girl was killed after accidentally being struck by a rock (Chacon et al., 2007; Urton, 1993), the face of a younger boy (possibly over 10 years old) can be seen in the crowd in a picture of modern *tinku* in Bolivia (San Martín, 2002), and there are descriptions of women carrying infants strapped to there backs accompanying the men to the *toma de la plaza* (Chacon et al., 2007). Overall, this suggests that *juvenile*s would have participated in *tinku*, but only in peripheral roles, e.g., boys as young as six carried the fighter's weapons, while it was young men and women closer to Guaman Poma's age categories, i.e., the 33 year old who were combatants or actively contributed to the festivities (Allen, 2002; Bolin, 1998; Chacon et al., 2007; Urton, 1993).

Tinku embodies the paradoxical nature of violence by helping relieve tensions that arise between moieties of the same *allyu* due to asymmetrical resource distribution (e.g.,

Urton, 1993). On a more abstract level, *tinku* defines the boundaries of moieties and forges bonds of reciprocity between opposing groups while defining the boundaries of the broader *allyu* (Allen, 2002; Arkush & Stanish, 2005; Gelles, 1995; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009; Urton, 1993). *Tinku* is the convergence of two complementary, but opposing, forces (Allen, 2002; Gelles, 1995). The meeting of the two groups in violence, as with destructive warfare, defines them as opposites, putting finite limits on each group's territories, resources, and community members (Allen, 2002; Gelles, 1995; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009). Simultaneously, its integration into a ritual framework prevents (in most cases) the antagonism from becoming destructive by providing a justification for the violence and elevating the causes and consequences of tension beyond the realm of mortals. Within this cosmological frame, the two groups are physically the same so any differences in the size, location and quality of land they will work, and thus the quality and quantity of the resources they will harvest are in the hands of the gods (Allen, 2002; Bolin, 1998; Gelles, 1995; Urton, 1993). In this space the bonds of reciprocity between humans and Pachamama are also sustained, "*Pachamama needs a few drops of blood and we all come together to provide this offering. So we meet as opponents and end in solidarity"* (Bolin, 1998, p. 95). The creation and maintenance of these reciprocal relationships is necessary for the perpetuation of Andean lifeways as these 'convergences' act to direct the flow of *sami* so that all living things have their appropriate "*level of liveliness*" (Allen, 2002, p. 178).

Human Sacrifice

Human sacrifice was an integral component of cultural rejuvenation in the Andes. Sacrificial practices were variable (Klaus & Toyne, 2016b; Schwartz, 2017; Verano, 2008), and included:

- The offering of human lives to the gods, e.g., in *capacocha* (Rubio, 2009), at the beginning/end of building or space's use (Eeckhout, 2004b; Eeckhout & Owens, 2008; Tung & Knudson, 2011), or as substitute sacrifices[2] (Toyne, 2015, 2016),
- The creation and maintenance of community borders and relations (Prieto et al., 2023)
- Retainers[3] for high status individuals, e.g., at Sipán (Alva & Donnan, 1994) and Sícan (Shimada et al., 2004),
- Enemies/prisoners of war, e.g., Huaca de la Luna (Hamilton, 2016; Sutter & Cortez, 2005), or Pacatnamú (Verano, 1997).

Methods of sacrifice also varied and included: being buried alive, strangulation, throat slitting, blunt force trauma, and decapitation (Alva & Donnan, 1994; Eeckhout, 2004b; Eeckhout & Owens, 2008; Klaus & Toyne, 2016b; Toyne, 2015; Verano, 1997).

Sacrifice was a mechanism of rejuvenation as it related to the creation and maintenance of reciprocal relations between humans and the divine, and it was tied to conceptions the continuation of an individual's existence after death (Rubio, 2009; Toyne, 2015; Tung, 2016; Verano, 1995). To the first point, sacrifice, in general, is a symbolic return of a gift to its origin that allows people to enter into, and fulfil, reciprocal relations with the divine (Rubio, 2009; Toyne, 2015). As to the second point, in various accounts of Andean creation myths the close connection between life and death, wherein death and destruction are necessary for life and creation, is a motif. Sacrifice was thus a means through which an individual transitioned between one life and the next where they were reunited with the ancestors and could intervene in the lives of the living (Eeckhout, 2004a; Rubio, 2009). The sacrifice of enemies or prisoners of war was highly communicative and may have had a similar effect to that of *tinku*, destroying and

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[2] The sacrifice of an individual or individuals as a proxy for someone else

[3] Individuals that were close to or served the deceased during their lifetime and were thus sacrificed so that they could accompany the deceased into the afterlife and serve/accompany them there.

solidifying community boundaries as well as the identities of the sacrificed and the sacrificers respectively.

Due to its variability, there is debate around the identification of sacrifice in the archaeological record. Iconographic evidence has played a central role in the identification and explanation of sacrifices. For example, iconography helped identify individuals at Sipán and San José de Moro as representing the principal figures in the Moche sacrifice ceremony, while patterns of trauma experienced by individuals from Huaca de la Luna are consistent with the depictions of events in the sacrifice ceremony (Hamilton, 2016). The Chronicles have also played an important role in our understanding of *capacocha*, a ceremony which saw boys and girls 'without any defects' buried alive on mountain tops as sacrifices to the mountain gods (*apus*) during the Inca period (Betanzos, 1551–1557/1996; Cobo, 1556/1963; Guaman Poma de Ayala, 1615/2009; Rubio, 2009). In cases where no supplementary evidence as to the nature of sacrifice in that community exists great care has to be taken and special attention must be paid to the context of the individuals' deaths and burials as to not carelessly label all evidence of physical trauma as 'sacrifice' (Eeckhout, 2004b; Eeckhout & Owens, 2008; Verano, 2001). While sacrifice is about the human-divine connection, the distinction between the religious and the secular was not rigid in the pre-Hispanic Andes (L. Watson, personal communication, 10 September 2023). Consequently, we cannot assume that sacrificial victims will only be found in 'sacred' contexts (Tung, 2016).

According to the Chronicles, animal and human sacrifices were carried out at Pachacamac on a regular basis (Eeckhout, 2004b; Eeckhout & Owens, 2008; Rostworowski, 2022). At the Temple of the Sun, Uhle uncovered the Cemetery of the Sacrificed Women, where women from the *aclla* who had been strangled were buried with the noose around their necks (Uhle, 1903/1991). Several other potential sacrifices have been identified inside the sanctuary at Pachacamac (Table 3.4) in both sectors I and II suggesting, that while the prevalence of human sacrifice was likely exaggerated, there is truth to the Chronicles' accounts (Eeckhout, 2004b; Eeckhout & Owens, 2008). Overall, the evidence for sacrifice at Pachacamac suggests they were carried out from at

least the MH although most occurred during the LH. Methods of sacrifice varied as did who was sacrificed, although child sacrifices do seem more prevalent.

Table 3.4 List of Individuals from Pachacamac Previously Identified as Potential Victims of Human Sacrifice, Summarised from Eeckhout (2004b), Eeckhout and Owens (2008), and Owens (2017).

Location	Date	Context: Description	Reference
Cemetery I	MH	In cemetery: Baby (age undefined) decapitated and dismembered	Fleming (1983): 65; (1986): fig. 4 Fleming et al. (1983):154-155 as cited in Eeckhout (2004b).
	No Date	North front of Old Temple: 'Sacrificed' babies	Franco (1993b): 46-47 as cited in Eeckhout (2004b)
	No Date	In north front of Old Temple: Decapitated woman, disarticulated	Franco (1993b): 46 as cited Eeckhout 2004b)
Pyramid III	LIP	Under a wall: Baby (age undefined) on back	Eeckhout (1995): 93-94 as cited in Eeckhout (2004b)
	LIP	In foundation fill: Boy (age undefined) lying on side	Eeckhout and Farfán, 2001 as cited in Eeckhout (2004b)
	LIP	In fill layer: Baby[1] (age undefined) on back	Eeckhout (1999a):350 as cited in Eeckhout (2004b)
	LIP	In burial chamber: Baby[1] (age undefined) on back	Eeckhout (1999c): 189, fig. 17 as cited in Eeckhout (2004b)
	LH	In burial chamber: Baby[1] (age undefined)	Eeckhout (1995): 91 as cited in Eeckhout (2004b)
Western Corridor	LIP-LH Transition	In foundation: Child (~6 years) with slice injury and possible BFT to cranium. *Tumi* knife found nearby.	Owens and Eeckhout (2008)
	LH	In foundation: Child extended on back, buried with a *cuy* (guinea pig)	Owens and Eeckhout (2008)

Table 3.4 Continued

Western Corridor	LH	In foundation: Child (~4 years) extended on back	Owens and Eeckhout (2008)
	LH	In foundation: *Juvenile* (~8 years) flexed directly under wall	Owens and Eeckhout (2008)
Pyramid V	LH	*Infant* (<1 year) buried alive	Owens and Eeckhout (2008)
Adjacent to Sacred Precinct	No Date	Adult Male with blunt force trauma with a stone club	Owens (2017)
Temple of the Sun	LH	On funerary terrace: Drowned woman, position of body unspecified	Uhle (1903): 84-88 as cited Eeckhout (2004b)
Central Plaza	LH	In south corner of eastern corridor to plaza: Middle adult male in an extended position with traces of red pigment and blunt force trauma	Eeckhout (1999b) as cited Eeckhout (2004b)

Note. All individuals identified here as sacrificial victims and description of the method of sacrifice used are the conclusion of the authors cited in the table. Sacrifice is difficult to identify however litigating the validity of these author's conclusions are outside of the scope of this thesis.

[1] No indication of how cause of death but hypothesised to be companions to adults who died of natural causes.

3.2 Summary and Next Steps - How do the Landscapes of the Central Coast Shape Expectations About Structural Violence?

Perú is a landscape of geographical and environmental extremes to which people have adapted to (technologically and culturally) and developed over many millennia. These landscapes supported the development and maintenance of complex social structures through technological innovations, domestication and cosmologies of duality, reciprocity and asymmetry. These cosmological principles were manifest both in the sociopolitical and economic structure of the central coast during the LIP, but also in the aspects of identity which shaped the risk of experiencing violence. Violence during the LIP was likely expressed through physical violence, and possibly occupational stress and access to resources. During the LIP, Pachacamac was part of the Ychsma *señorio* which controlled the coast up to the middle portion of the Rimac and Lurín river valleys. Economic

specialisation by the *curacazgos* created a situation where no group could be completely self-sufficient, and each community had to trade in order to procure the resources they themselves could not produce. This means that while Ychsma society was hierarchical, communities and groups within could exercise a great deal of agency, thus potentially reducing the burden of hierarchical relations on those with less power, i.e., health-related SV may not be as acute and visible within the MUNA cemetery community.

This does not mean all individuals had an equal risk of experiencing violence. From the literature, it is clear that gender and age were key aspects of identity that shaped the risk of experiencing violence. The gendering of the Andean world, while likely more fluid than portrayed by the Chronicles was rigid enough to create distinct patterns in behaviour and risk, for example, via who was more likely to participate in *tinku*. Similarly, Andean age categories show there was a schedule of the behaviour and responsibilities an individual would have over their lifetime, but also to what degree they participated in and were entangled with the wider community. Status, though differential resource access, may also be a determining factor in the risk of experiencing violence. However there is evidence showing that there were no significant differences in overall health between elites and non-elites likely because of the redistributive economy (Cuéllar, 2013; Lanfranco & Eggers, 2016; J. S. Williams & Murphy, 2013). Finally, having a non-local status only impacted a person's risk of experiencing violence in particular contexts (e.g., Marsteller, Knudson, et al., 2017; Tung & Knudson, 2011). As the LIP was generally a period of political decentralisation and, more importantly, the MUNA burial community has been identified as local to the central coast (Nakahodo, 2023), local/non-local status should not have impacted the burial community's risk of experiencing violence. Going forward this means that gender (I will be using biological sex as a proxy for gender, discussed in chapter 5), age and status will be the aspects of identity used to study violence more closely.

Finally, section 3.1.4 clearly illustrates that physical violence, through punishment, *tinku* and human sacrifice was a constant, visible, and socially sanctioned part of individuals' and communities' lived experiences. This underscores the importance of looking at markers of health and physical trauma simultaneously during my analysis and

punishment, *tinku*, sacrifice are scenarios that will have to be considered as potential causes of trauma amongst the burial community.

Chapter 4

4 Ethics

This chapter will discuss the ethical principles that underscored my work with physical and digital images of human remains. I will also discuss some other the ethical considerations that arose in exploring the theoretical aspects of violence and structural violence.

Human remains have a particular type of agency borne from their embodiment of their cultural context (while alive and in death), and a community's history and identity which connects people – past and present (Alfonso & Powell, 2007; Tung, 2014; Watkins, 2018). Working with human remains, and our justification for research – whether it be on the basis of furthering scientific understanding of our past, bringing an individual "back to life" by telling their story, or as an act of restorative justice – means that we have a duty of care; to the deceased, their communities, as well as current and future anthropologists (Alfonso & Powell, 2007; Subotić, 2021; Thomas & Krupa, 2021; Watkins, 2018). Carrying out these duties involves treating the dead with dignity and respect, recognising the sovereignty descent communities have over the treatment of their ancestors' remains as well as the digital representations of them, and preserving human remains so they are available for future inquiries by both anthropologists and their communities (Thomas & Krupa, 2021; Walker, 2000). These principles are enshrined the *Code of Ethics* for the Canadian Association of Biological Anthropology (2019), and the British Association of Biological Anthropology and Osteoarchaeology's (2019) *BABAO recommendations on the ethical issues surrounding 2D and 3D digital imaging of human remains*, among others. Both documents informed my thesis in terms of:

- The care taken when unpacking, handling, and repacking skeletonised remains and *fardos* during analysis, transport, and during the process of CT scanning.
- Our close collaboration with the *Museo Pachacamac*
- The use and dissemination of digital images of individuals analysed, and

- The use of non-destructive and non-invasive methodologies which contribute more broadly to the development of a sustainable bioarchaeology.

Further ethical considerations came to light as my thesis progressed. Work by Watkins (2018) and those included in Nystrom and colleague's (2017) edited volume on dissection, experimentation, and autopsy highlight the issues of the objectification of human remains, and the subjectification of vulnerable groups as to render them "appropriate" scientific subjects and what effect this has on present-day communities. Nested within this second point is the reality that, as researchers, we can perpetuate structural violence through the methods and the language we use as well as the context we construct (or fail to). These potentialities highlight the importance of grounding research in relational ethics and having reflexive methodology that is critical not only of my research design, but also my own positionality – an educated European Canadian woman, who does not speak Spanish (Subotić, 2021; Zuckerman et al., 2014).

In Chapter One I explained why I was using "burial community" to described those I am working with, continuing along that thread, it has been more challenging to navigate the line between subjectification and narrativization; to respect and highlight the humanity of those I am working with while not constructing narratives about communities I am not part of. It has required a critical examination of what do/ can I know as an anthropologist, but also what things I do/cannot know or understand by virtue of my positionality and the limitations of the evidence itself. Thorough contextualisation we as researchers can create a visceral image of the past that brings to the forefront the various barriers, challenges and relationships people had to navigate in their daily lives (e.g., Farmer, 2003); many of which people today may feel connections to. While this can function to humanise those we analyse (Zuckerman et al., 2014), it can still divorce them from their own histories when the narratives crafted by the researchers overstep (whether in details or certainty) what can be known. I acknowledge that statistical analyses are part of the machinery of subjectification (Watkins, 2018), however, cases such as this where contextual evidence is limited and I am who I am, the integration of a thorough contextualisation with

statistical analyses is necessary to maintain balance between the need to humanise those we work with limiting the narrativisation of their experiences.

On a final note, my thesis involves the identification of violence, its victims, and its perpetrators. This requires pause as labeling people and groups as "violent" has consequences (e.g., Appleby, 2010; Q. Williams, 2022). Anthropologists should be especially attentive to these consequences as our research has been used to shape the sociopolitical landscape (see Marcone (2022) for a review of the role of archaeology in Peruvian nation building). Subotíc (2021) works with archival records, but her work has salient points for bioarchaeologists. Archives, like human remains, are inherently political, they embody complex fields of meaning, provide us with a glimpse into the deep past, and can expose personal information or experiences that may be harmful to the deceased or their living communities. Similarly, in our analyses "*[we] touch not only the delicate papers [or bones] of the dead, but the stories that might unsettle the sleep of the living"* (L. Cameron, 2001, p. 39). How we conduct research ethically comes down the choices we make in curating context and in conducting critical self-reflection throughout research (Subotić, 2021; Thomas & Krupa, 2021; Zuckerman et al., 2014). The context we construct must lay out, as clearly as possible, the social norms around actions, practices, and punishments which would be classed as violent from a present-day, Western perspective (Korbin, 1977, 2003). Throughout the research process we must also examine how our assumptions play into the conclusions we draw.

Chapter 5

5 Burial Community and Methods

Analysis was conducted on 59 individuals from the MUNA burial community. This chapter will outline the cemetery's location and history, how the SV was analysed, and the methods used as part of this analysis.

5.1 The Burial Community

Figure 5.1 Map of Pachacamac Archaeological Zone (Outlined in Black) Showing the Location of the MUNA Cemetery (Grey Rectangle in Red Outlined Area), and Location of Temples, Pyramids with Ramps and Other Monumental Architecture. Division of the different sectors is represented by the dashed line.

***Note*. Map was made by overlaying a satellite image (Google Earth Pro, 2023) with the Pachacamac site map (Museo Pachacamac, n.d.).**

The MUNA cemetery, outlined and shaded in grey (fig. 5.1), is located in "Sector III" of the Pachacamac Monumental Archaeological Complex designated for the construction of the National Museum of Archaeology (Baldeos, 2015; García & Baldeos, 2020). Sector III is an undefined, sand-covered area, that is outside of the site's sanctuary walls. The area is bordered by Vista Alegre, a densely populated neighbourhood, to the north and the former San Fernando chicken farm to the southwest. The old Panamerican Highway bisects the sector and divides sector II and III (Baldeos, 2015; Eeckhout & López-Hurtado, 2018; García & Baldeos, 2020; Owens & Eeckhout, 2022). 138 funerary contexts were recovered during the archaeological survey led by John Bladeos in 2015 (Fig. 5.2) preceding the museum's construction, and a further 22 were recovered between 2016 and 2019 during construction (Baldeos, 2015; García & Baldeos, 2020).

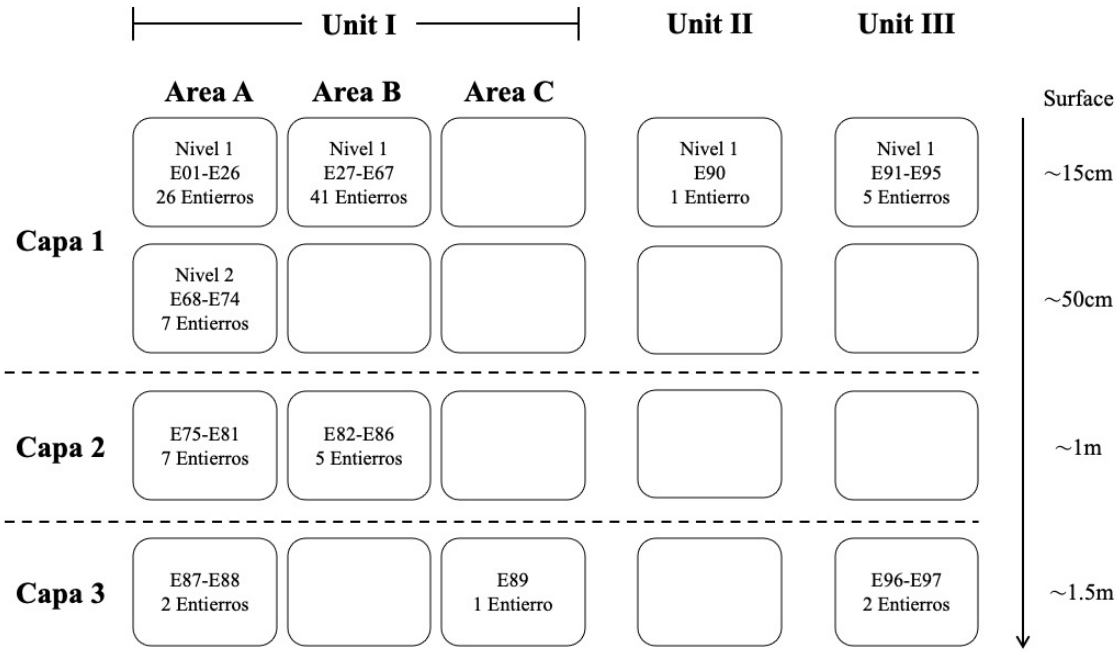

Figure 5.2 Diagram of the Stratigraphic Relationship Between *Entierros* Excavated in 2015 (Baldeos, 2015).

In the modern period urban development and industrial activities impacted the *entierros'* preservation. During the 1950s-1970s the area was used as a sand quarry and the mining likely decreased the depositional depth of the *entierros* and increased their exposure to modern disturbance (Baldeos, 2015; García & Baldeos, 2020). Modern disturbances include the use of the area as a 'transit way,' by the neighbourhoods surrounding the cemetery such as Vista Alegres, to public amenities, e.g., the bus-stop directly across from the Pachacamac museum entrance, and the activities of the former 'San Fernando' chicken farm (Baldeos, 2015). Baldeos (2015) also hypothesised that the *entierros* in *capa* 1, *nivel* 1 were originally in *capas* 2 or 3 but accidently uncovered during mining and then reburied at the shallower depth (Fig. 5.2). Overall, these activities have likely played a major role in many of the *fardos* being "disturbed," meaning that the bundle's integrity was severely compromised and the largely disarticulated skeletal remains of the individual(s) inside them were exposed. Not all the disturbance can be attributed to modern activity though. Entomological analysis, skeletal analysis, and analysis of the wrappings of headless individuals found their burials were delayed, and at least 6 people had had their head removed from their *fardo* when they were in the advanced stages of decomposition (A.J. Nelson at al., in press). Ceramics, burial goods, *fardo* construction, burial positions (Table 5.1), and the extramural location of the cemetery suggested that while MUNA cemetery was in use from the late Wari period most of the individuals interred there were from the Ychsma period, possibly into the Inca period, i.e., the cemetery was in use c.700-1470 CE (Baldeos, 2015; García & Baldeos, 2020).

Table 5.1 Summary of Burial Position, Textiles, and Burial goods by *Capa* (layer) and *Nivel* (level) from Excavation of MUNA Cemetery. From Baldeos (2015).

Capa* / *Nivel	**Burial Characteristics**	**Timing of Deposition**
1/1	Burials are largely disturbed and the remains disarticulated, textiles destroyed and burial goods fragmented. Fragments of burial goods are consistent with those found in *capas* 2 and 3	From **same time period as individuals *capa* 2 and 3**, possibly were removed from original depositional depth by sand mining operations.

Table 5.1 Continued

1/2	All individuals are in extended position. Bundles are constructed using plain textiles, torora reed mats and unprocessed cotton. Burial goods include Ychsma ceramics, *mate (Langeria sp.)*, and spondylus shells.	Last episode of cemetery use, **possibly from the Late Horizon**
2	Adults in seated flexed position and nonadults in extended position. Bundle constructed with plain or stripped textile and unprocessed cotton. Some bundles have wooden masks and Ychsma ceramics are part of burial goods.	**From Ychsma period**. The style of is typical of the initial phases of the Ychsma period (end of the Middle Horizon to the beginning of the Late Intermediate Period).
3		

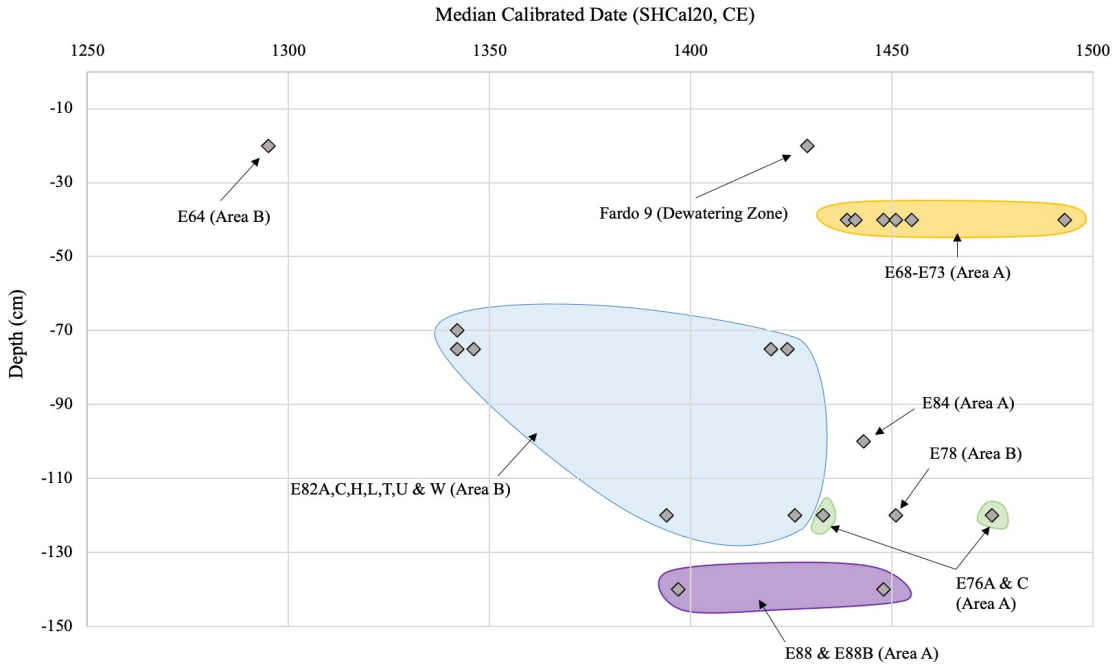

Figure 5.3 Temporal and Stratigraphic Distribution of Fardos Subject to C-14 dating. Data from Nelson et al. (in press).

Note. **Coloured shapes indicate the *entierros* identified as clustered burials by Baldeos (2015)**

Radiocarbon dating was conducted on 22 of the MUNA *fardos.* Textiles from the innermost layer of textile (that could be reached without opening the *fardo*) were analysed at the Radiochronology Laboratory at the Laval University and the Keck Carbon Cycle AMS Facility at the University of California, Irvine. Dates were calibrated using the SHCal20 curve (A. J. Nelson et al., in press). Results of the analysis broadly support Baldeos' (2015) conclusions about when the cemetery was in use, the earliest *fardo* (E64) dates to 1278-1313 CE (Fig. 5.3) and the latest (E71) 1456-1508 CE, i.e., end of the early Ychsma until around, if not into, the Late Horizon transition (A. J. Nelson et al., in press). C-14 dates also support Baldeos (2015) that the *entierros* from *capa* 1, *nivel* 1 were likely deposited there by sand mining in the mid-20th century.

'Burial goods' is a broad category that can include objects used to prepare or handle the deceased, those buried with them, as well as those used by the living in the course of rituals (Ekengren, 2013). They are often, but not necessarily, a representation of the individual's living identity because they reflect how relatives viewed the deceased's life and social roles (Ekengren, 2013). As burial goods associated with an individual were not chosen by the deceased themselves, researchers must interrogate their use. Discussed in chapter three, sumptuary grave goods can act as status markers because access to them is restricted due to cost or societal rules/norms. For the central coast, spondylus and metal are commonly defined as sumptuary goods (Owens & Eeckhout, 2015; Sutherland et al., 2014; Watson, 2016). Analysing *fardos* from Cemetery I, Owens and Eeckhout (2015) also included imported goods, e.g., jaguar claws, polished semiprecious stones, and luxury Wari ceramics in their list. At Ancón, sumptuary and/or symbolic burial goods were defined as maize (with or without grains), spondylus, coca bag, metal, hair nets, feather fans, banners (standards), ear spools and ceremonial reeds (a crossed shape structure joined by coloured threads) (Watson, 2016). Baldeos (2015) reported there was a lack of sumptuary burial goods or other symbols of status amongst the MUNA burial community, indicating they were not of a high socioeconomic status (Baldeos, 2015). Because of the level of disturbance amongst the *entierros,* this conclusion will have to be examined further.

5.2 Methods

My inquiry followed the process laid out by Klaus (2012) and synthesised by Martin and Harrod (2015). In chapter two I commented that their synthesis did not account for outcomes other than violence being explained, I have added these to my methodology illustrated in Figure 5.4.

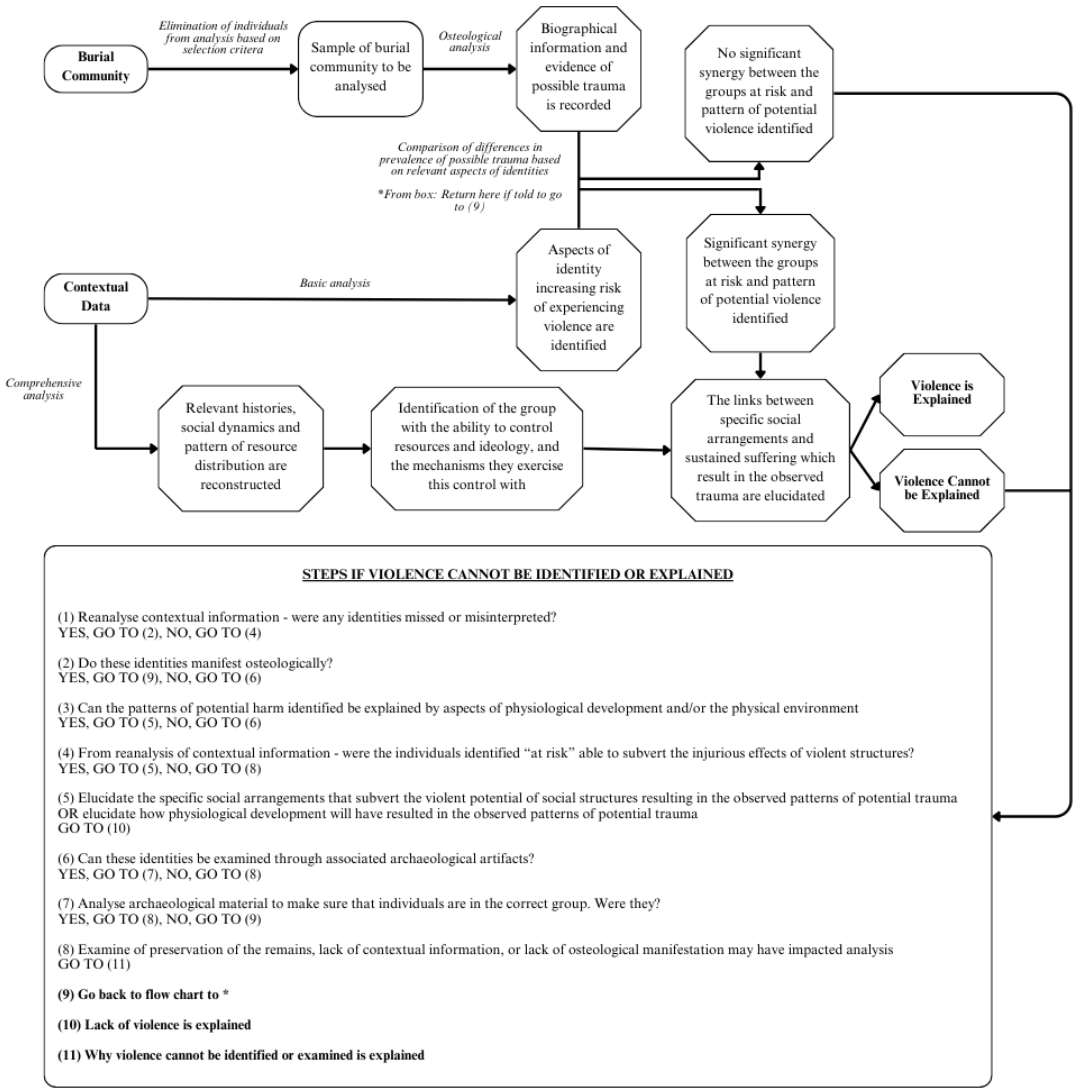

Figure 5.4 Diagram of the Process used to Investigate Violence Amongst the MUNA Burial Community. Adapted from Klaus (2012) and Martin and Harrod (2015).

5.2.1 Selection of Individuals for Analysis

The 59 individuals analysed were chosen from the larger MUNA burial community in two phases. The first phase of selection was done prior to data collection, *fardos* (both disturbed and intact) were prioritised or eliminated based on the presence of a cranium and the preservation of the remains (see Table 5.2 for descriptions). *Fardos* with 'good' preservation were given priority for analysis and those with 'regular' level of preservation were given analysed subsequently. Poorly preserved individuals were excluded as the high levels of fragmentation, degree of taphonomic damage and/or the number or type of missing elements obliterated the features relevant to this thesis. See Figure 5.5 for an example of the first phase of selection.

Table 5.2 Descriptions of Levels of Preservation

Preservation	Description
Good	Little to no taphonomic damage, soft tissue/hair can be present
Regular	>50% skeleton is present, some taphonomic damage present
Poor	<50% skeleton is present, taphonomic damage to multiple bones

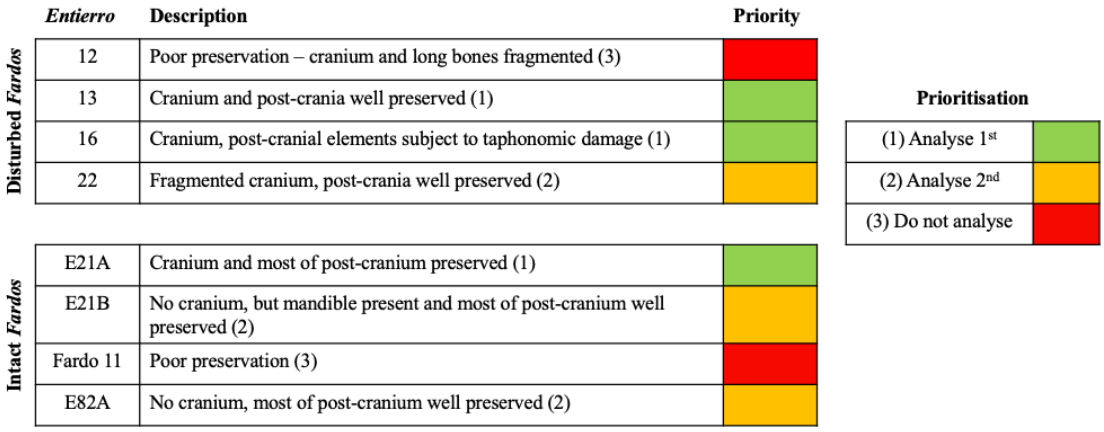

Figure 5.5 Example of the First Phase of Selection – Prioritisation and Elimination of Disturbed and Intact Fardos.

The second phase of selection occurred prior to analysis. Selection focused on the individuals inside each *fardo* as there had been comingling, especially amongst the disturbed ones, and the preservation of the individuals within each *fardo* varied. Only

those with a cranium and who could be individualised - their sex and age could be estimated – and had a good or regular level of preservation were analysed. This reflects the requirements of working with SV analytically (that you can compare harm to aspects of individual and/or group identity), and that I was recording *cribra orbitalia* and porotic hyperostosis which manifest on the cranium.

None of the disturbed *fardos* recovered between 2016 and 2019 were included in my analysis because peculiarities in the storage of their remains and time constraints impeded Andrew Nelson, co-primary investigator of the MAM project, and Kate Woodley's ability to individualise comingled remains.

Burial Community Analysed

Figure 5.6 shows the age and sex distribution of the 59 individuals from the MUNA cemetery selected for analysis. The burial community consisted of slightly more adults than nonadults (n_{adults}=34, $n_{nonadults}$=25), and slightly more males than females (n_{male}=18, n_{female}=11).

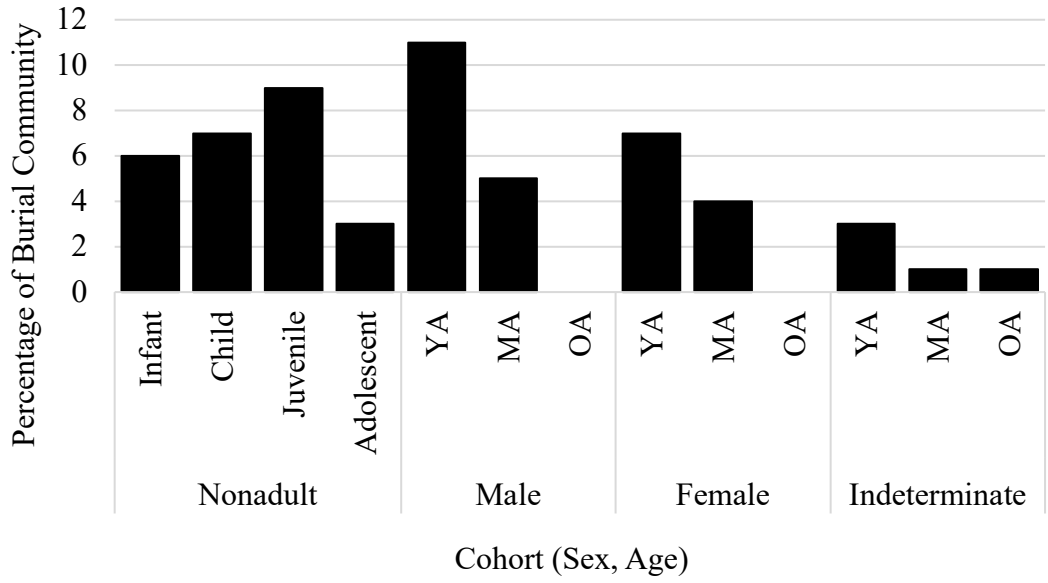

Figure 5.6 Age and Sex Distribution of Individuals in the analysed MUNA Burial Community.

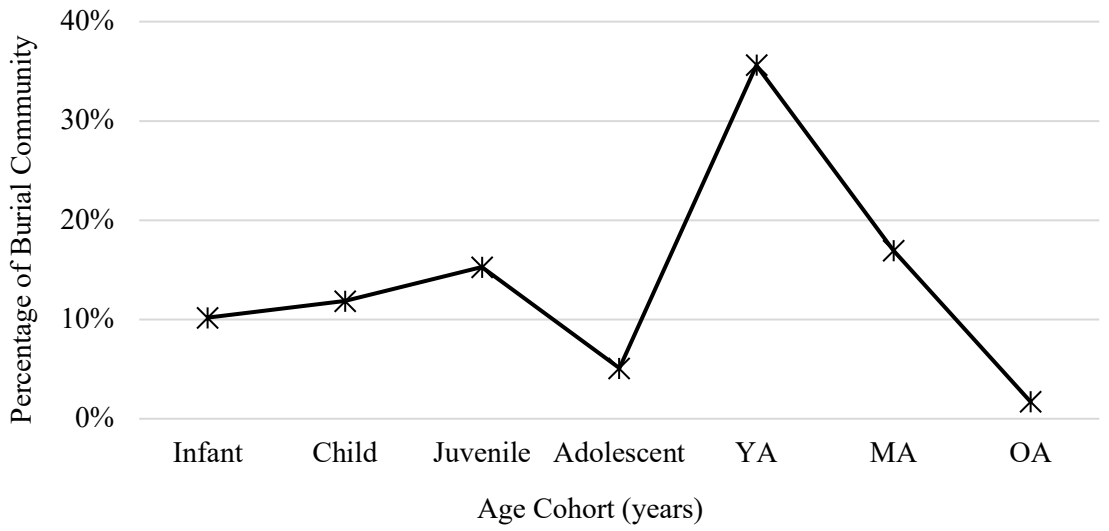

Figure 5.7 Percentage of the 59 Individuals Selected for Analysis of SV From the MUNA Burial Community Represented by Each Age Cohort (Post-Phase II of Selection).

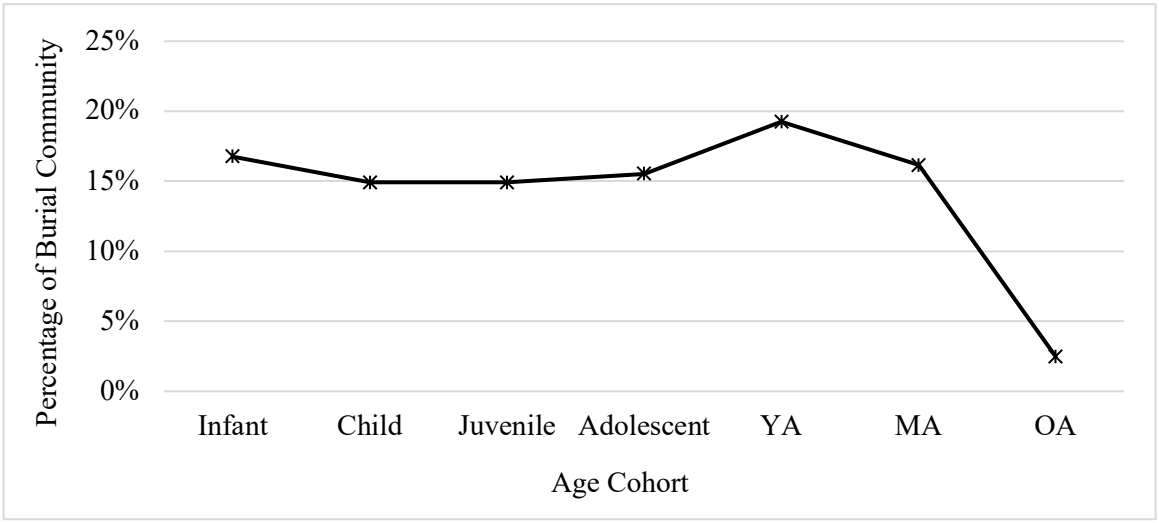

Figure 5.8 Percentage of the MUNA Burial Community (Post-phase I of Selection of *Entierros* for Analysis) Represented by Each Age Cohort.

The age distribution of the MUNA burial community (Fig. 5.7) was largely the product of the second phase of selection which eliminated those with bad preservation and those for whom age and/or sex could not be estimated. This drastically reduced the number of nonadults and, to a lesser degree, middle adults in the community to be analysed.

Prior to the second phase of selection the age distribution of the larger MUNA community (Fig. 5.8) was congruent with Andean populations experiencing population growth as seen in (as per Table 3 in Drusini et al., 2001). Like Drusini and colleagues (2001)'s work, the proportion of nonadults in burial community was high except for adolescents where there was a precipitous drop in numbers. Rates rose again in young adulthood and then dropped off in middle and old adulthood because these cohorts made up a smaller proportion of the living community.

Burial Position

As seen in Figure 5.9 the most common burial position was 'flexed' followed by 'disturbed' and 'extended'. Most of the individuals who were flexed were adults while most of the extended individuals were nonadults which was congruent with Ychsma burial practices (Díaz, 2015; Díaz & Vallejo, 2005).

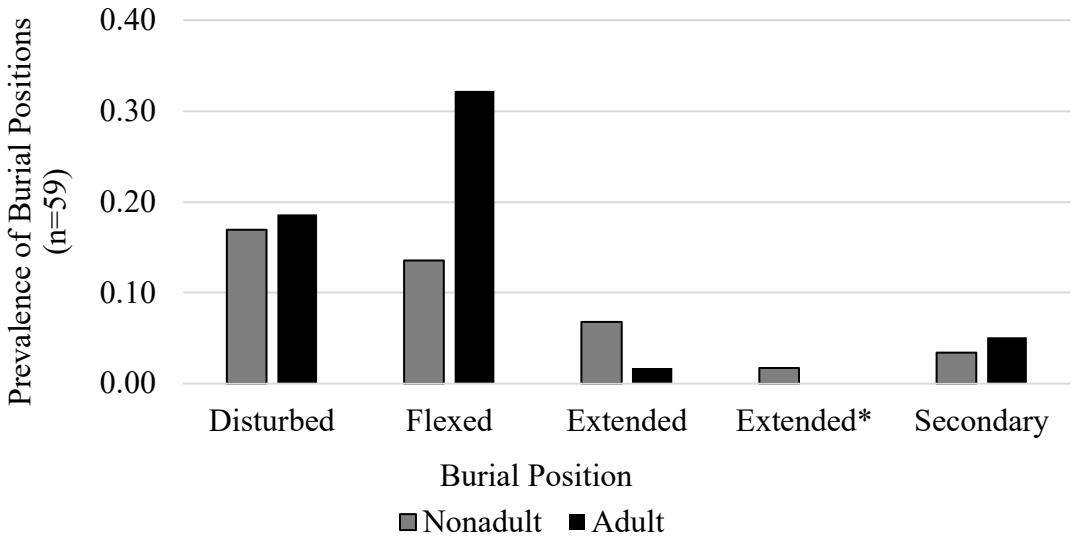

Figure 5.9 Prevalence of Different Burial Positions amongst the *Entierros* with an MNI of 1 in the MUNA Cemetery by Age (n=59)

As the majority of the individuals analysed were from disturbed *fardos*, the high prevalence of 'disturbed' burials was unsurprising. There were four notable exceptions to what was expected from normative Ychsma burial practices: E69 was the only extended

adult analysed here. All flexed nonadults were estimated to be at least 5 years of age at their deaths however E76H and E88 were estimated to be 1-2 years and 1-3 years old respectively. Finally, E84 was an *adolescent* (10-18 years – closer to 10 years) with blunt force trauma to the frontal who was buried in a deviant 'extended*' position.

Burial Goods

As the presence of burial goods amongst disturbed *fardos* could be a function of comingling, only *fardos* with a single individual (or when it was clear who the primary individual was e.g., E77B and E88) were analysed (n = 34 Table 5.3). A good example of how comingling may have affected the association of burial goods amongst disturbed *fardos* is E90B. Osteological analysis estimated that E90B was male but there were spindles recorded amongst their burial goods which are objects associated with females (Baldeos, 2015). While it is possible E90B's gender identity did not correspond to their estimated biological sex it is more likely given the proximity of E90A (estimated to be female) and E90B – the excavation photos show there was no space between the two *fardos*, and that was extensive taphonomic damage to their wrappings – that the spindles, belonged to the former but were misassigned to the latter as the bundle interior was exposed.

Table 5.3 Distribution of Burial Goods and Sumptuary Goods Amongst Those in Intact Fardos by Estimated Age and Sex

		n	**Observed**		**Prevalence**	
			Present	**Absent**	**Present**	**Absent**
Burial Goods	All *Entierros*	32	22	10	0.69	0.31
	Nonadult	12	6	6	0.50	0.50
	Adult	20	18	2	0.90	0.10
	Male	10	9	1	0.90	0.10
	Female	8	7	1	0.88	0.12
Sumptuary Goods	All *Entierros*	32	22	10	0.69	0.31
	Nonadult	12	6	6	0.50	0.50
	Adult	20	16	4	0.80	0.20
	Male	10	8	2	0.80	0.20
	Female	8	6	2	0.75	0.25

***Note*. Includes E77B and E88 as the principal individuals could be identified.**

Fisher's exact tests were used to explore whether there was a relationship between the presence of burial goods (including sumptuary goods), age, and sex. Almost all burials had associated burial goods (Fig. 510) many of which consisted of ceramic fragments, *mate* and food offerings. E21B had a wooden club. Several females had spindles amongst their burial goods, and while no slings (usually wrapped around men's heads in Ychsma burials) were recorded, Baldeos (2015) records the presence of a possible agricultural tool associated with E59 (not included in this thesis), likely indicating that those buried in the MUNA cemetery followed gendered Ychsma mortuary practices.

A significantly greater number of adults had burial goods compared to nonadults ($p = 0.030$). There were no significant differences between age cohorts for nonadults ($p = 1.000$) or adults ($p = 0.521$). As with burial position, E88 stood as the only nonadult under 5 years old with burial goods. The difference may be insignificant, as discussed, the Inca did not record their age in years (Cobo, 1653/1990), so it is possible that E88's burial position and the presence of burial goods reflects that their behaviour was such that they were more integrated into the community than other of the same chronological age. For adults, the comparison of estimated sex ($p = 0.100$), age ($p = 0.521$), and sex by age ($p_{YA} = 1.000$, $p_{MA} = 1.000$) were not significant factors affecting the presence of burial goods.

Estimated age and sex did not distribution impact the distribution of sumptuary goods. There were no significant differences between adults and nonadults ($p = 0.119$), estimated sex ($p = 1.000$), age amongst adults ($p = 0.549$), and sex by age ($p_{YA} = 0.470$, $p_{MA} = 0.400$). Overall, this suggests that the individuals in the MUNA cemetery were of similar status.

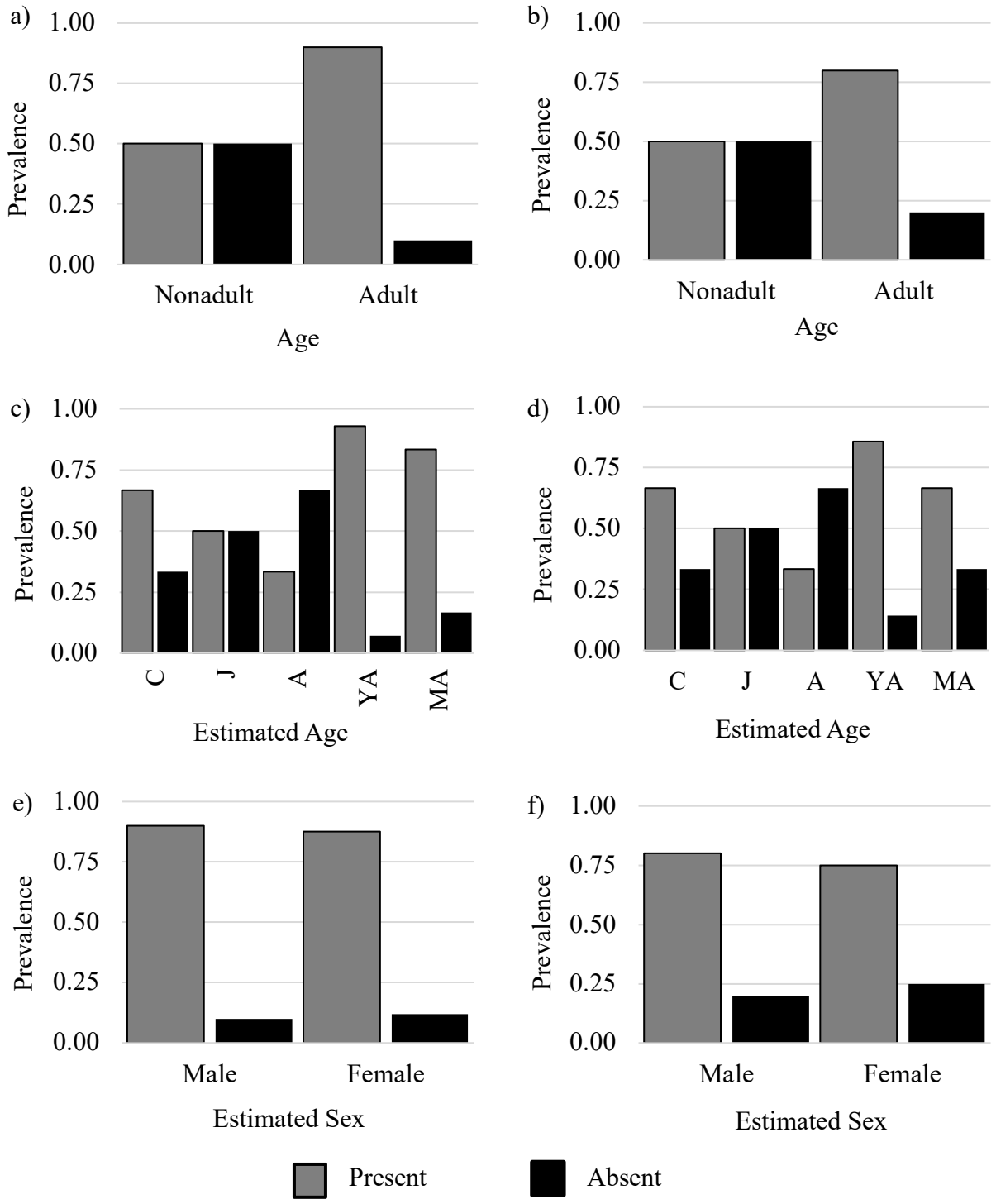

Figure 5.10 Prevalence of Burial and Sumptuary Goods
a) Burial Goods Between Adults and Nonadults, b) Sumptuary Goods Between Adults and Nonadults, c) Burial Goods Amongst Age Cohorts, d) Sumptuary Goods Amongst Age Cohorts, e) Burial Goods Between Males and Females, and f) Sumptuary Goods Between Males and Females

5.2.2 Cultural Context: Data Collection and Analysis

To identify identities at risk of, or buffered from, experiencing violence, and to contextualise the osteological data, cultural and ecological information relevant to the burial community was gathered. As SV research should have historical depth and geographic breadth, information from outside the Late Intermediate Period (LIP) and the central coast was considered relevant. The sources I used included: archaeological and ethnohistorical data (e.g., Arkush & Stanish, 2005; Díaz, 2015; Eeckhout, 2004a; Eeckhout & Owens, 2008; Gero, 2001; Rostworowski, 2016, 2022; Silverblatt, 1987; J. R. Topic & Topic, 1997; and Tung, 2021 for a few examples), the Spanish chronicles (e.g., Cieza de Leon, 1553/1864, 1883; Cobo, 1653/1990; de Molina, 1873; Guaman Poma de Ayala, 1615/2009), and modern ethnographic and anthropological research (e.g., Bolin, 1998; Campuzano, 2008; Horswell, 2020; Urton, 1993). I used these sources to sketch the prevalent social structure, burial patterns, forms of labour, and health on the central coast and at Pachacamac during the MH, LIP, and LH during the "basic analysis". For the "comprehensive analysis" these sources were then to add more detail to the social identities, identify the cosmological principles and ideologies underpinning the social structures, activities, and identities relevant to the MUNA burial community.

5.2.3 Osteological Data: Data Collection

The following information, where possible, was collected for all individuals: estimated sex, age and stature, trauma, markers of ill-health, and mortuary treatment. For estimated sex, age, and stature, population-specific standards were be used when available.

Skeletonised individuals were analysed macroscopically at the Museo Pachacamac in June and July 2022. *Fardos* were first x-rayed using a 10040HF Orange BCF generator (kVp = 60, mAs = 5, and film to focus = 180cm, courtesy of Dr. Rabanilla, Osteoray S.A.C., Lima, Perú), and a scilDX Mobile,14x17 inch Detector-C08TX0N-030 panel,

driven OR Technology's software dicom PACS® DX-R 7.0 (courtesy of Michael Nöel, Heska Canada Limited, Barrie, ON). The best preserved *fardos,* as judged from the x-ray were chosen to be CT scanned. This was done using a Siemens Healthineers SOMATOM go.up (kVp = 110, pixel size = 0.678mm, slice thickness = 0.6mm), at Resocentro in Lima. 3D rendering of the CT scans and the analysis of 2D slices was done in Dragonfly v.2022.2, the flagship software of the Montréal-based Object Research Systems (ORS), now part of Comet Group (www.theobjects.com), and ORS^{SI} when the 3D model in Dragonfly did not provide enough detail. This analysis was done in the bioarchaeology lab at Western University between January and March 2023.

When assessing a trait or examining a bone in the 3D rendering, the bone of interest was isolated in the 3D rendering using the clip tool and then the orientation of the light source, colour scheme (look up table) of the model and the window level were adjusted to best visualise it and/or the relevant trait. The colour scale used for the model is directly linked to the density of objects in the bundle so changing the window level changes the midpoint of the colour scale. This affects which materials and features are visible in the 3D rendering and allows the removal of objects, e.g., cotton fill, soft tissue, or other bones, obstructing the feature of interest. When obstructions could not be removed, the 2D slices were consulted. When the 2D slices had to be consulted, the orientation of the slices was adjusted using the x, y and z axes so the bone was oriented in anterior-posterior position.

Sex Estimation

Sex is a state of being male, female or intersex defined by dimorphic biological traits that develop during puberty (Mays & Cox, 2000; Milner & Boldsen, 2012). Sex may be related to, but is distinct from, genders which are culturally constructed identies and roles. Andean gender norms were outlined in chapter 3, and the potential fluidity of the norms means that using estimated biological sex as a proxy for gender (as will be done here) cannot be done without consideration (Campuzano, 2008; Horswell, 2020; Vogel & Cutright, 2013). Gender can be difficult to estimate because it does not necessarily

manifest in the osteological and archaeological record in a simple manner (Gero, 2001). Ychsma burial goods were gendered (see Table 3.3 for a list of gendered items) providing an accessible means to estimate it (Díaz, 2015; Díaz & Vallejo, 2005). Among the MUNA community, when estimated sex and gender were incongruent with each other, further consideration was given to the mortuary context before placing an individual in a group matching their gender rather than estimated sex. This step was necessary because of the amount of disturbance in the cemetery.

Sex estimation methods use scores based on secondary sexual traits. The development of these traits is determined by changes in circulating levels of hormones, thus sex cannot reliably be determined for individuals under 15 years old (Mays & Cox, 2000; Milner & Boldsen, 2012). Furthermore, the development of dimorphic cranial traits (i.e., to what degree a particular trait is masculinised or feminised regardless of biological sex) is dependent on intrinsic biological factors and external cultural influences. This places an emphasis on using population specific standards to estimate sex where possible (Garvin et al., 2014).

For individuals in disturbed *fardos,* the standard method outlined in Buikstra and Ubelaker (1994) was used to estimate sex from the pelvis and Walker (2008), which is based on Buikstra and Ubelaker's (1994) method was used to estimate sex from the cranium. For Walker (2008), cranial traits are scored according to the standard method and then scores are input into discriminate functions to estimate sex via percentage probability. I used Walker's (2008) discriminate function derived from an archaeological group of Native Americans from California to estimate sex. While this was not specifically formulated for the pre-Hispanic central coast there are synergisms between the two groups – both are robust and their mastoids and glabellas are the most consistently dimorphic traits (Walker, 2008). Importantly, the function does not use the nuchal crest for estimating sex which would be a trait impacted by the frontal-occipital cranial modification common to the MUNA burial community (Jilala et al., 2021; Nakahodo, 2023; Walker, 2008).

For those in intact *fardos* Walker (2008) and Klales and colleagues (2012) were used to estimate sex via the cranium and pelvis respectively. Klales et al. (2012) was developed for 3D models and uses a 5 point scale to assess Phenice traits (Phenice, 1969), the scores from which are then entered into a discriminate function and produce a percentage probability of sex (Klales et al., 2012). The method used to estimate sex and their estimations are summarised in Table 5.4.

Table 5.4: Summary of Sex Estimation Methods and Estimated Sex Categories.

	Method	Estimated Sex (percentage probability or score)
Disturbed and Intact *Fardos*	Walker (2008) – Discriminate function for Native Americans used	Probability 95 - 100% – Male or Female 75 - 94.99% – Probable Male or Probable Female ≤ 74.99% – Indeterminate
Intact *Fardos*	Klales et al. (2012)	
Disturbed *Fardos*	Buikstra and Ubelaker (1994)	Score 1 – Female 2 – Probable Female 3 – Indeterminate 4 – Probable Male 5 - Male

Adult Age Estimation

The age cohorts I used (Table 5.5) were based on of reconciling biological life history stages (Bogin, 2012; Bogin & Smith, 1996), socially-defined stages (Guaman Poma de Ayala, 1615/2009), and age categories used in the broader MAM project as per Buikstra and Ubelaker (1994) (A.J. Nelson, personal communication, 30 September, 2023). For this thesis multiple standard methods were used to estimate age at death for adults. For those in disturbed *fardos* the pubic symphysis (Brooks & Suchey, 1990), auricular surface (Buckberry & Chamberlain, 2002), and dental wear (Lovejoy, 1985) were assessed, the 4th sternal rib end (Muñoz et al., 2018 based on Işcan et al., 1984, 1985) was not assessed due to poor preservation of the ribs and comingling. For individuals in intact fardos, the pubic symphysis, 4th sternal rib end and dental wear were assessed, the auricular surface was not assessed as the quality of the 3D model and scans was not fine enough it see relevant features.

Table 5.5 Estimated Age Cohorts (Adult and Nonadult) for MUNA Cemetery

Age Category	Age Range (Years)
Nonadults	
Infant	Birth – 1 year
Child	2 – 4 years
Juvenile	5 – 11 years
Adolescent	12 – 20 years
Adults	
Young Adult	21 – 35 years
Middle Adult	36 – 50 years
Old Adult	51+ years

Muñoz et al. (2018) was used instead of Işcan et al. (1984, 1985) as the later have been found to systematically underestimate age amongst Hispanic communities (Cerezo-Román & Espinoza, 2014; Muñoz et al., 2018). Muñoz et al. (2018) was used as its age standards were developed for modern Mexican populations. Disarticulation and model quality confounded identification of the 4th rib. As there is little variation in 4th-9th sternal rib end, a composite score of at least three ribs in this sequence was taken as is best practice when not using the 4th rib (Yoder et al., 2001).

Analysis of dental wear was conducted by Nakahodo (2023) and Lovejoy (1985) was used because method requires assessing all teeth present, not just the molars. The method was adapted to better fit the MUNA burial community however as the standards for this method were developed for a group from Libben (Ohio) and it is generally recognised that age estimations for the central coast will be overestimated using dental wear.

Where possible, multiple methods were used to estimate an individual's age as the use of multiple methods generally provides a more accurate estimation than assessing one using method alone (Milner & Boldsen, 2012). For the skeletonised individuals, when estimations spanned over two age categories the pubic symphysis and the auricular surface were given the most weight because they are more accurate (San Millán et al., 2013). For the *fardos,* the pubic symphysis and the 4th rib end were given the most weight when reconciling estimates.

Nonadult Age Estimation

Long bone length (Gaither, 2004), epiphyseal fusion (Schaefer et al., 2009), and dental development and eruption (Gaither, 2004) were used to estimate age in nonadults. The cohorts used are defined in Table 5.4. Gaither's (2004) long bone length and dental eruption standards are directly relevant to the MUNA burial community as they were developed for estimating the age of nonadults on Perú's central coast and account for the fact the nonadults from the central coast are shorter than most other reference samples.

Long bone length – maximum diaphyseal length – and iliac breadth were measured following standard practices (Buikstra & Ubelaker, 1994). Electronic calipers or an osteometric board were used to measure length (in mm) for the skeletonised individuals, while for those in *fardos*, long bones were measured by the steps described in the subsequent section; 'Stature Estimation'.

Finally, epiphyseal closure (Schaefer et al., 2009) and dental eruption (Gaither, 2004) were used to refine young adult age estimations. For this the fusion of the iliac crest, the medial end of the clavicle, and the 1st and 2nd sacral vertebrae as well as the eruption of the 3rd molar were looked at due to their later fusion/eruption age.

When reconciling estimates, those from dentition were weighed more heavily as tooth development and eruption is more canalised – more buffered from environmental insults and individual variation – than long bone growth and epiphyseal fusion (Scheuer & Black, 2000; Wasterlain et al., 2018).

Stature Estimation

For all skeletonised individuals, complete long bones were measured (in mm) using standard methods (Buikstra & Ubelaker, 1994). However, this process was more complicated for the individuals in *fardos* because there is no widely accepted method for measuring long bone in CT scans. Measurements were taken of the bone – reoriented so that it was in anterior-posterior view – in 2D slice-view. Dragonfly's ruler function was

not used because the most proximal and distal points are not necessarily on the same 2D plane. Instead, the series of slices were scrolled though to find the most proximal or distal point and a point was placed there. Each point had a set of coordinates and the distance between the two, i.e., the length of the long bone, was calculated using the following equation:

$$\text{Length (mm)} = \sqrt{(x_{prox} - x_{dist})^2 + (y_{prox} - y_{dist})^2 + (z_{prox} - z_{dist})^2}$$

The result was then divided by 10 to convert to centimetres. Stature (in cm) was estimated using the regression equations from del Angel and Cisnero (2004). These equations are a revision of Genovés (1967), specifically for Mesoamerican populations, and do not require the correction factor of -2.5cm. Where possible the stature estimates for the tibia and femur (averaging the left and right value) were used because they have been found to give the most accurate estimates (Anzellini & Toyne, 2020; Genovés, 1967; Pomeroy & Stock, 2012).

Pathological Conditions

In line with other SV research, nonspecific stress markers, evidence of osteoarthritis, and dental pathology were recorded (Table 5.6). The operational definition for the pathological conditions record in in Appendix B. 'Stress' refers to the disruption of an individual's physiological balance by any biological, cultural or environmental factor (Klaus, 2014; Temple & Goodman, 2014; Temple & Klaus, 2023). Under conditions of structural violence, culture is the ultimate agent of stress as it causes and sustains the restriction of resources vital for maintaining balance and disrupting fundamental biological processes (Boldsen & Milner, 2012; Klaus, 2012). For all individuals, bone abnormalities were recorded, their location, appearance, size, margin characteristics, and focus (localised or systemic) described in accordance with best practice (Klaus & Lynnerup, 2019). Analysis was macroscopic for skeletonised individuals while for those in *fardos* texts by Taylor et al. (2010) and Anderson et al. (2021) were consulted to aid with identification of conditions. During analysis it became evident that only severe cases

of cribra orbitalia and porotic hyperostosis would be visible in the 2D slices due to the resolution of the clinical CT scan. Periosteal new bone (PNB) was also less visible in scans compared to dry bone, but more subtle cases could still be identified in scans.

Table 5.6 Aspects of the Pathological Conditions Recorded in the MUNA Burial Community

Condition	Aspects Recorded
Nonspecific Stress Markers	
Cribra Orbitalia	Presence/Absence State[a]
Porotic Hyperostosis	Presence/Absence State
Periosteal New Bone	Bone(s) effected Localised/Systemic
Harris Lines[b]	Bone(s) affected Number of Lines
Osteoarthritis	
Osteoarthritis	Joint(s) effected
Dental Pathology[c, d]	
Caries	Number, location, severity
Abscesses	Number, state, severity
Antemortem Tooth loss	Number of teeth lost State of bone resorption

[a] Active, healing or healed
[b] Harris Lines only recorded for individuals in *fardos*
[c] Only adults were assessed due to poor preservation of deciduous teeth (Nakahodo, 2023).
[d] Linear Enamel Hyperplasia is a common stress marker used however was not included in my thesis as no instances of the conditions were found amongst the burial community.

Research has repeatedly found that cranial modification does not negatively impact long term health in terms of cognitive function, presence of cribra orbitalia or dental conditions including caries or dental inclusion (Allison et al., 1981; Jimenez et al., 2012; Okumura, 2014; Ortner & Putschar, 1985; Tiesler, 2014). However, the modification process itself may have impact *infant* health due to the compression of the soft tissue, lack of blood and air flow, and the potential lack of hygiene, in the areas being modified (Guillén et al., 2008; Mendonça De Souza et al., 2008; Tiesler, 2014). Thus it is unsurprising that there is an established relationship between the process of cranial modification and the presence of cranial lesions – supra-inion lesions and porotic

hyperostosis (Guillén et al., 2008; Holliday, 1993; Mendonça De Souza et al., 2008; Stewart, 1976).

Most individuals in the MUNA community examined by Nakahodo (2023) exhibited cranial modification. During analysis, a pattern of cranial lesions emerged that were recorded by N. Nakahodo and I; lesions formed a 'U' around bregma on the frontal and continued posteriorly, clustered either side of the sagittal suture but superior to the temporal line, and finally, lesions were clustered around the parietal-occipital suture, and on the occipital, superior to the nuchal crest (see Nakahodo, 2023 Fig. 5.3). These lesions were ultimately deemed to be associated with modification because they fall outside of the pattern expected for infantile scurvy or anaemia (Brickley & Mays, 2019; Ortner, 2011), and the locations of lesions were consistent with where the modification apparatus would be, including on areas that were not actively being modified (Nakahodo, 2023). The pattern of lesions outlined above was described and then attributed to cranial modification during data collection.

Dental health was assessed by Naomi Nakahodo (2023) and was limited to adults due to the poor preservation of deciduous teeth in the burial community. For the skeletonised individuals, analysis was done macroscopically, using a magnifying glass in some cases. Loose teeth were sorted into available alveoli by morphology and fit and were otherwise labelled as "assorted teeth" (Nakahodo, 2023). For the *fardos*, this initial inventory was completed in ORS^{SI} because of the higher quality of the model than in Dragonfly. Here, teeth were inventoried based on morphological characteristics. All subsequent analysis was done in Dragonfly's 2-D slice view because the image was better quality and visual settings were easier to manipulate (N, Nakahodo, personal communication, 9 September 2023). Standards from Buikstra and Ubelaker (1994), adapted to suit the burial community, were used to record caries, antemortem tooth loss, abscesses, dental wear and dental calculus (Nakahodo, 2023). Only the first three were used to investigate violence amongst those in the MUNA cemetery. During data collection no instances of linear enamel hyperplasia were found amongst the burial community.

Trauma

Trauma was recorded in accordance with the standard methods (Buikstra & Ubelaker, 1994). Adults should have an increased prevalence of trauma compared to nonadults because they have had more time to accumulate injuries. Thus, the causes and lethality of trauma was deemed be a better gauge of violence rather than prevalence. Trepanations were recorded as physical trauma but were not included in analysis of violence.

Lethality is a measure of intent, it looks as whether trauma was meant to injure or kill by taking into consideration the timing, location and size of trauma, as well as whether it is a singular incidence or part of a series (Vega Dulanto, 2014, 2016). The levels of lethality and their definitions are outlined in Table 5.7, and recording lethality was necessary to compare trauma between MUNA and Ancón.

Table 5.7 Levels of Lethality

Lethality	Description (*timing* – description)
I (Low)	*Antemortem* – occupational fractures (except severe fractures of the humeral or femoral diaphysis) and fractures of the facial bones
II (Medium)	*Antemortem* – severe fracture of the humeral or femoral diaphysis, multiple facial fractures, fracturs to the cranial vault <1cm, and a maximum of two rib fractures
III (High)	*Antemortem* – ≥3 ribs fractures, fractures of the cranial vault >1cm
IV (Fatal)	*Perimortem* – only fractures affect the cranium, ribs, or humeral/femoral diaphysis
V (Extreme)	*Perimortem* – fractures affecting multiple areas of the cranium, or the cranium and other parts of the post-crania

Note. Descriptions from Vega (2014), and Baraybar and Gasior (2006) and Lund (2009), as cited in Vega Dulanto (2016).

Identifying the cause of trauma is difficult as there is overlap in the injures different causes result it, not all injuries will manifest in osteological changes, and our ability to create diagnostic criteria are hampered by a lack of contextual evidence or underreporting of types of injuries in clinical settings. Injuries amongst the MUNA community were placed into one of five categories (Table 5.8) based on an injury's timing, location, and

relationship to other injuries, as well as the individual's biographical information and mortuary context. The criteria for these categories are in Appendix B.

Table 5.8 Categories of Violence (Descriptions in Appendix B)

Category	Includes
Abuse	Child abuse, intimate partner violence (domestic) abuse, and elder abuse
Structural Violence	State-sanctioned punishment, *tinku,* and human sacrifice
Physical Violence	Interpersonal violence
Accidental Injuries	Fractures due to isolated falls

Note. Categories have been defined using work from Arkush and Stanish (2005), Bolin (1998), Chacon et al. (2007), Eeckhout and Owens (2008), Gaither (2012), Galloway and Wedel (2013), Guaman Poma de Ayala (1615/2009), Lovell and Grauer (2018), Redfern and Roberts (2019), Toyne (2015), Tung (2014), and Verano (1995, 2001, 2016).

Mortuary Context

Burial position (Table 5.9) and burial goods were recorded for all individuals. However, analysis of burial goods was restricted to those in intact *fardos* because the complexity of funerary practices at the site (e.g., A.J. Nelson et al., in press), proximity of the disturbed *fardos* to each other and the unknown level of comingling prevented any concrete association between the burial goods and a particular *fardo* from being made, nor could the location of a grave good, relative to the bundle, be identified. Sumptuary and/or symbolic burial goods included: maize cobs, Spondylus, coca bags, metal, ear spools, standards, feather fans and ceremonials canes, as defined by Watson (2016).

Identifying objects in CT scans can be challenging. Throughout an object, its density and composition, measured in Hounsfield units (HU), fluctuates. Consequently, objects will have a HU range, and there is a great deal of overlap of ranges between different objects (Gostner et al., 2013). As part of the MAM project, a database of the density ranges for burial goods commonly found on the central coast is being compiled and was used here to aid in identifying burial goods inside the bundles.

Table 5.9 Description of Burial Positions Identified Amongst the MUNA Burial Community.

Burial Position	Description
Flexed	The individual is in a 'squatting' or foetal position with legs flexed anteriorly so they are gathered in front of the chest, their feet are crossed, and arms usually wrapped around or bent over the legs.
Extended	Individual is in dorsal recumbent position with lower limbs extended and upper limbs flexed at the elbow anteriorly or slightly crossed on top of body.
Extended*	The individual is in a frontal recumbent position with the lower limbs flexed dorsally at the knees and arms are behind back
Secondary	Fardo is intact but remains are not in a discernible position. Smaller elements may be missing while larger elements have been collected and bundled together.
Disturbed	Fardo is not intact and original position of bones cannot be determined.

5.2.4 Identifying and Explaining Violence (Or Lack Thereof)

As per previous research using SV, the markers of SV analysed represented different mechanisms of violence (see Table 2.3 for references), the mechanism of violence being studied are summarised in Table 5.10. Violence was identified when there was a significant difference in the prevalence, state, and/or timing of pathological conditions, or in the type of physical trauma experienced between the two groups being analysed.

Table 5.10 Summary of the Markers of Violence, Their Associated Mechanism(s) of Violence, and What Indicates SV is Present.

Marker	Mechanism of Violence	Indication SV is Present
Nonspecific Stress Marker	Resource distribution	Increased prevalence or difference in state of lesions between relevant groups – with consideration of possible underlying biological/environmental causes for differences.

Table 5.10 Continued

Osteoarthritis	Labour distribution	Early onset or significantly increased severity of OA relative to other relevant groups
Dental Health	Resource distribution and access to health care (context dependent)	In the Andes: restriction of one group's access to protein, chicha or coca – with consideration of other biological/environmental causes for differences
Physical Trauma	Physical Violence and distribution of labour	Physical Violence: For the Andes presence of trauma consistent with *tinku,* punishment, or human sacrifice Labour distribution: increased prevalence of occupation-related fractures relative to other relevant groups

Note. It is not necessary for all markers of SV being investigated to be present for SV to be present. As the different markers are caused by different mechanisms, which markers are positive, and which are negative for SV will indicate something about how violence is operating.

To test for SV, I used Fisher's Exact Tests to compare categorical data and I used a student's T test to compare mean statures. Fisher's Exact tests are useful for small sample sizes, particularly in cases where cell values are expected to be less than 5, where the approximations from chi-square tests would be less precise (Freeman & Campbell, 2007; Hess & Hess, 2017). Working on a 2x2 contingency table and holding the marginal totals constant, Fisher's test examines the associations between variables by calculating how extreme the observed distribution of data in that contingency table is relative to all other possible distributions (Hess & Hess, 2017). This means that the closer the p-value is to 1, the more possible combinations there are that are more extreme than the one observed and vice versa.

For stature, when one of the groups being compared had a variance three times or greater that of the other group's I assumed that the two groups had unequal variances. For all statistical tests and a-level of 0.05 was used. Analyses were done in Microsoft ® Excel for Mac, version 17.78 using the XLSTAT Cloud add in.

As noted in chapter one, part of answering my first research question was establishing an understanding of general levels stress and trauma people living on the central coast during the LIP experienced. To make sure that the MUNA burial community had similar experiences to others living on the central coast I compared the average stature, rates of NSSM, osteoarthritis, and trauma, and dental health at MUNA to those at buried in the Necropolis at Ancón (a community local to the central coast).

Within the MUNA burial community, the prevalence of NSSMs, osteoarthritis, dental conditions, and trauma were compared by estimated age and sex, and status.

Violence Was Identified

Where violence was identified, the cosmological and ideological underpinnings of the social structure, the nature of power, and the mechanisms of resource distribution outlined in the contextual analysis were linked to the manifested patterns of harm.

No Violence Was Identified

In scenarios where there was no violence identified, contextual evidence was re-examined to ensure groups defined ‘at risk’ were correct, possible methods of subversion were located, and characteristics of the burial community (preservation and aspects of social identity that can manifest skeletally) were examined. Statistical tests were redone where necessary and then context and osteological data were connected as before to explain any of the following; why there was violence, why there was no violence, or, why violence could not be examined.

Chapter 6

6 Results

The statistical tests conducted to identify SV among the MUNA burial community are displayed here. The data for all tests conducted are summarised in Appendix C.

6.1 Comparing Health and Trauma Data from MUNA and the Necropolis at Ancón

Environment, alongside social structure, can have a large impact on stature and rates of non-specific stress markers (Pechenkina & Delgado, 2006). This is why, in the introduction, I noted that part of answering my first research question will be establishing understand of the general levels of stress and trauma people living on the central coast during the LIP experienced. Those buried at the Ancón Necropolis were local to the central coast (Watson, 2016), so, this comparison provides an indication of whether those buried at Pachacamac experienced similar environmental and cultural contexts during their lifetime.

6.1.1 Stature

Estimated stature at MUNA, Ancón, and Cemetery I are summarised in Table 6.1. On average, females at Ancón were significantly taller than those buried in the MUNA cemetery ($t = 2.878$, $p = 0.009$). Men from Ancón were also taller than those in the MUNA cemetery, but this difference was not significant ($t = 1.70$, $p = 0.098$). Owens and Eeckhout (2022) estimated stature for individuals in cemetery I (inside Pachacamac's sanctuary) which may provide an indication of whether the shorter stature of those in MUNA was consistent across the site or specific to the MUNA burial community. Their estimates are exceedingly short which calls into questions the validity of the estimates and the methodology used by the authors, but due to the dearth of other stature estimates from Pachacamac I will discuss them here. Owens and Eeckhout (2022) calculate stature

from the maximum femoral length using the formulae from Sciulli and Giesen (1993)[4]. These equations were formulated for estimating the stature of Native Americans from Ohio and are inappropriate for Pachacamac. In order to get an idea of the what the stature of those in cemetery I were, I back calculated the average femoral length (cf. Mackey & Nelson, 2020) from the mean statures provided by Owens and Eeckhout (2022) and then input the estimated femoral lengths into del Angels and Cisneros' formulae. Estimated average statures for those in Cemetery I are square bracketed and bolded in Table 6.1.

Table 6.1 Mean Estimated Stature (cm) for Males and Females during the LIP and MH from MUNA[1], Ancón[2], and Cemetery I, Pachacamac[3]

	Stature (cm)	Standard Deviation
Middle Horizon		
Ancón		
Male	159.04	4.98
Female	146.62	3.16
Cemetery I, Pachacamac (Inside the Sanctuary, pre-1010 CE)		
Male	146.4/146.6 **[159.80/159.96]**	Not given
Female	131.9/133.2 **[144.35/145.80]**	
Late Intermediate Period		
MUNA		
Male	157.37	4.97
Female	144.34	5.13
Ancón		
Male	161.24	2.98
Female	150.36	4.57
Cemetery I (post-1010 CE)		
Male	142.6/142.5 **[156.30 /156.20]**	Not given
Female	133.6/133.3 **[146.32/145.90]**	

[1] Stature estimated using del Angel and Cisneros (2004).
[2] From Watson (2016) using del Angel and Cisneros (2004).
[3] From Owens and Eeckhout (2022), see footnote 3. Estimates bolded in square brackets were made by me after back calculating average maximum femoral length and then estimating average stature using del Angel and Cisneros (2004) as previously described.

[4] Owens and Eeckhout (2022) cite that they used equations from Trotter and Gleser (1952), however the equations they record using their endnotes (without citation) – (2.443*MAXFEMUR) + 42.805 for males and (2.336*MAXFEMUR) + 44.253 for females – are from Sciulli and Giesen (1993). There were inconsistencies in the recording of average stature between the body paragraph in the chapter and those recorded in table 8.5 (p.206). Because it is unclear which is correct, I have included both here in my calculations described above.

Interestingly during the MH, the estimated average stature for males and females in Cemetery I were similar to those at Ancón, however during the LIP, while estimated stature increased at Ancón, in Cemetery I, estimates were more similar to those in MUNA burial community as male stature decreased, and female stature increased only negligibly. Migration due to trade, religious celebrations, or warfare may have resulted the movement of highlanders (who tended to be shorter than those from the coast) to the coast, possible reducing the average stature of those interred in coastal cemeteries. In particular, migration related to religion may have reduced the mean stature of those in the MUNA Cemetery but not at Ancón as the latter was not a pilgrimage center (Marsteller, Knudson, et al., 2017; Pechenkina & Delgado, 2006; Rostworowski, 2016, 2022; Watson, 2016). This hypothesis is unlikely as those in MUNA burial community were found to have the type of cranial modification that indicated that they were local to the central coast (Nakahodo, 2023). Changes to resource distribution (whether than be linked to social change at the site or to food scarcity) at Pachacamac but not Ancón cannot be ruled out. While investigating this difference in terminal adult stature further is outside the scope of this thesis, this could be a jumping off point for further research looking at SV at the regional level.

6.1.2 NSSMs and Dental Health

There were no significant differences between the rates of NSSMs (Fig. 6.1) for adults and nonadults between the burial communities at the Ancón necropolis and the MUNA cemetery. For dental health (Fig. 6.2), there were no significant differences in the rates of caries and antemortem tooth loss between adults as a whole, or within each sex. MUNA adults ($p = 0.011$) and MUNA females ($p = 0.021$) has significantly lower rates of abscesses than their counterparts from Ancón.

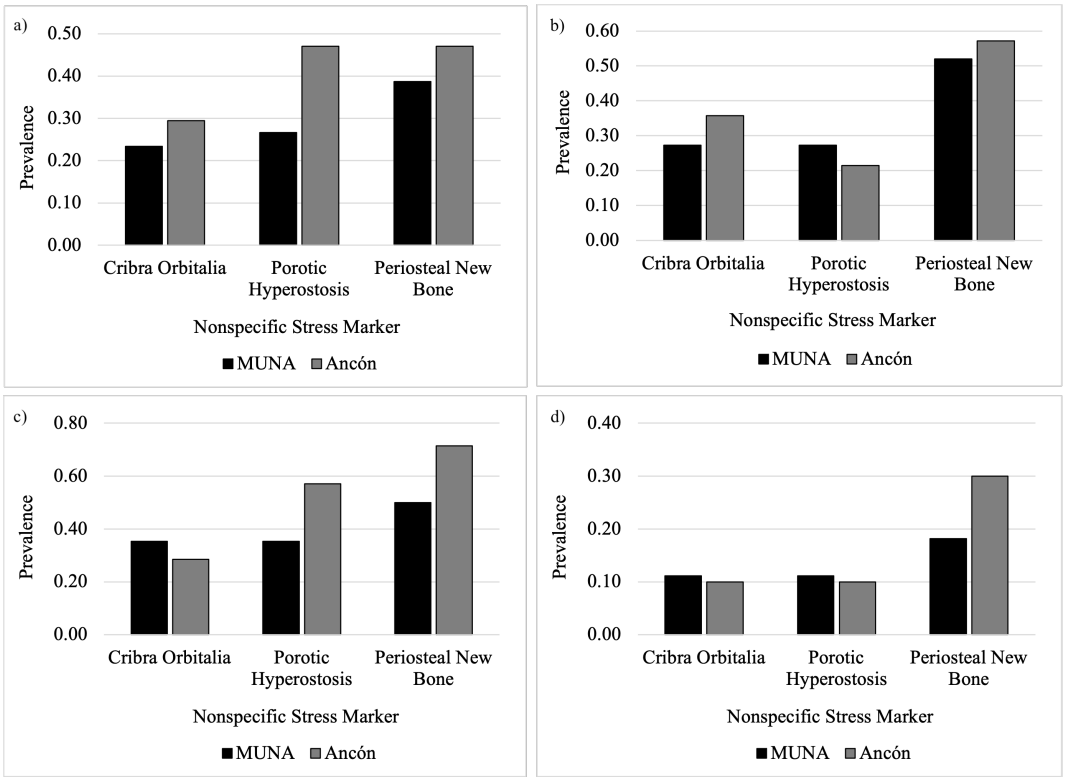

Figure 6.1 Comparison of the Prevalence of NSSMs at MUNA and Ancón. a) Adults, b) Nonadults, c) Males, d) Females. Data for Ancón from Watson (2016)

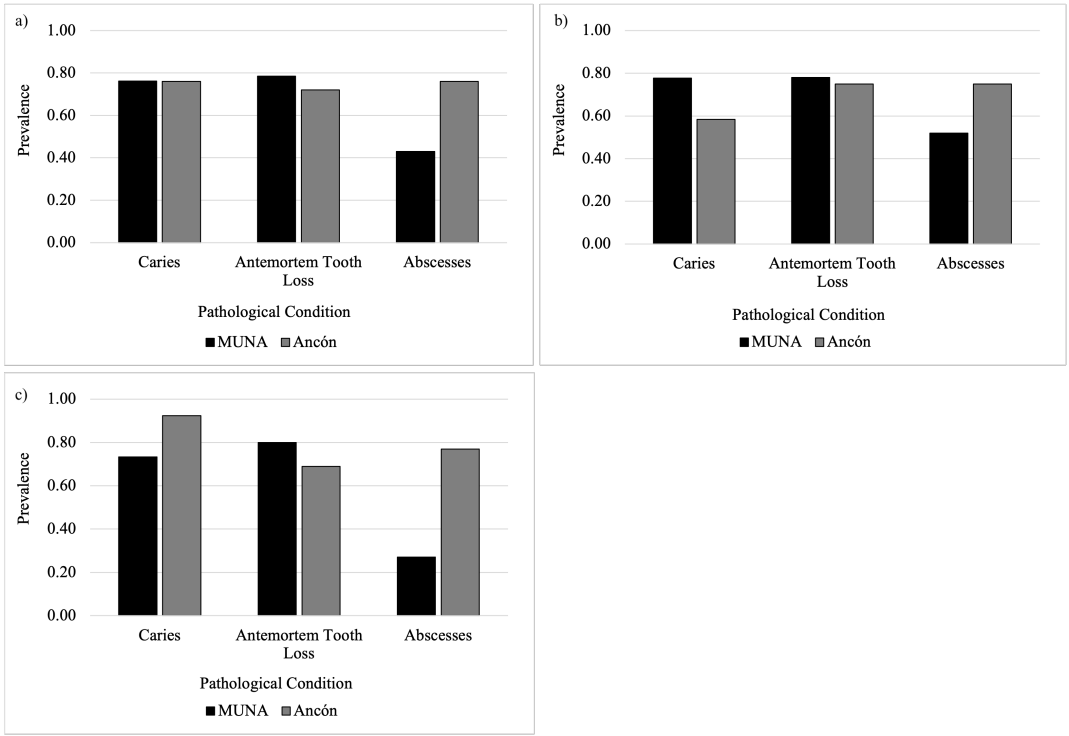

Figure 6.2 Comparison of Dental Conditions Between MUNA and Ancón. a) Adults, b) Males, c) Females. Data for Ancón from Watson (2016).

6.1.3 Osteoarthritis

The pattern of OA prevalence amongst the MUNA burial community differed to that at Ancón (Fig. 6.7). Rates of OA were notably less at MUNA than at Ancón and the latter had significantly higher rates of OA in most vertebral joints as well as most appendicular joints. These differences are likely a reflection of sample size and age distribution – there were only 4 male and 4 female MAs in the MUNA burial community compared to between 5-12 males and 15-17 females per joint from Ancón (Watson, 2016). The significant results for joints where MUNA had a prevalence of 0.00 reflects that of all possible distributions, the observed one here was one of the more extreme ones.

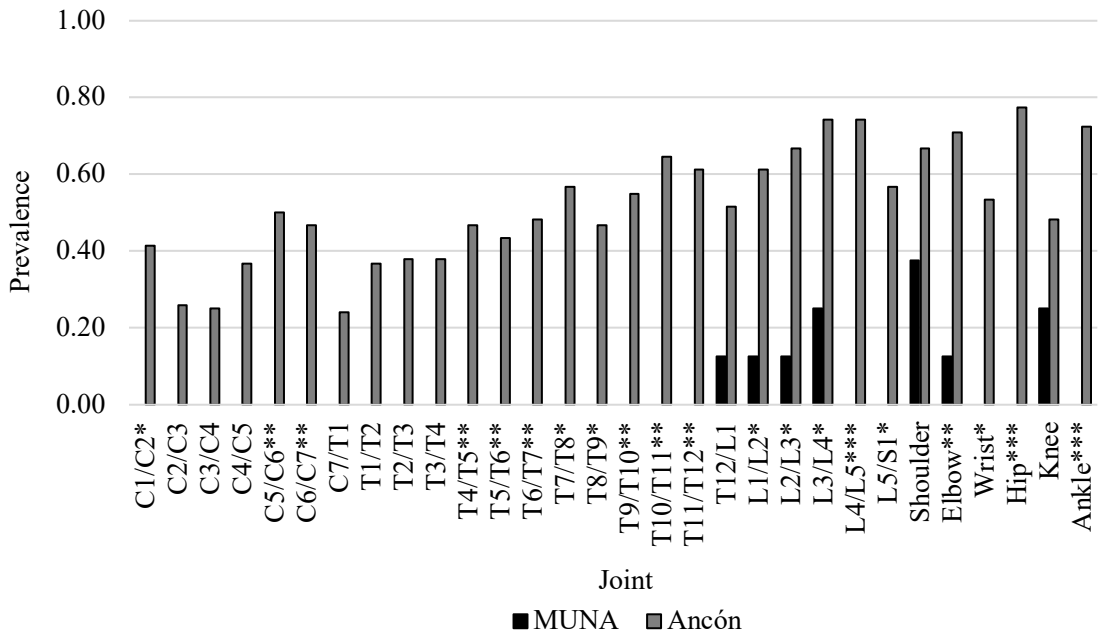

Figure 6.3 Comparison of the Prevalence of Osteoarthritis Between MUNA and Ancón.
***Note.* * < 0.05, ** <0.005, *** < 0.0005. Data for Ancón from Watson (2016).**

6.1.4 Physical Trauma

Rates of physical trauma, according to the categories from Watson (2016), were compared (Fig. 6.4) by age and estimated sex. Only parry fractures between nonadults

were not compared as there was no data from Ancón (Watson, 2016). The only significant differences between the two communities were: the prevalence of rib fractures between adults (p = 0.012) and between males (p = 0.015), and the prevalence of vertebral fractures between adults (p = 0.003). In all cases the prevalence of trauma was higher at Ancón compared to MUNA.

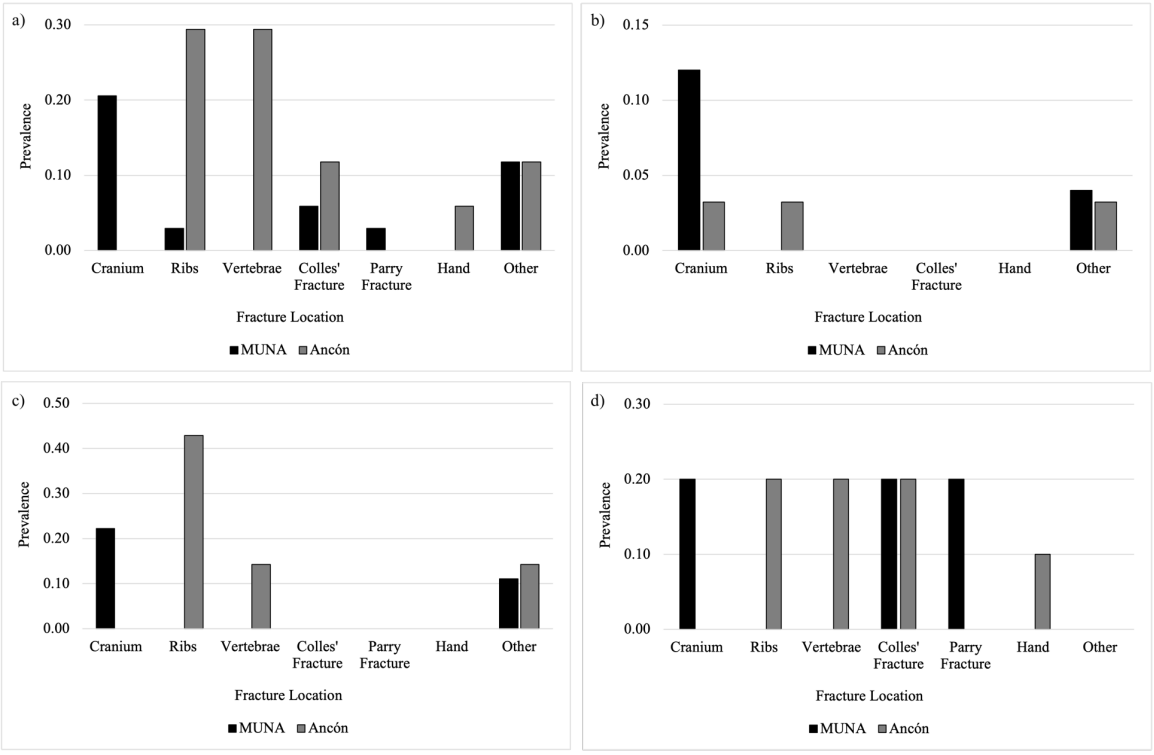

Figure 6.4 Comparison of Types of Trauma Experienced at MUNA and Ancón. a) Adults, b) Nonadults, c) Male, d) Females. Data for Ancón from Watson (2016). *Note.* Parry fractures amongst nonadults were not compared as there was no data for Ancón.

6.1.5 Conclusion

Overall, there were some significant differences observed between those buried in the MUNA cemetery at Pachacamac and Ancón. These differences were most apparent in stature, prevalence of osteoarthritis and physical trauma. Considering that those at MUNA were found to be locals (Nakahodo, 2023). This suggests that there was variation

in life ways on the central coast; while there were similarities in the physical and cultural environments experienced by the communities at each site, there were also differences that manifested osteologically.

6.2 Identifying SV in the MUNA Burial Community

Age and sex were the main axes of identity used to compare rates of pathological and dental conditions, as well as physical trauma. While the distribution and types of burial goods suggested that those in the MUNA cemetery were of similar status, there was some variation amongst individuals, so status (via the presence or absence of sumptuary goods) was also a variable of analysis, but only for those in intact *fardos*, due to the issues with comingling discussed in Chapter 5. This restriction had two consequences, firstly the relationship between status and the presence/state of NSSMs could not be analysed as the two data sets were incongruous. The resolution of the clinical CT scanners did not provide enough definition to identify healed or healing lesions, only extensive or severe cases, thus only disturbed *fardos* (n=27) were analysed for NSSMs. Secondly, sample size precluded most calculations where multiple variables were considered, i.e., when the intersection multiple axes of identity, such as sex and status, were analysed, because groups being compared would have no or one individual in each. Consequently, only the presence or absence of sumptuary goods was considered here.

It should be noted that the prevalence of NSSMs amongst females in MUNA burial community may be underrepresented in this analysis as I am only including those from disturbed *fardos*. Most females (8/11) were intact *fardos*, and only one of the three from disturbed *fardos* could be analysed for cribra orbitalia and porotic hyperostosis, all three were analysed for periosteal new bone.

6.2.1 NSSMS

Discusses above, analysis of NSSMs, was restricted to disturbed *fardos.* Harris Lines were the exception to this and only individuals in *fardos* (n=30) were analysed in this case.

Cribra Orbitalia (CO)

There were no statistically significant differences found in rates of CO between adults and nonadults ($p = 0.670$), or males and female ($p = 0.444$) as a whole, but there was a difference in the distribution of the state of lesions between adults and nonadults (Fig. 6.5).

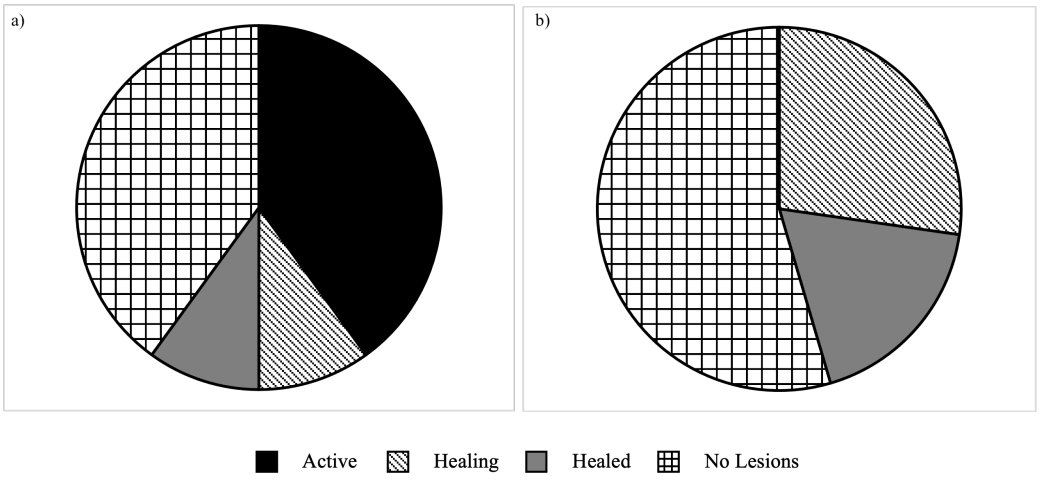

Figure 6.5 Comparison of the Distribution of the State of Cribra Orbitalia. a) Adults, b) Nonadults.

The prevalence of active lesions amongst nonadults was significantly higher than adults ($p = 0.035$). Nonadults also had and greater prevalence of healing lesions while adults exhibited more healed lesions, however neither of these differences were significant ($p_{healing} = 0.586$, $p_{healed} = 1.000$). When the nonadult cohort was broken down into specific age cohorts (Fig. 6.6) only *children* had active lesions and *juveniles* were the only to have both healing and healed lesions.

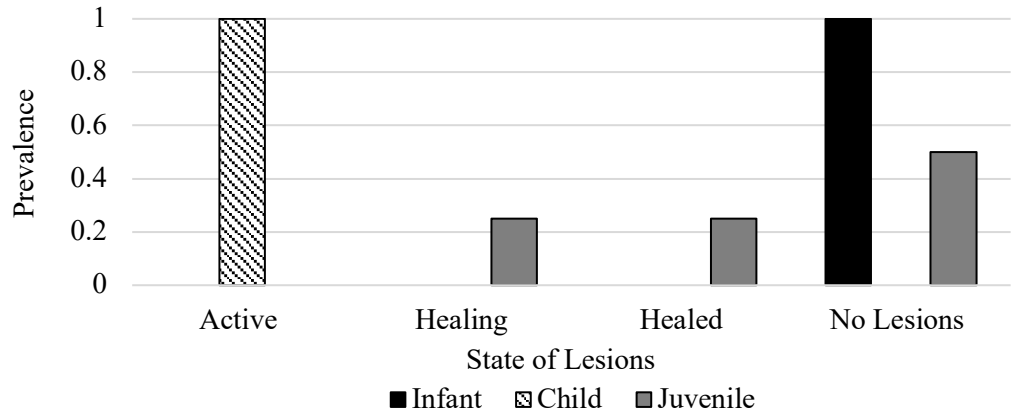

Figure 6.6 Distribution of Cribra Orbitalia Lesions (by State) by Estimated Age Among Nonadults

Porotic Hyperostosis (PH)

There were no statistically significant differences in prevalence of PH between adults and nonadults ($p = 1.000$) or between males and females ($p = 0.333$).

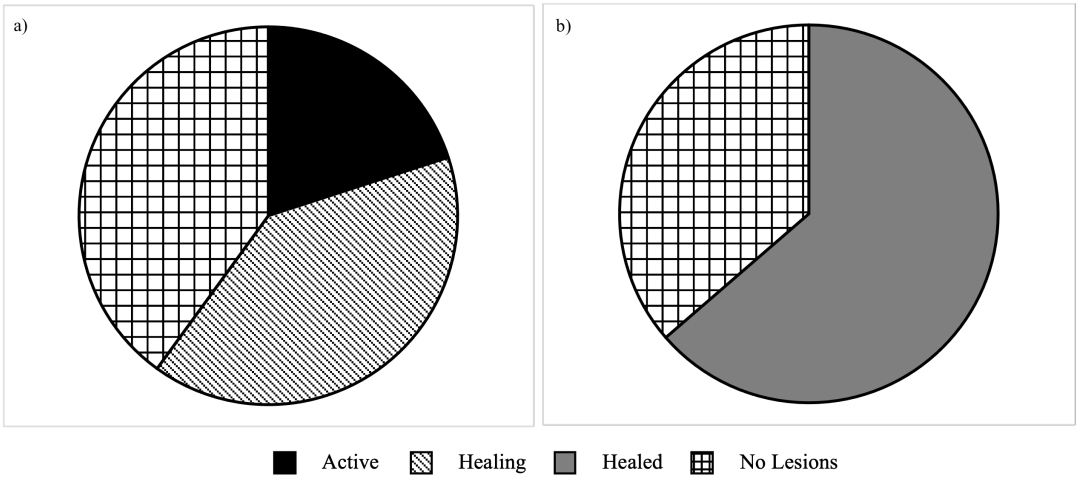

Figure 6.7 Comparison of the Distribution of the State of Porotic Hyperostosis. a) Adults, b) Nonadults

Like with CO, the distribution of lesion state changed with age (Fig. 6.7) however, for PH, the difference in the prevalence of active lesions between adults and nonadults was

not significant (p = 0.214) while for the prevalence of healing (p = 0.035) and healed (p = 0.004) lesions it was significant. Healing lesions were more prevalent amongst nonadults whereas more adults exhibited healed lesions. Looking at the distribution of lesion states by nonadult age cohorts (Fig.6.8), *children* were again the only cohort with active lesions, but they also had healing lesions and no lesions in this case. *Juveniles* had either healing or no lesions.

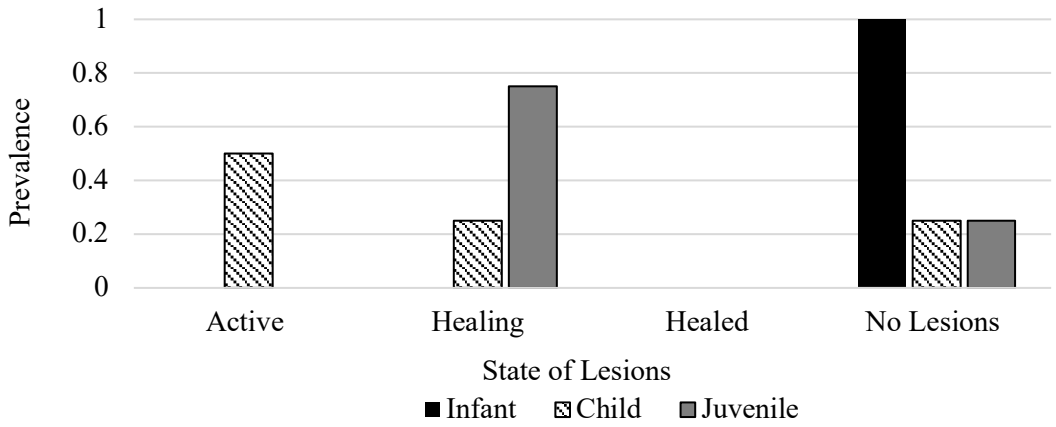

Figure 6.8 Distribution of Porotic Lesions (by State) by Estimated Age Among Nonadults

Periosteal New Bone (PNB)

There was no significant difference in the prevalence of PNB between adults and nonadults (p = 0.378). PNB was more prevalent amongst males, but this was not significant (p = 0.183). There were significant differences in the distribution of PNB adults and nonadults (Fig. 6.9). Localised lesions were more prevalent amongst adults (p = 0.011) and systemic lesions were restricted to nonadults (p = 0.002). The state of PNB varied within nonadult age cohorts (Fig. 6.10). *Infants* only had active bone formation and *adolescents* only had healing new bone. Both *children* and *juveniles* had the greatest variability in lesion state both exhibiting active, healing, or no lesions while the latter also had healing PNB.

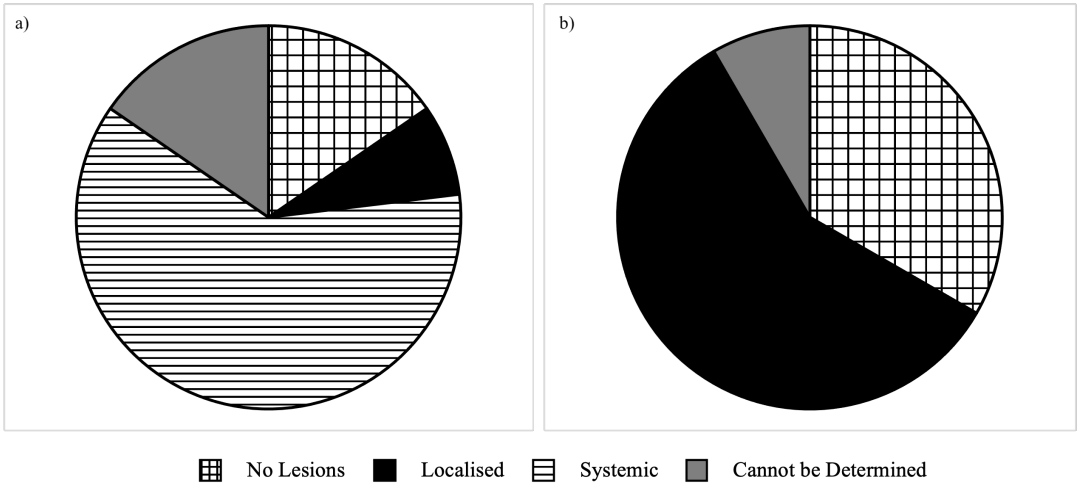

Figure 6.9 Comparison of the Distribution of Periosteal New Bone. a) Adults, b) Nonadults

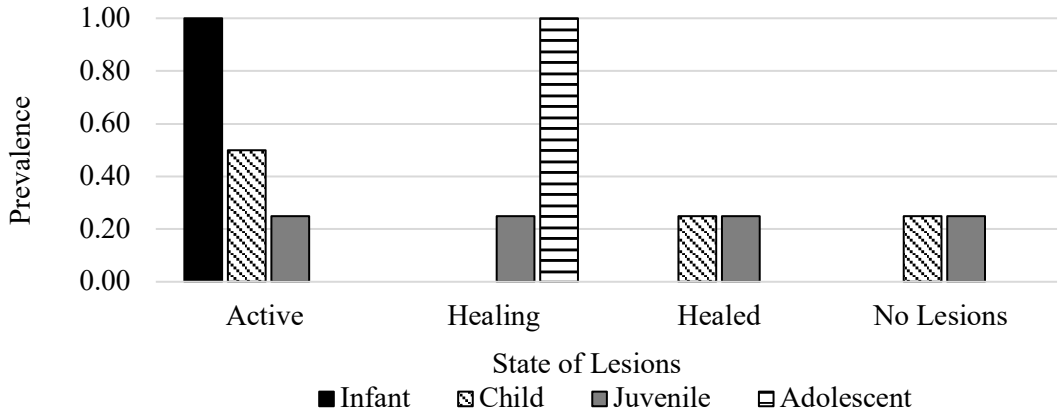

Figure 6.10 Distribution of Periosteal New Bone (by State) by Estimated Age Among Nonadults

Harris Lines

There were no significant differences in the prevalence of Harris lines based on sex ($p = 1.000$) or on status ($p = 0.458$). For the former the prevalence between males and females was almost equal (males:females = 0.44:0.50), while for the latter Harris lines were more prevalent amongst those with sumptuary goods, i.e., those seemingly with higher status. Looking at the number of Harris lines individuals had, there were no significant difference in those with 1 or 2 versus those with 3 or 4 based on sex ($p = 1.000$) or status (1.000).

6.2.2 Dental Health

Figure 6.11 illustrates the prevalence of all dental conditions discussed in this section for males (left column) and females (right column).

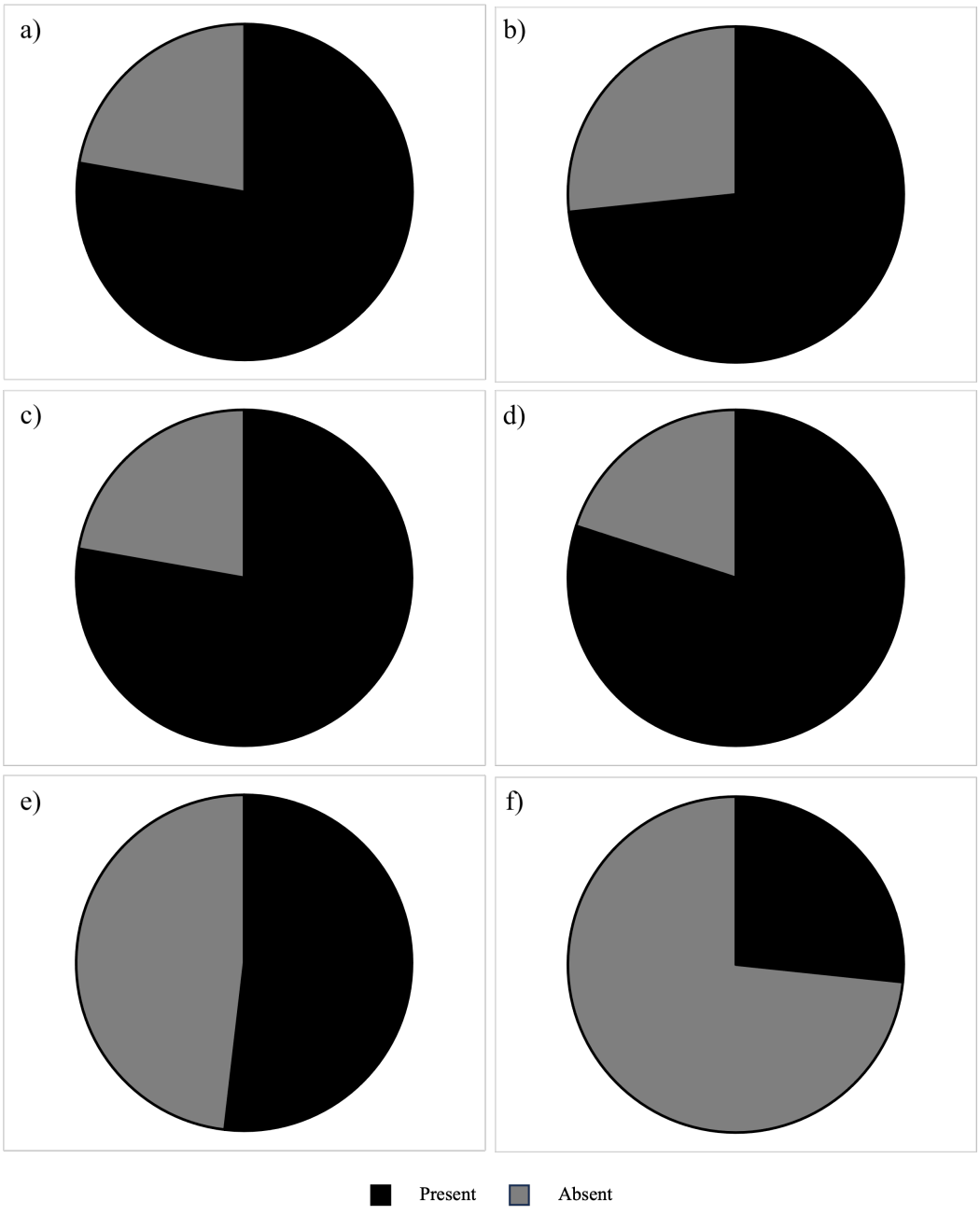

Figure 6.11 Prevalence of Dental Conditions Amongst the Adult MUNA Burial Community.
a) Caries – Male, b) Caries – Female, c) Antemortem Tooth Loss (AMTL) – Male, d) AMTL – Female, e) Abscesses – Male, f) Abscesses – Female.

Caries

As expected, caries were more prevalent amongst MAs than YAs but this was not significant (p=0.665). There was a slightly higher prevalence of caries amongst males compared to females (Fig. 6.11a and b) although this was not significant either (p = 1.000). Amongst YAs and MAs, men had a higher prevalence of caries (p_{YA} = 1.00, p_{MA} = 0.375) neither of these differences were significant. There was no difference in the prevalence of caries by status, all individuals had caries. Looking at severity of caries, males had a greater amount of small caries and severe caries, but less moderate caries as compared to females. None of these differences were significant (p_{small} = 0.838, $p_{moderate}$ = 0.340, p_{severe} = 0.502). Although the differences were not significant, those without sumptuary goods had a greater prevalence of small (p = 0.255) and moderate caries (p = 0.763) while those with sumptuary goods had a greater prevalence of severe caries (p = 0.339). Males had a slightly higher number of teeth affected by caries than females, but this difference was not significant (p = 0.736).

Antemortem Tooth Loss

Males were slightly less likely to have lost teeth antemortem than females (Fig. 6.11c and d), but this was not significant (p = 1.00). This slight difference emerges at middle adulthood. AMTL was equally as prevalent, 67% of males and females showed evidence of ATML, during young adulthood whereas 80% of males and 86% of females had experienced AMTL in middle adulthood (p = 1.000). Those with sumptuary goods were less likely to experience ATML but this was not significant (p = 0.524). Overall, and when broken down into age cohorts, males were more like to have active resorption compared to females, but this difference was not significant (p_{sex} = 0.536, p_{YA} = 0.698, p_{MA} = 1.000). The prevalence of active versus complete resorption was almost equal between those with and without sumptuary goods ($Prevalence_{Active}$ no sumptuary goods = 0.27, sumptuary goods = 0.26, p = 1.000). The only significant difference was that men had lost more teeth antemortem compared to females (p = 0.003), losing 18% teeth in observable alveoli compared to 12% respectively.

Abscesses

Amongst the adults of the MUNA burial community YA were significantly less likely to have abscesses then MAs ($p = 0.017$), in line with the cumulative nature of dental attrition. Males were slightly less likely have abscesses than females, this was not statistically significant ($p = 0.193$). No YA females had abscesses, but this was not significantly different than the prevalence of abscesses amongst YA males ($p = 0.245$). In juxtaposition to YAs, MA females were more likely to have abscesses than males, but not significantly so ($p = 1.000$). Those without sumptuary goods were more likely to have abscesses but this was not significant ($p = 0.608$). Comparing the severity of abscesses, females had significantly more small abscesses than males ($p = 0.031$), and males had more moderate and severe abscesses, but these were not significant ($p_{moderate} = 0.247$, $p_{severe} = 0.658$). Amongst MAs, males had more small and severe abscesses than females ($p_{small} = 0.072$, $p_{severe} = 1.000$), but females had more moderate ($p = 0.220$) abscesses. Those with sumptuary goods had less small ($p = 0.152$), more moderate ($p = 1.000$), and more severe ($p = 0.545$) abscesses than those without sumptuary goods. None of these differences were statistically significant. Looking at the number of alveoli affected by abscesses, males had significantly more abscesses than females ($p = 0.026$).

6.2.3 Osteoarthritis (OA)

During data collection, I observed that, overall, indications of OA were fairly sparse amongst the MUNA burial community and that the presence and severity of the indicators of OA fit expectations – nonadults were not affected, while for adults the prevalence of OA (in terms of presence/absence and number of joints affected) increased with age, as did the severity of pathological changes. This was confirmed during analysis. No nonadults had evidence of OA so, the subsequent analysis only includes adults. Overall, the prevalence of OA was slightly higher in MAs than YAs, but this was not significant ($p = 0.415$), males were more likely to have OA compared to females, but this was just not significant ($p = 0.051$), and finally, those without sumptuary goods were

more likely to have OA, but this was not significant (p = 272). YA males were significantly more likely to have OA compared to females (p = 0.035), however MA males and females were equally as likely to exhibit OA; both have a prevalence of 0.5, p = 1.00. Figure 6.12 shows the distribution of OA-affected joints by various measures. Of the joints where OA was identified there were no significant difference in the prevalence of OA based on sex, age, status or sex and age. P-values for these tests are in Appendix C.

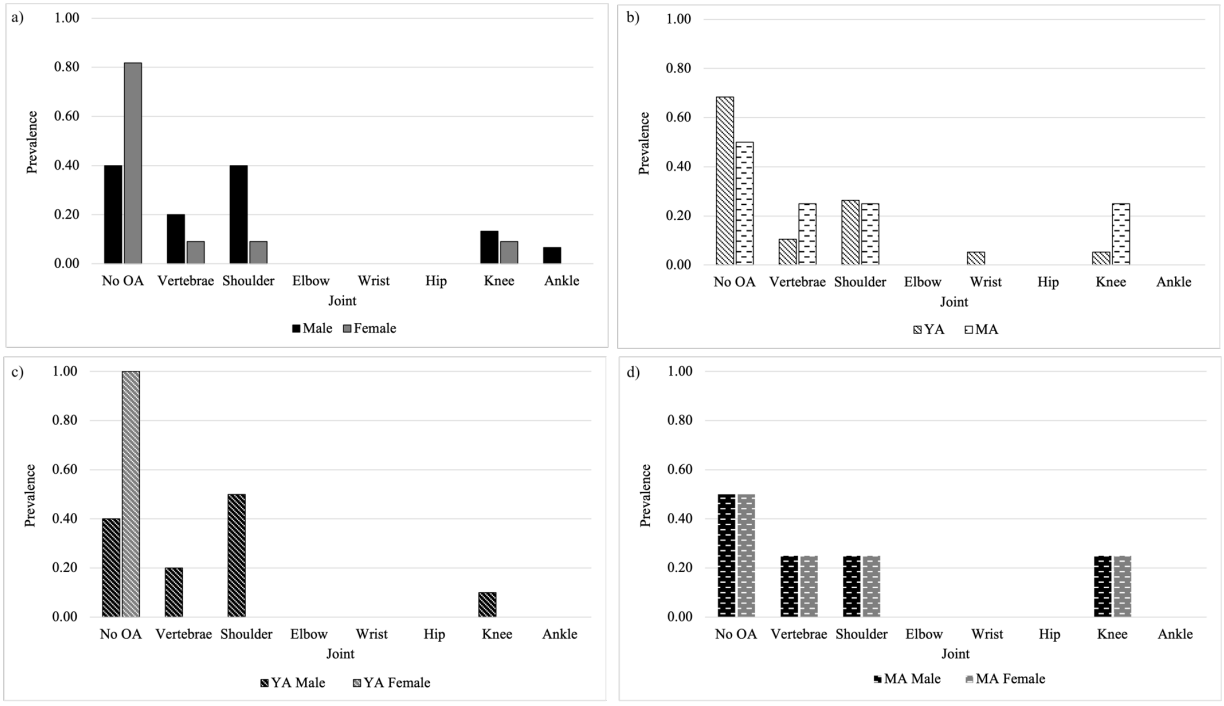

Figure 6.12 Distribution of Osteoarthritic Joints Amongst Adults in the MUNA Burial Community.
a) Sex, b) Age, c) Sex Amongst Young Adults, d) Sex Amongst Middle Adults

6.2.4 Physical Trauma

The prevalence of trauma by age, sex, and status is illustrated in Figure 6.13. As expected, adults were significantly more likely to experience physical trauma than nonadults (p = 0.020). Trauma was slightly less prevalent among males than females, but this was not significant (p = 1.000). YA males were more likely to experience trauma

than YA females (p = 1.000) while the inverse was true for MAs, males were less likely than females to experience trauma (p = 0.524). Those with sumptuary goods were less likely to the experience trauma, but this was not significant (p = 0.442). There were also no significant differences in the prevalence of violence based on the presence or absence of NSSMs (p = 1.000) or Harris lines (p = 0.456). Although not significant, those with NSSMs were slightly less likely and those with Harris lines more likely to experience trauma.

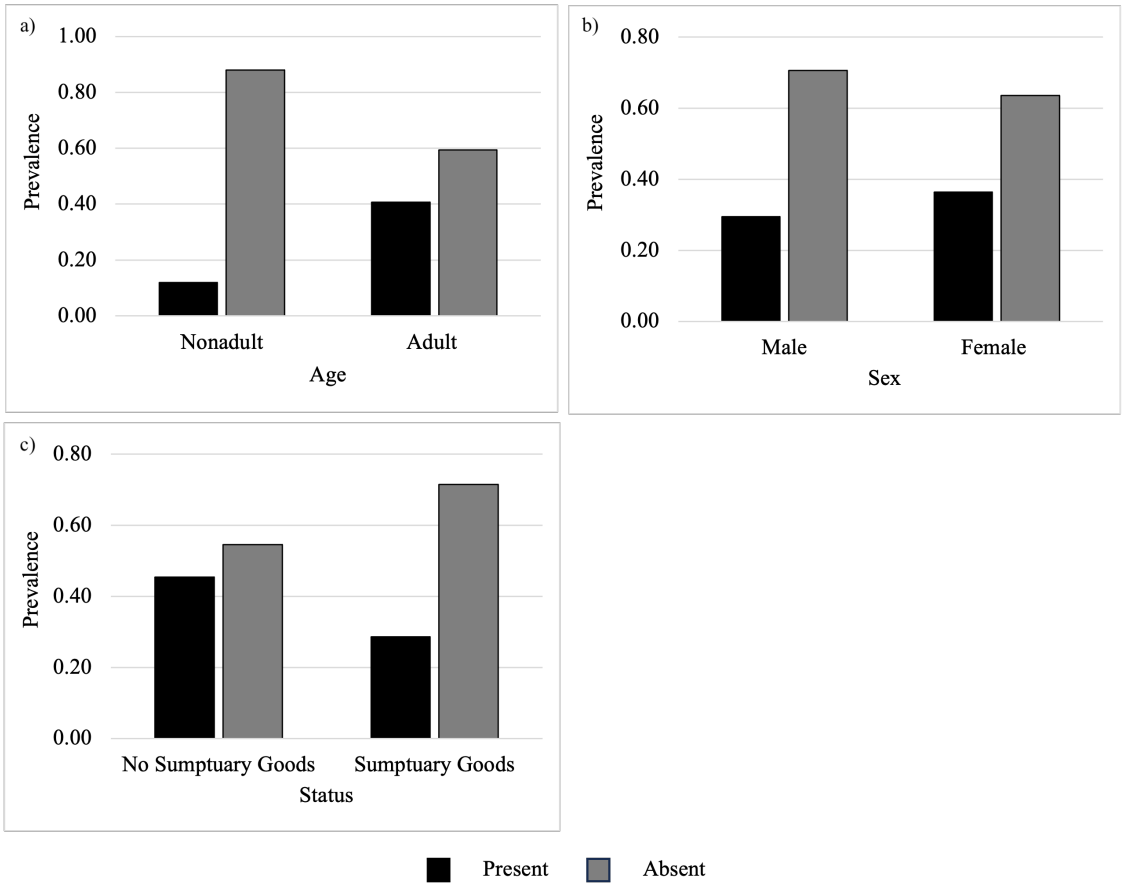

Figure 6.13 Prevalence of Trauma Within the MUNA Burial Community. a) Age, b) Sex, c) Status.

Amongst adults the cranium was the most effected single element of the body, however cumulatively the postcranial skeleton was more effected by trauma (Fig. 6.14). There was no pattern regarding who was affected by post-cranial trauma; E77B (female MA) and E82T (indeterminate YA) had possible Colles' fractures, E79 (YA Male) had a paired

rotational fracture of the radius and ulna, Fardo 8, a YA female, had a fractured tibia and fibula, and finally E26B, a YA male broke their proximal femur. For all the individuals above, the trauma described was the only instance of trauma they had experienced, and all were antemortem, showing various degrees of healing. *Fardo* 4 (indeterminate YA) had a healed fracture to the right illiopubic eminence, which was unique amongst the burial community. It is possible this could have resulted from increased mechanical strain on the os coxa rather than an episode of physical violence as the right side of the pelvic girdle compensated for what is likely tuberculosis-related destruction of the left sacroiliac joint.

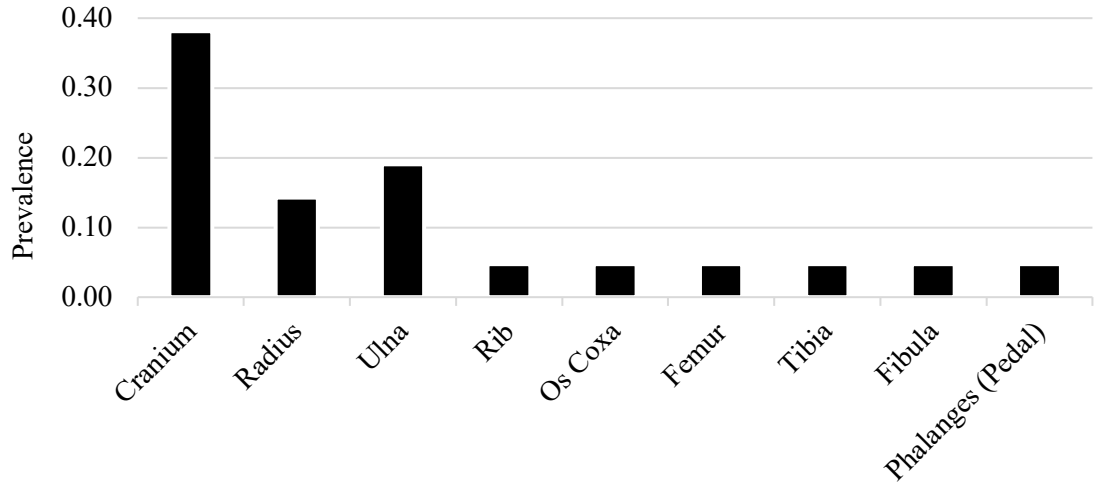

Figure 6.14 Prevalence of Element Effected by Trauma Amongst Adults.

The pattern of antemortem limb fractures was not unique to this small group of the MUNA burial community, amongst those not analysed for SV as they did not fit the phase II selection criteria there was a Colles' fracture (E58), fracture of the distal humerus (E36, individual A – male), fracture of the distal femur (E18), and fracture and subsequent infection of the femoral neck (E87 – indeterminate). All these instances of trauma were antemortem and showed an advanced degree of healing.

Seven adults exhibited cranial trauma. There was some pattern to the trauma; fractured noses and trepanations were restricted to male and indeterminate individuals, and blunt

force trauma (BFT) was largely focused on the posterior parietals (left and right), see Figure 6.15 for examples. Despite those patterns, cranial trauma was ubiquitous sex and age-wise, and the timing of injuries varied with both antemortem and perimortem instances.

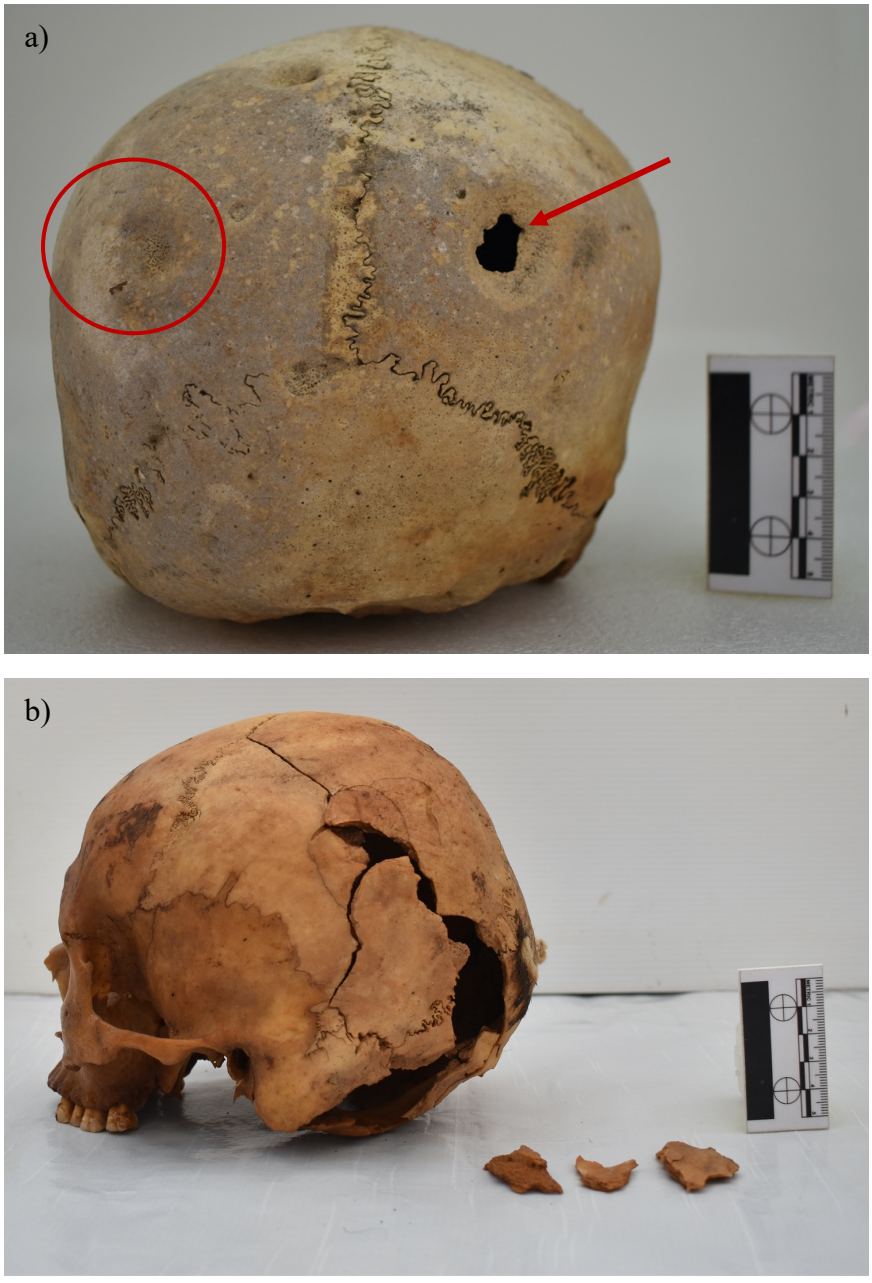

Figure 6.15 Examples of Trauma in the MUNA Burial Community.
a) E83 – Well-healed BFT (circled in red) and Trepanation (Red Arrow) on Posterior Cranium, b) E37 – BFT and Taphonomic Damage to Posterior Cranium.

Three individuals have evidence of trepanations (Fig. 6.15a and 6.16); E67 (3 trepanations, intermediate YA), E77C (one trepanation, YA male), and E83 (one trepanation, MA male). E83's trepanation could have been associated with trauma as both the trepanation and trauma show similar degrees of extensive healing. However, taphonomic damage prevents such association for E67, and there was no associated trauma with E77C's lesion. For the latter two individuals, both trepanations were perimortem.

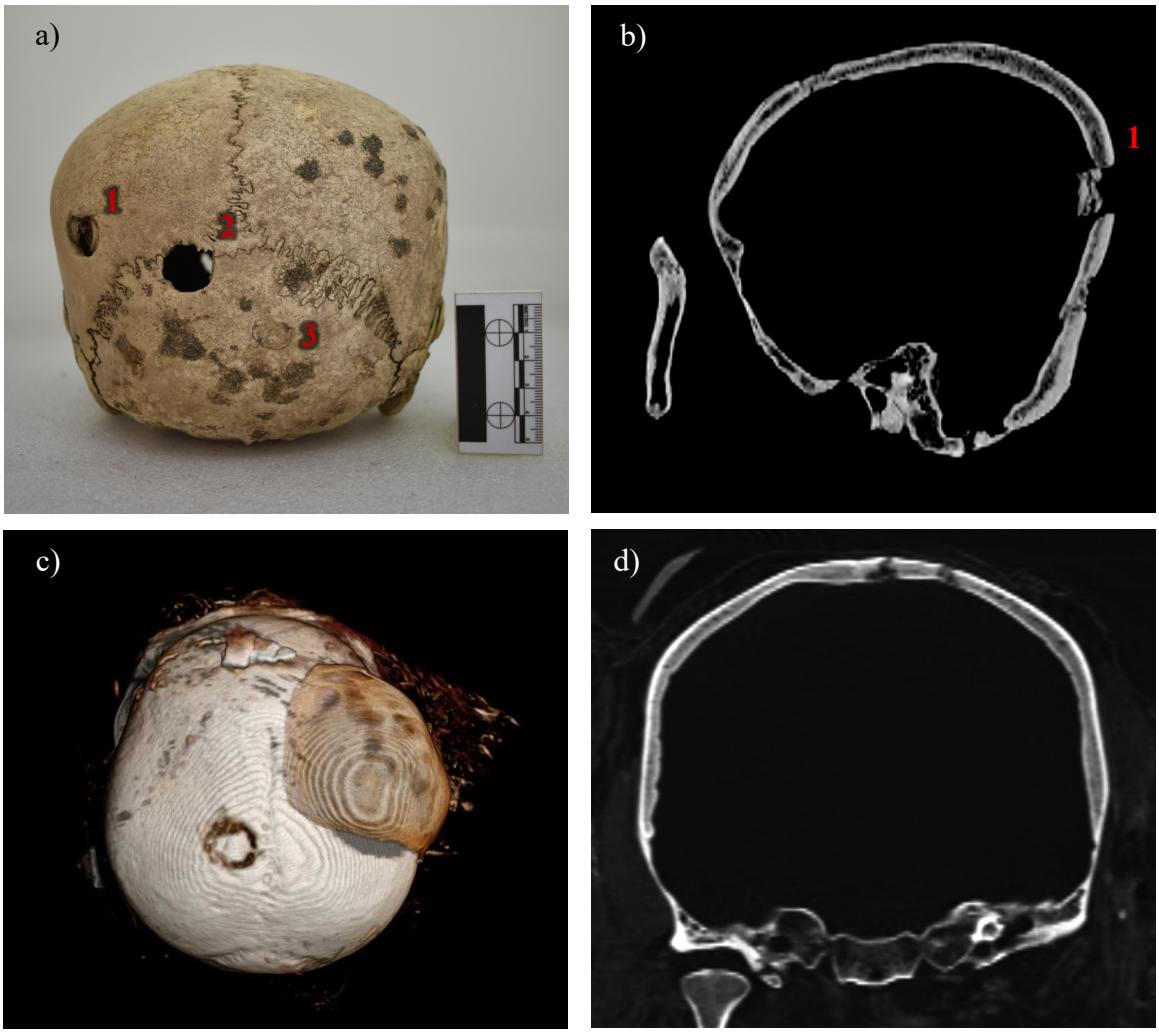

Figure 6.16 Examples of Trepanations in the MUNA Burial Community. a) E67 (Photo)– Posterior Cranium with Two Complete Trepanations (1 and 2) and One Incomplete Trepanation (3), b) E67 (2D Slice) Mediolateral View of Trepanation 1, c) E77C (3D model) Possible Trepanation on Superior Left Parietal Adjacent to the Sagittal Suture (orange shape is an *infant's* parietal), d) E77C (2D slice) Anterior-Posterior View of Possible Trepanation.

All three nonadults exhibiting trauma experienced BFT, and for two of them, like adults, this was to the posterior parietals. The trauma experienced by E84 and E21A are notable within the burial community more generally. E84 was an *adolescent* and was the only person in the burial community to experience BFT to the frontal. E21A experienced excessive trauma with at least 5 instances of BFT to the posterior cranium and one to the anterior – all other individuals analysed here had only 1-2 instances of cranial trauma (Andersen et al., 2023).

Looking at the type and lethality of trauma experienced by the MUNA burial community there were differences in the experiences of different age cohorts evident. Figure 6.17 shows the distribution of the different types of violence experienced within the MUNA Burial Community by age.

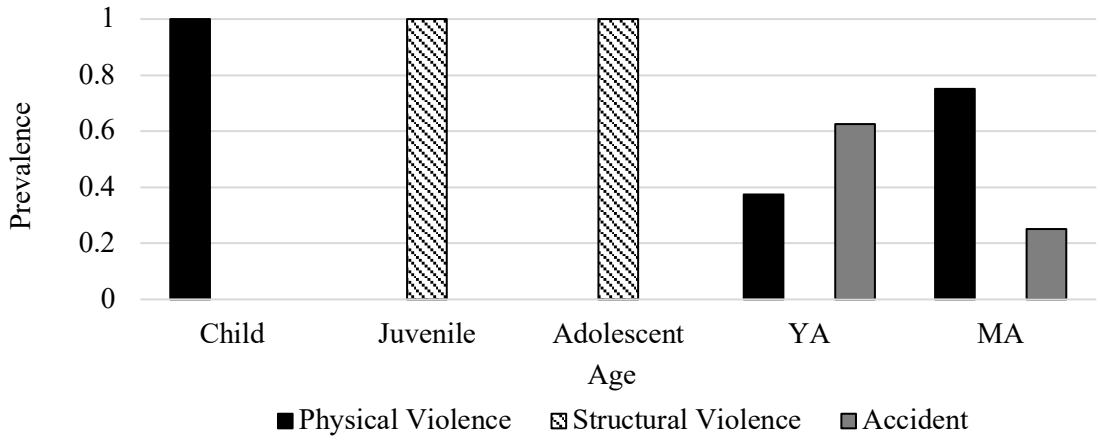

Figure 6.17 Distribution of the Type of Violence Experienced by Different Age Cohorts in the MUNA Burial Community.

Of the individuals with blunt force injuries to the cranial vault (n = 6), four were identified as experiencing physical violence and two structural violence (Table 6.2).

Table 6.2 Summary of Individuals with Cranial Trauma Who Experienced Physical and Structural Violence.

Physical Violence
E37 **Age and Sex:** YA Male **Burial Position:** Disturbed primary burial **Sumptuary Goods:** Silver staining on vertebra suggest the presence of silver in *fardo.* **Cranial Trauma:** At least 2 possible instances of BFT, one to the posterior right parietal, intersected on its inferior edge by parietal-occipital suture. Lesion is circular with diameter of 20.5mm. Second instant of possible BFT is on the superior left parietal – trauma is circular but size is obscured by taphonomic damage to area. A radiating fracture line extends from the superior edge of the lesion and extends superiorly and slightly medially to the coronal suture. Edges of the fracture are straight suggesting it is likely taphonomic. It is possible there is another instance of BFT on the left nuchal crest, this is also obscured by taphonomic damage to area. **Other Trauma:** None **Health:** Healing CO, OA in shoulder (bilateral)
E70 **Age and Sex:** *Juvenile* (8-12 years old) **Burial Position:** Extended, in intact *fardo* **Sumptuary Goods:** None **Cranial Trauma:** At least two instances of BFT localised to the posterior left and right parietals, superior trauma measures 50.48mm in diameter and inferior measures 99.84mm in diameter. Radiating fracture lines from the right side of the trauma to just posterior of the right temporal while another branch terminated just posterior to the right edge of the frontal. **Other Trauma*:*** None **Health:** Harris line (1 line) present
E81 **Age and Sex:** MA Female **Burial Position:** Flexed, in intact *fardo* **Sumptuary Goods:** lumps of clay, 7 canes in left side of bundle (possible was bilateral, similar canes can be seen eroding out of bundle in excavation photo) **Cranial Trauma:** Healed depression fracture on the medial portion of the posterior right parietal. Trauma measures 16.9mm in diameter **Other Trauma*:*** None **Health:** No Harris lines or OA identified

Table 6.2 Continued

E83
Age and Sex: MA Indeterminate
Burial Position: Disturbed primary burial
Sumptuary Goods: N/A
Cranial Trauma: Well healed instances of BFT on the posterior left parietal. Trauma was circular with diameter of ~15mm. There was also a healed trepanation in line with the trauma on the posterior right parietal. The trepanation was done via the scraping method making the affected area elliptical in shape (trepanations on E67 and E77C were done via the grooving method), opening to endocranium measures 12mm x 10mm, total scraped area measures 21mm x 15mm (Nakahodo et al., 2022).
Other Trauma: None
Health: Healed PH, no OA identified.

Structural Violence

E21A
Age and Sex: *Juvenile* (6-11 years old)
Burial Position: Secondary burial, in intact *fardo*
Sumptuary Goods: Yes – piece of metal over right eye orbit.
Cranial Trauma: 5 instances of blunt force trauma to the posterior parietals, likely from a star-headed mace. Wounds are circular with diameters of: a) 17.2mm, b) 21.4mm, c) 18.9mm, d) 14.8mm, and e)17.1mm. E21A also had a major instance of BFT to face; a large, flat object impacted the face from a slightly left, anterior direction causing the fracture along the frontal, a tripod fracture at the left zygomatic and displacement of the bone inward and medially. The mandible is fractured at the left ramus, with the midface, including the maxilla exhibiting a complex crushing pattern. The nasal bones do not appear to be impacted (Andersen et al., 2023).
Other Trauma: Four ribs are fractured (unclear if consecutive ribs), inward bending of the fracture edges indicate the force came from an anterior direction. It is possible the fractures were caused by the post-mortem treatment of remains, such bending fractures and crushing fracture of the medial distal femoral condyle have been found amongst the disturbed *fardos* as a consequence of the bundling process.
Health: Harris lines (2 lines) present.

E84
Age and Sex: *Adolescent* (10-18 years old)
Burial Position: Extended* - this is a deviant burial amongst the MUNA burial communities, in intact *fardo*
Burial Goods: None
Cranial Trauma: One instance of massive BFT to the frontal focused just superior to the supraorbital torus, causing maximum area of 99.3mm x 91.3mm to collapse inwards. Diameter of the small concentric fracture is 34.8mm and the larger one is ~67mm. Impact has caused fracture of the inferior portion of the nasal aperture.
Other Trauma: Hands are missing
Health: No Harris lines

Entierros 70, 81, and 83 were identified as experiencing physical violence as:

- For E70, BFT is not consistent with the type of punishments laid out in the chronicles for nonadults nor is treatment of body if they were killed as part of the punishment of an adult (bodies tended to be denied proper burial rights) (Cieza de Leon, 1553/1864, 1883; Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). For adults, punishments that involved the head were meant to cause death, E81 and E83 show signs of healing.
- Human Sacrifice in invariably successful, and at Pachacamac has been shown to have a spatial and/or temporal element to it (Eeckhout & Owens, 2008; Owens, 2017). None of the MUNA individuals' interments bracket the cemetery's use, and they were from stratigraphic positions that were unlikely to have been disturbed by modern activities (Baldeos, 2015; García & Baldeos, 2020; A.J. Nelson et al., in press).
- *Tinku* is also unlikely. E70 would have likely been too young to be at, let alone participate in combat (Chacon et al., 2007; Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009; Urton, 1993). For the adults, lack of involvement of the post-crania and posterior focus of trauma unlikely given accounts of combat where consistently individuals are facing each other (e.g., Bolin, 1998; Chacon et al., 2007; Urton, 1993).
- E37 was classed as experiencing physical violence as there was not enough evidence to suggest structural. E37 was part of the group disturbed by modern activities and was in the same area as E64 (the *fardo* with the earliest radiocarbon date in the MUNA cemetery (A.J., Nelson et al., in press)), this could mean that they bracketed the cemetery's use (possibly giving them some temporal significance), but it is not known how much time of the cemetery's use the fardos is that disturbed layer represent, and there is no architecture in the area that would allow us to say that E37's burial was spatially unique. The disturbed nature of the *fardo* also means that burial treatment could not be assessed, although the presence of silver staining on a vertebra does suggest that silver was present when E37 was bundled. The posterior position of the BFT does not necessarily suggest

participation in *tinku* nor does the lack of injury on the post-crania, but being a *YA*, E37 was at an age they were likely to participate in it.

E21A and E84 were identified as experiencing SV, in both cases the type of injuries sustained, and their burial treatment stood out. The specific type of SV experienced by these nonadults and how this relates to Andean cosmology will be examined in chapter 7.

Overall, Nonadults were significantly more likely than adults to experience fatal trauma ($p = 0.007$). Nonadults were also more likely to experience violence that was intentional and structural rather than physical compared to adults, although these differences were not significant ($p_{intentional} = 0.213$, $p_{SV} = 0.083$). Females were more likely to experience nonfatal violence compared to males ($p = 1.000$), as were those with sumptuary goods compared to those without them ($p = 0.545$). Males and those with sumptuary goods were more likely to experience violence that was intentional compared to females and those without sumptuary goods, but neither of these differences were significant ($p_{sex} = 1.000$, $p_{status} = 1.000$). Males and those with sumptuary goods were also more likely to experience SV rather than PV compared to their counterparts, again like with the difference in prevalence of violence that was intentional, these differences were not significant ($p_{sex} = 1.000$, $p_{status} = 1.000$).

6.2.5 Conclusion: SV in MUNA

The identification of SV is some markers of violence but not others, tells us something about how structural violence operated amongst the MUNA community during the Late Intermediate Period. The evidence for or against SV based on the marker of violence are summarised in Table 6.3.

Table 6.3 Summary of Results of Analysis and Identification of Structural Violence.

Nonspecific Stress Markers (SV via Resource Distribution)
Nonadults were more at risk of having NSSM with a significant difference in the state of the condition based on age; nonadults had active cribrotic or porotic lesions and systemic periosteal new bone, while adults' lesions were healing or healed and the distribution of PNB was localised. Harris lines were almost ubiquitous amongst the *fardos*, there were no sex or status-based patterns to their distribution or number. Conclusion: There are no indications of systematic resource deprivation that would result in increased prevalence, or a prolonged delay in healing processes of NSSM amongst any one group. *Structural Violence is unlikely***.**
Dental Health (SV via Resource Distribution)
Overall, the prevalence of all dental conditions increased with age as expected. While not significant, more males had caries, and each male had more caries than females, however they did not develop them at an earlier age. Status did not impact the risk of developing carious lesions. While sex did not seem to influence severity of lesions, those with a higher status tended to have more severe caries, again this was not significant. Men were also significantly more likely to lose teeth antemortem, but not sooner than females. While not significant, those with sumptuary goods were less likely to exhibit AMTL. Regarding abscesses, men had a significantly higher number of alveoli affected by abscesses than females and they also were developing them at an earlier age although this was not significant. Those with no sumptuary goods were more likely to have abscesses, but not significantly so. Conclusion: Status did not significantly impact dental health but being male significantly increased the risk of developing abscesses and losing teeth antemortem. As the aetiologies of pathological dental conditions are multifactorial, further examination is required. *Structural Violence is possible, but unlikely.*
Osteoarthritis (SV via Labour Distribution)
As expected, nonadults did not have evidence of OA and the prevalence of OA increased with age amongst adults. When broken down by sex, men were significantly more likely to exhibit OA in young adulthood and were more likely to have OA overall, although the latter was not significant. When broken down by joint there are no significant differences in the prevalence of OA by sex or status when calculable. OA was more prevalent amongst males in the shoulder joint, but more prevalent in females for the vertebrae, knee, and ankle joint. Like with sex, lower status individuals were more likely to have OA and exhibit it in young adulthood. These differences were not significant. Structural Violence: Being male increased one's risk of developing OA prematurely. *There is possible evidence of SV***.**

Analysis and Identification of Structural Violence Cont.

Physical Trauma (SV via Physical Violence and Labour Distribution)

Generally, adults were significantly more likely to experience trauma than nonadults. Amongsts adults there were no significant differences in the prevalence of violence based on sex, status, or the presence of NSSMs. The majority of trauma experienced by adults was accidental injuries to the post-crania and this was reflected in the fact that nonadult were significantly more likely to experience fatal trauma than adults. While not significant, nonadults were also more likely to experience intentional rather than accidental trauma, and structural rather than physical violence. Females and higher status individuals were more likely to experience nonfatal violence and males and high-status individuals were more likely to experience SV.

Structural Violence: Two nonadults – E21A and E84 – were identified as experiencing structural violence due to the nature of the injuries and their burials. These two individuals will be discussed further in the next chapter. *There is evidence of Structural Violence.*

Chapter 7

7 Discussion

In the previous chapter the presence of and the mechanisms of violence experienced by the MUNA burial community were identified. In this chapter I will look to explain why this is the case (answering research question one). Subsequently, I will discuss what the process of investigating SV has shown about the applicability of the framework in bioarchaeology.

7.1 Research Question One: Explaining Violence within the MUNA Burial Community

Contextual research brought into sharp relief the potential complexity of identifying SV in the pre-Hispanic Andes. Andean cosmology has engendered a situation where the asymmetry between communities produces a potential power imbalance and possibly structural violence, while simultaneously, the duality of these groups, the nested structure of society, and the nature of completing and sustaining reciprocal bonds reduces these power imbalances and thus the potential for violence. On the central coast during the LIP, political decentralisation and economic specialisation may have also worked to reduce (but not necessarily eliminate) power imbalances by tying power to local conditions (social and environmental) and preventing any one community from becoming completely autonomous. Meanwhile, the ritual importance of blood in the Andes supported the creation of clearly defined spaces where activities causing bloodshed, e.g., *tinku* or sacrifice, were considered okay, if not socially necessary. How these principles, alongside biological processes have resulted in structural violence via mechanisms of physical violence but prevented SV via mechanism of resource or labour distribution are examined subsequently.

7.1.1 Why Did SV Not Operate Via the Distribution of resources or Labour?

Nonspecific Stress Markers

The social structure of the Ychsma polity, and its basis in reciprocity, reduced the potential for structural violence to operate via mechanisms of resource and labour distribution because it distributed power throughout the wider community rather than allowing it to coalesce amongst a minority of it. While the Ychsma social structure was hierarchical and there were asymmetries within communities, the *curaca* did not own the land, resources, or labour that they were in charge of distributing and/or directing, i.e., power was not innate. Instead, their power was legitimised through action, in particular their fulfillment of reciprocal obligations where, in exchange for tribute, the *curaca* was required to redistribute these resources in a way that would benefit the entire community (Villacorta, 2004). Having power underpinned by the principle of reciprocity distributed power amongst the community and increased the agency of those with lower status; they had the power to legitimise or delegitimise the *curaca's* control based on the latter's fulfillment of their obligations.

Power was not just distributed along 'economic' lines, men and women had their own independent lines of authority which would have specifically reduced the potential for systemic gender inequality in resource access (Eeckhout, 2004a; Rostworowski, 2016, 2022; Silverblatt, 1987). Looking at diet, there is no insinuation in the chronicles that the basic diets men and women differed from one another (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009), however, isotopic work has indicated there may have been some sex-based differences in diet. For example, at Puruchuco during the LH, men consumed more protein than women (J. S. Williams & Murphy, 2013) and Tung (2021) found that in the Wari heartland, in the wake of the dissolution of the Empire male's consumption of foods enriched in ^{13}C (e.g., chicha) increased relative to female's. Important for the development of NSSMs, the chronicles indicate that gender was not necessarily be ascribed at birth, thus any gender-based differences in resource distribution would only start impacting health at the point when someone was gendered. Evident in the

illustrations of Guaman Poma de Ayala's (1615/2009) age categories, people were androgynous at birth, they then became gendered as they could perform the tasks ascribed to that gender, and then move back to androgyny in old age (Dean, 2001). Nonadults were thus ungendered until they could start participating in household activities at 5 years old (Guaman Poma de Ayala, 1615/2009). Explained below, the manifestation of cribra orbitalia and porotic hyperostosis are dependent on the presence of haemopoietic marrow, which in cranium, has begun to convert to mixed marrow from around five years old (Brickley, 2018). Consequently, gendering practices in the Andes may preclude the use of NSSMs, specifically cribra orbitalia and porotic hyperostosis, when exploring gender-based SV. Turning back to MUNA, the lack of differences in the distribution and number of Harris lines between men and women may broadly reflect gender equality in resource distribution as the risk of a nonadult experiencing stress during development was similar regardless of gender.

As the structure of Ychsma society would have reduced the potential for SV amongst the MUNA community, the pattern of NSSMs evident amongst the MUNA community is most likely a reflection of biological processes. The development of NSSMs by *children* reflects that those living in the central coast during the LIP experienced periodic stress due to things such as circulating respiratory and infectious illnesses (e.g. tuberculosis), as well as periodic dietary deficiencies (Blom et al., 2005; Davies-Barrett et al., 2021; Owens & Eeckhout, 2022). Prior to weaning, the transfer of maternal antigens, vitamins and other nutrients to *infant*s provides them with a passive immunity to various pathogens and a buffer against dietary deficiencies. With the gradual cessation of breastfeeding (i.e., the *infant*'s reliance on breastmilk) and the introduction of supplementary solid foods, *children* lose this buffer yet still have an immature immune system. This is a process that begins around 2 years old in the Andes according to the chronicles (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). During this vulnerable period *children* are exposed a multitude of new pathogens and stressors through the consumption of solid foods possibly low in essential nutrients, and their interactions with new environments (Bogin, 2012; Lewis, 2018).

Changes to the type of marrow in nonadults were the likely cause of the shift in lesion state from active to healing and healed amongst *juveniles* and *adolescents*. While cranial lesions have several different aetiologies, anemia is a common cause. Anemias are deficiencies in red blood cells or the haemoglobin in red blood cells, commonly due to blood loss or disruption of red blood cell homeostasis (Walker et al., 2009). Nutritional deficiencies and infectious illnesses are the leading causes of homeostatic disruption. When anemic conditions are prolonged and other biological responses have been unsuccessful, haemopoietic (red) marrow is stimulated to increase red blood cell production and expands. This expansion leads to the resorption of the outer table of the cranium and the development of lesions – in individuals with red marrow (Brickley, 2018; Walker et al., 2009). While all morrow is red at birth, it converts to yellow "fatty" marrow over time with a transitional period where the marrow is mixed. The timing of marrow conversion does vary throughout the body, and between individuals (Brickley, 2018). But in general, for the cranium, conversion of red marrow to largely mixed marrow begins in the face and mandible around 5 years old and is completed by 11 years old. The conversion to mixed marrow is complete in the occipital and frontal region around 11-15 years, and then the parietals around 25 years. Once an area is finished converting to mixed marrow it then continues the conversion process to yellow marrow, so by 30 years old the parietals have mainly yellow marrow (Brickley, 2018). This means that from the *juvenile* period, the cranium has less potential to respond to anemia through stimulated red blood production leading to the cessation of new cranial lesions and eventually the remodelling of older lesions over time. Consequently, we expect to see (as we do here) an increase in the number of individuals with active lesions during childhood when buffering ceases, and the gradual healing of those lesions as the immune system develops and marrow changes from red yellow in the *juvenile*, *adolescent* and *young adult* periods (Brickley, 2018; Lewis, 2018; Walker et al., 2009).

The congruence between nonadult age estimations based on dentition, long bone measurements, the number of Harris lines, and the lack of linear enamel hypoplasia amongst the burial community further support that while present, the stress experienced by nonadults was not especially severe and may have only been periodic (e.g., during an

El Niño). The congruence between age estimates is important because dental development is more canalised than long bone development so highly stressful environments will lead to discrepancies in the age estimates between markers (e.g., Cardoso et al., 2019; Gaither, 2004).

Dental Health

The development of oral pathological conditions is multifactorial, determined by the interaction of underlying biology, diet, and cultural factors (Gagnon & Juengst, 2019; Lanfranco et al., 2017). As previously noted, the chronicles do not suggest that there would have been sex-based differences in diet although there is archaeological evidence for differences in protein and ^{13}C consumption in the Andes (Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009; Tung, 2021; J.S. Williams & Murphy, 2013). There is also indications that status may have impacted diet through differential access to preferential cuts of meat, fish, chicha and coca (Lockhard, 2013; Prieto, 2014; Tung, 2021). Nakahodo's (2023) analysis of dental conditions found there was a lack of sex-based difference in the diets of the MUNA burial community. Overall, both men and women showed patterns of dental attrition that were consistent with carbohydrate-rich, maize-based diet, that was more abrasive due to sand. At this time, it is unclear whether there were status-based differences at MUNA, on-going isotopic work will hopefully shed more light on dietary variation or homogeny in the MUNA burial community based on sex and status.

In the Andes, access to power may not have been beneficial to oral health. The chewing of coca and consumption of chicha (a maize beer) were important parts of Andean social life and could have had a demonstrable impact on dental health (Table 7.1). Both were important for reinforcing bonds of reciprocity, as *curacas* would distribute them as payment for labour, and chicha was provided by the *curaca* at feasts, and it was a means of households negotiating status (Gagnon & Juengst, 2019; Indriati & Buikstra, 2001; Rostworowski, 2016).

Table 7.1 Impacts of Chewing Coca and Chicha Consumption on Dental Health.

Coca (Indriati & Buikstra, 2001): **Effect on oral environment:** Release of alkaloids in leaf have an anesthetic and narcotic effect on the oral environment and supress regular production of saliva inducing xerostomia (dry mouth). **Markers of consumption:** Formation of green spots on tooth crown, localised 'V-shaped' alveolar bone resorption, AMTL and formation of cervical-root caries in on the buccal surface of the posterior dentition and presence only of the roots of molars.
Chicha (Gagnon & Juengst, 2019; Lanfranco & Eggers, 2010): **Effect on oral environment**: Mastication of maize starts the breakdown of starches, a process furthered by boiling. The sugars produced are consumed by yeast during fermentation reducing the amount of sugar available for oral bacteria. Chicha's liquid state decreases the time food particles adhere to the tooth surface, allowing a rebalancing of oral pH faster than with more solid preparations of maize. Boiling leads to the enrichment of ^{13}C and ^{16}O relative to their terrestrial and water sources, respectively. **Markers of consumption:** Chicha producers will have poorer oral health than non-producers, consumers may have better oral health than non-consumers. Identification of fermentation damages maize starches in dental calculus, enrichment of $\delta^{13}C$ and $\delta^{16}O$ ratios relative to sources. No one marker is diagnostic of chicha consumption.

Dental analysis conducted by Nakahodo (2023) did not find evidence of coca consumption by the MUNA burial community and at this point there is not enough evidence to make any conclusions about chicha consumption. Considering Tung's (2021) finding that chicha consumption decreased among women in the wake of the Wari period – possibly an indication of their decreased political participation – it could be useful, as part of the isotopic work being done, for future research to investigate chicha consumption amongst the MUNA burial community itself, and in comparison to individuals from the LIP interred inside Pachacamac proper. The former could investigate whether the shift in societal organisation away from kin-based hierarchies to those based on economic and political power during the LIP had appreciable effects on power at the

site. The latter could investigate how the distribution of power effected where you were buried.

Overall, it is unclear why males have increased prevalence of abscesses and (likely) subsequent antemortem tooth loss. The presence or absence of SV cannot be identified or explained on the basis of this information.

Osteoarthritis

While the increased prevalence of OA amongst men overall was not significant, men were significantly more likely than women to exhibit OA in young adulthood. As OA increases in prevalence with age from middle adulthood, the early onset of the condition may suggest that men, from a younger age, were undertaking more repetitive, physically intense labour than women. According to Guaman Poma de Ayala (1615/2009), boys started taking part in hunting (and presumably helping with farming) from adolescence. During adolescence girls were 'learning how to spin yarn' and began weaving in earnest from young adulthood. Ethnohistoric and archaeological research has also noted that women helped with agriculture, and that when needed, dichotomous nature of the male and female spheres broke down so that women would do traditionally male work and vice versa (Rostworowski, 2016; Vogel & Cutright, 2013). Thus, both males and females would have been doing repetitive, physical tasks from an early age, so while there should be a different distribution of OA based on sex, males, theoretically, should not be developing OA earlier than females.

We cannot say conclusively what activities MUNA men were doing although it was likely related to agriculture – as mentioned in a previous chapter, there was a lack of grave goods normally associated with male activities, although E59 (from the MUNA cemetery but not analysed for this thesis) was recorded as having a possible agricultural tool (possibly a *tacla*; a wooden tool used by men to turn over and break clods of dirt) associated with it (Baldeos, 2015). This would fall in with the model of economic specialisation for the Ychsma *curacazgos* who were agriculturalists (Bueno Mendoza, 2012; Rostworowski, 2016, 2022). However, females at MUNA were likely doing

repetitive work too, as indicated by presence of spindles in several women's *fardos*, and a needle and ball of yarn interred with Fardo 4. In short, there is no indication that the work females were doing would be less repetitive than males.

Modern clinical literature has found that there is a higher prevalence of OA in males under 50 years, but the prevalence of OA among females increases and surpasses that of males after 50 years (Vina & Kwoh, 2018). While differences in lifestyle do account for some of these sex-based differences, biological factors influence sex differences in OA development and progression (Peshkova et al., 2022; Vina & Kwoh, 2018). Biological factors include the shape properties of the joint and loading, and differences in the genetic pathways controlling OA cartilage expression, the latter of which is implicated in the increased severity of OA among females (Peshkova et al., 2022; Vina & Kwoh, 2018). Evidence is conflicting on the role of testosterone and dihydrotestosterone in OA development and progression, but studies have found that estrogen, and progesterone affect cartilage homeostasis (Peshkova et al., 2022). Pre-menopausal levels of estrogen promote the chondrogenic potential of chondrogenic progenitor cells (a fundamental part of cartilage repair) while estrogens, more generally, inhibit the matrix metalloproteinase (involved in tissue remodelling and the destruction of extracellular matrices) pathway in cartilage (Peshkova et al., 2022). The implication of this discussion is that pre-menopausal females may be somewhat buffered from the impacts of lifestyle as it relates to the development of OA, and consequently, the development of OA during young adulthood by MUNA males was not a product of structural violence.

7.1.2 Methodological Considerations

There were aspects of my study design that have impacted my analysis and will have prevented or hindered the identification and explanation of why there was or was not resource-based SV. As I have noted elsewhere, the selection process drastically cut down on the number of individuals who could be analysed and how representative they were of the larger burial community. I my thesis only one old adult fit the selection criteria,

preventing analysis of what is a very expansive age category, where individuals' relationships and roles within the community may have undergone several changes prior to their death (Guaman Poma de Ayala, 1615/2009). Interestingly, there were also very few old adults in the main group itself; post selection phase I, only 8 individuals were estimated to be old adults suggesting factors outside of study design may have also influenced the composition of the MUNA community. For one, there is the possibility of experienced-based errors in age estimation, even with the use of multiple methods. Secondly, if the MUNA population was experiencing population growth as per Drusini and colleagues (2001) then there would be fewer old adults in the living community to enter the burial record. Lastly, as Pachacamac was a place of pilgrimage, consideration should be given to who would be able to make the journey to the site. It is possible that fewer old adults were buried in the MUNA cemetery as some would not have been able to make the journey to Pachacamac.

Finally, what could be analysed on the CT scans versus on dry bone also impacted analysis. The resolution of clinical CT scanners only allowed for the identification of the most extensive examples of CO and PO. This rendered the two groups – those *fardos* and skeletonised individuals – incomparable and further reduced sample sizes for NSSMs. The resolution of CT scan was also an issue for the dental analysis as noted by Nakahodo Moromizato (2023). Less severe conditions, such as: caries measuring <1mm, the finer details that would assist differentiating dental wear from caries affecting the crown, and those that would assist in assessing healing and resorption rate for abscesses and AMTL could not be assessed.

7.1.3 Why did SV Operate Through Physical Trauma?

Two individuals identified as experiencing structural violence (Table 7.2) but via physical mechanisms. This is possible as violence is a continuum, so there is a middle section between structural violence operates through physical mechanisms. The following sections will outline the types of SV did E21A (a juvenile with 5 instances of BFT to the posterior cranium and one instance of massive BFT to the face) and E84 (an adolescent with BFT to the frontal and a deviant burial position) experienced and the principles were necessary for that violence to be greenlit by the community.

Punishment

It is unlikely that E21A and E84's injuries were punishment as they are incongruent with those prescribed to nonadults in the Chronicles. Punishments for nonadults included: spanking, whipping, and ear pulling, usually administered by men in the *Rocto macho* (Deaf Old Man, 78-100 years) age category (Cieza de Leon, 1553/1864, 1883; Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009). Nonadults may have been subject to physical trauma as in "fifth punishment of the Inca" (Guaman Poma de Ayala, 1615/2009, p.254) where a poisoner and all their kin (except of suckling babies) were killed via clubbing according to the illustration. In this punishment all individuals were denied a proper burial and were instead exposed to wild animals; while E84's burial was deviant and E21A's burial was not common within the community (secondary burials are normal within Ychsma practices but was uncommon in the MUNA burial community), neither E84 nor E21A were denied a burial. Overall, it is unlikely that E21A and E84's cranial trauma is the result of punishment.

Human Sacrifice

Human sacrifice has a deep antiquity throughout the Andes and shows a great deal of variation related to the purpose of the sacrifice. Overall though, through the destruction of life, sacrifice imbues the sacrificed body with a meaning specific to the community's physical and social needs at the time and thus was intrinsically linked to the creation and perpetuation of the community's lifeway (Eeckhout & Owens, 2008; Prieto et al., 2023; Toyne, 2015; Verano, 1995, 2008). Here, I am specifically discussing sacrifice to the gods. Like with Ychsma social structure, ideas and justification for sacrifice was based in the notion of reciprocity. When to the gods, human sacrifice is a symbolic return of a gift to its origin, allowing a community to enter into, and fulfil, reciprocal relations to them (Allen, 2002; Rubio, 2009; Toyne, 2015). In fulfilling these obligations, the flow of *sami* is directed so that all living things have their appropriate "*level of liveliness*" (Allen, 2002, p. 178). As with *tinku,* the circumscription of sacrifice within a ritual framework, raises the violence inherent to it above the machinations of mortals – as an individual person, who is sacrificed would not matter, rather what mattered was who they represented, i.e., their identity as a member of a specific community, or representing the ideal of that community, was enhanced above their personal identity.

Thus, the removal of personal identity would have been integral to changing the moral colour of sacrifice to okay, or at least not wrong (Klaus & Toyne, 2016a; Toyne, 2005; Galtung, 1990; Verano, 1995). This could have been achieved by not including burial goods in *fardos.* The inclusion of individualising burial goods, e.g., funerary masks or gendered items, in *fardos* was an important part of Andean funerary practices because it helped the deceased maintain their living identity in the afterlife, facilitating their active participation in the world of the living (Eeckhout, 2020; Rostworowski, 2022; Toyne, 2015; Tung, 2014). Consequently, excluding these identifying features, especially in the *fardos* of adults may have been part of the active transformation of the individual into a representative of the community (Toyne, 2015; Tung, 2014).

Both E84 and E21A are possible sacrificial victims, however, it seems less likely in the case of E84. E84 exhibited an extreme form of frontal-occipital cranial modification

which may have marked them out as coming from a distinct ethnic group (A.J. Nelson, personal communication, December 2023) [5]. This is relevant as non-locals have been identified as potential sacrificial victim elsewhere, e.g., a female at Conchopata (in the southern highlands) from the MH described by Tung and Knudson (2011). The lack of burial goods associated with E84 could indicate an erasure of individual identity, however this point is largely speculative and should not be given much weight as there was two other *adolescents*, one with and one without burial goods, that had not experienced trauma in the MUNA burial community. The trauma sustained by E84 does show similarities to injuries sustained by sacrificial victims inside the sanctuary at Pachacamac. Owens (2017) described an adult male that was in an extended position by the entrance of the sacred precinct. Like E84, the man had sustained BFT to the cranium, likely caused by a stone club – E84's trauma was likely caused by a wooden club, like the one found with E21B (see Appendix D) – however unlike the male described by Owens (2017) and the other potential sacrificial victims identified at Pachacamac, E84's burial does not have any unique temporal or spatial element to it. E84 was buried c.1443 CE (1429-1457 CE), which is not special in terms of the cemetery's use, although it is within the same timeframe (late LIP to the early colonial period) as the potential sacrifices studied from inside the sanctuary walls (Eeckhout and Owens, 2008). A close analysis of the funerary processes at the cemetery found that *fardo* deposition was the result of serialised burial events where new individuals were interred close to existing burials over several decades (A. J. Nelson et al., in press). Thus, E84's burial location which lacks any association with funerary or monumental architecture, or association with a public space, is clustered with E85, and proximal to the E82 cluster and the singular burial of E83, is normal within the spatial distribution of the cemetery. In all, it seems unlikely that E84 was the victim of sacrifice. They no doubt died a violent death, but their external burial context does not set them apart from the wider burial community in a way that would suggest they were intentionally a gift for the divine. This does not preclude the possibility

[5] E84 was not included in Nakahodo's (2023) analysis therefore it is not clear whether their cranial modification would have significantly differed from the rest of the MUNA burial community.

that E84 took part in *tinku* however, an event that a) is directly connected to community identity thus may result in burial practices that outwardly conform to Ychsma burial practices, and b) is sacrificial in nature, thus shares similar cosmological logic as human sacrifice.

E21A is more likely to be a victim of sacrifice. As noted previously, the pattern of cranial trauma does not fit known punishments for Andean *children* and E21A died at an age where they may have been present at *tinkus* but were unlikely to be active participants in fighting. The pattern of cranial trauma is similar to PSI 3 (age undefined) who was buried in a plaza associated with pyramid 3 inside Pachacamac's sanctuary and suffered an linear depression fracture to the right frontal and crushing fracture to dorsal right parietal (Eeckhout & Owens, 2008). Of the individuals from the MUNA cemetery who have been radiocarbon dated, E21A is in the same area and stratigraphic layer as E64 (*capa* 1, *nivel* 1) who has a δ^{14}C date of 1278-1313 CE – the earliest date of those who were tested. It is possible that E21A and E64 were interred around the same time, at or near the cemetery's first use. For E21A, dying and/or being interred near the beginning of the cemetery would be in line with the human sacrifice in Pachcamac's sanctuary (Eeckhout & Owens, 2008). However, as in the case of those from MUNA who were identified as experiencing physical violence it is unclear how much of the cemetery's use period is represented by those in *capa* 1, *nivel* 1. Continuing δ^{14}C testing (including of E21A) will shed light on this dilemma (A.J. Nelson, personal communication, 18 March 2024). As a secondary burial, E21A would not be considered 'deviant' within the larger schema of Ychsma mortuary practices (Díaz, 2015; Díaz & Vallejo, 2005), and delayed burial would allow for more direct interaction between the living and the deceased prior to the latter's interment. These interactions could take many forms and there is no evidence (traumatic or otherwise e.g., in the type of burial goods) that these would have been related to ritual. Overall, the possible timing of E21A's burial, and similarity of the trauma experienced by PSI 3 suggests that human sacrifice is a plausible explanation for massive trauma E21A experienced.

Tinku

Tinku has a broad definition and encompasses activities with various levels of lethality (Arkush & Stanish, 2005; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009; Urton, 1993). As discussed in chapter 3 and alluded to above, *tinku* is underpinned and justified by ideas of reciprocity, and made morally okay by the circumscription of violence and raising of its causes and consequences to the divine (Allen, 2002; Bolin, 1998; Gelles, 1995; Urton, 1993). The circumscription of violence in its perpetuation cannot be downplayed, as 'the meeting of two halves', *tinku* represents a means to define community identity and disperse tensions between groups with unequal power in a space where the potential negative (physical) impacts of violence are limited, and instead violence is a force of rejuvenation (Arkush & Stanish, 2005; Urton, 1993).

Tinku was also part of the larger process of integrating young people into the wider community and social hierarchy. There is an age-based distinction in what level of society a child is involved in evident in the chronicles. For boys there is a switch after 9 years old – those from 5 to 9 years contribute to the household, whereas for the 9–12-year-old group, their tasks begin to integrate them into the wider community (Guaman Poma de Ayala, 1615/2009). At 5-9 years, girls begin assisting women in the community, but their primary tasks are still within the household. Like the boys, this switches when girls reach 9 years old (Guaman Poma de Ayala, 1615/2009). Overall, the community-level nature of *tinku* is thus an important aspect of aging and social development, while I am focused on combat, *tinku* was just one part of a larger festival that also included food, drink, dancing, etc. In these festivals, both of the gendered halves on the Andean world were represented and participation of both was required for meeting and definition of boundaries. Thus, it provided a limited space where adolescents could start taking on more community-level responsibilities.

As discussed with the individuals who experienced physical violence in chapter 6, it is more likely given the ethnographic accounts of *tinku* that injuries sustained while participating in it would be to the anterior of the body – although this would depend on the tenor of combat, are people slinging unripe fruit at each other such as in *yawar mayu*

or is it a hostile melee as with the *toma de la plaza* (Bolin, 1998; Chacon et al., 2007; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009; Urton, 1993)? Also, given information in the chronicles it is possible that *juveniles* would present at *tinku*, however combatants were adults, and maybe older *adolescents* (Chacon et al., 2007; Cobo, 1653/1990; Guaman Poma de Ayala, 1615/2009; San Martín, 2002). These ages would preclude E21A from being a combatant in *tinku*, making it unlikely their injuries were caused by participation in it. E84's trauma would fall within the expectation of anterior facing trauma and as an *adolescent*, they could have been participating in combat. As mentioned in the last section, as those who died in *tinku* were not specifically gifts for the divine, so it is possible that their burial may outwardly conform to normative burial practices. That ethnogrphically, *tinku* is generally tied to annual festivals would also increase the likelihood that individuals who died during combat would be found throughout the cemetery's use as well.

Is It Structural?

It is not impossible that the injuries sustained by E21A and E84 are examples of physical violence, i.e., there is no structural component to them. Overall, levels of physical violence in the Andes did increase during the LIP, likely due to political decentralisation, and rates of cranial trauma on the central coast were the highest in the Andes during this period (Arkush & Tung, 2013; Krzanowski, 2016; Vega Dulanto, 2016). Compared to Ancón, instances of cranial trauma amongst MUNA were high; at Ancón, there were no adults with cranial trauma from the LIP and only 3% of nonadults had cranial trauma (Watson, 2016), in comparison 12% of nonadults and 15% of adults at MUNA had cranial trauma. Across the central however, rates of cranial trauma amongst nonadults were similar to MUNA, at Armatambo, in the cemetery "22 de Octubre", 12.8% of nonadults had cranial while 50% of those at the Chancay site of Las Shicras did (Vega Dulanto, 2016). Amongst adults, rates of cranial trauma at MUNA were low compared to other sites on the central coast, at Armatambo (the cemeteries "22 de Octubre," and "Héroes del Pacífico"), and Las Shicras, 26.9%-75% of adults (males = 36.4%-50%,

females = 20%-83.3%) had cranial trauma, whereas at MUNA, 15% of adults – 11% of males and 9% of females showed evidence of cranial trauma (Vega Dulanto, 2016). In the 22 de Octubre cemetery while there was an instances of perimortem BFT to the posterior cranium in a male adolescent (they also have several injuries to the post-crania) most individuals sustained injuries to the anterior of the body (Vega Dulanto, 2016).

While the coastal valleys do not exhibit the same proliferation of fortified settlements seen in the upper basins, a complex network of citadels, fortresses, and watchtowers, covering the lower Huauara valley, speaks to a community that was defensively-minded, and suggests that we cannot exclude warfare and raiding from potential causes of the cranial trauma exhibited in the MUNA burial community (Krzanowski, 2016). The size and shape of the instances of focal BFT are consistent with star-shaped maces, depicted in the chronicles, and the trauma sustained by E84 is consistent with a wooden mace as found interred with E21B. The use of these weapons does not speak to opportunistic violence in the same way that use of everyday objects such as a *tacla* might, underscoring the plausibility of warfare and raiding as possible cause of trauma. On the central coast, young males with blunt force trauma, puncture wounds and sharp force trauma, and at Punta Lobos (north coast) males were found face down with their hands and feet tied behind their back (reminiscent of E84) and a cloth tied around their eyes, however the individuals from Punta Lobos and the central coast were all part of mass graves associated with episodes of extreme violence (Vega Dulanto, 2016). Overall, there is not convincing evidence that the cranial trauma is physical violence and thus are more likely examples of structural violence.

7.1.4 The Role of (Non)violence in Cultural Continuity and Change

The results and discussion presented in the previous chapter and sections provide an interesting picture of life during the LIP for those in the MUNA cemetery, particularly how violence and nonviolence may have operated at once. Duality and reciprocity were key principles regulating the distribution of resources and labour amongst those in the

MUNA burial community. Throughout this analysis, the consequence of status differences (through the presence and absence of sumptuary goods) has been difficult to pin down, likely due to the important of reciprocity in the reproduction of communities and how that dispersed power. Covey (2008) discusses how the distribution of power may have shifted away from traditional kinship lines to a basis in economics or politics during the LIP on the central coast. Elsewhere in the Andes, such a shift (due to the dualistic nature of gender roles) is suggested to have caused the disenfranchisement of women relative to men in various periods of Andean history (Gero, 2001; Silverblatt, 1987; Tung, 2021). Presently, there are no indications that either gender was marginalised during the LIP or Ychsma-Inca transition, despite this potential change to how power was distributed. A lack of or minimal change to resource and labour distribution during the Ychsma-Inca transition would be unsurprising as the incorporation of Pachacamac into the Inca State was relatively peaceful and involved co-opting already existing social structures (Rostworowski, 2016, 2022). However, future research comparing the health of those in the MH and in the LH (when the site was fully under Inca control) to MUNA would be useful to investigate how political centralisation in Andes make have impacted resource distribution in terms of status and gender – i.e., when politics were centralised, was resource and labour distribution still fairly equitable or did the coalescing of power solidify an worsen their unequal distribution? Answering this question could be a part of understanding why there is continuous occupation at Pachacamac – to what degree has the production and fulfilment of reciprocal bonds between leaders and the community writ-large been an aspect of sustaining continuous occupation at the site?

While there were several instance of physical violence in the MUNA burial community, only E21A (a likely victim of human sacrifice) and E84 (possibly a participant in *tinku*) were identified at experiencing structural violence. Identifying the type of SV they were subject to highlighted how the individual's participation in the event is as important as how their body is treated after death. As identity in the Andes is action based (a motif that has emerged in explaining (the lack of SV), we can understand that the victim's participation in SV as an acknowledgement of their role within the larger group, the diminution of their personal identity to that of the communal identity. Correspondingly,

the community's treatment of their body after death is the community's acknowledgement of the victim's communal identity and their role in perpetuation of Andean society (Owens, 2017; Toyne, 2015; Tung, 2014). Like with resource distribution, future research should aim to have more temporal breadth with a focus on where sacrifice and *tinku* appear in relation to the production and sustainment of cultural identity and bonds. For example, do sacrifice and *tinku* tend to operate at the same time or is the former carried out only at the beginning and end of the use of space while the latter is conducted throughout is use? Restriction of these forms of SV could imply that sacrifice was an integral part of community formation, claiming a space for that community, while *tinku* was necessary for reproducing the bonds created through sacrifice.

7.2 Research Question Two: Using SV Analytically

7.2.1 Point One: Applicability

The slow trickle of work done in non-Euroamerican contexts after 2012 suggests that SV is applicable outside of Euroamerican contexts and can provide us with more nuanced understandings about the intricacies of inequity, conflict, the flow of power over time, and of course, violence (Kieffer Nail, 2018; Stone, 2012; Tung, 2021; VanDerwarker & Wilson, 2016). Further to this point, I was able to explain why SV violence was or was not present based on the cosmological principles and social structure of the central coast during the LIP.

However, as an analytical framework, SV was not perfect. The explanations I have drawn for dental health and osteoarthritis are inconclusive and fraught, and while connections between gender, age and my osteological observations were fairly easy to draw, those with status were much more elusive.

In the last chapter, and throughout my thesis I have touched on various methodological, osteological, taphonomic, and experiential limitations that will have impacted my thesis

at various points. These limitations, while I have discussed them in a piecemeal fashion, operated cumulatively, limiting the groups that could be compared, leading to drastically different sample sizes, and increasing the changes important features of a pathological condition or trauma may not manifest, will be obscured, or would not be recognised. Particularly for status, the almost ubiquitous nature of sumptuary goods meant the "no sumptuary goods" group could be half to a third the size of the "sumptuary goods" group, and small cohort sizes prevented the analysis of multiple variables e.g., status and sex, as groups consisted of none to two individuals. These issues have certainly impacted the strength of my analysis overall, but they do not mean that SV is in ineffective framework in non-Euroamerican contexts.

Issues with individualising comingled remains have highlighted that if looking to examine health, funerary context and practices may be the biggest factor determining the applicability of the framework. Mass graves and communal ossuaries, when studied in isolation may not lend themselves to health-focused SV research because of difficulty of individualising remains. However, in these scenarios (when data is systematically recorded) comparing health outcomes and trauma between sites rather than within time may be an avenue through which SV can be used in such contexts.

The type and amount of contextual evidence I had were the biggest contributors to my conclusion about dental health and osteoarthritis and will be the biggest limitation to using SV in non-Euroamerican contexts, and older Euroamerican contexts more generally. While the Ychsma did not have rich iconographical records associated with other Andean cultures, I was able to craft an understanding of social structure and cultural mores shaping life in the LIP based on ethnographic research, the Spanish Chronicles, and a rich library of bio- and archaeological work in the Andes. The major difference between contextualisation of this research versus the research that has currently been conducted in Euroamerican contexts is the degree of specificity and the breadth of topics covered. For the former, there is a dearth of work recording Indigenous perspectives from the central coast. As explained by Rostworowski (2016), the Spaniards were entranced by the Inca and determined to eliminate idolatry, coastal populations declined precipitously in the wake of Spanish colonisation, and many priests and

priestesses went into hiding before their perspectives could be recorded. Thus, to get a more fleshed out picture of life during the LIP, I had to assume that there was a degree of cosmological and/or physical continuity, temporally and geographically, throughout the Andes, so that I could draw on sources from outside of the Lurín valley and the LIP. In contrast, for industrial period contexts, extant records directly related to life in a specific location, and, to latter point, documents covering more topics may be available for researcher. Overall, researchers working on industrial societies have access to information that is more specific to the time and place, and more varied in topic for research than was available for the MUNA cemetery.

As we look at communities from further back in time (or at ones that do not have the same proclivity for recording everything as we do) regional or site-specific nuances may be obscured due to time-averaging, our ability to identify groups at risk of violence will decrease, and there will an increasing risk that our explanations of SV will be nonsensical for the context we are analysing. While SV can be a powerful analytical framework, helping us explain the root causes of systematic, impactful inequalities, in contexts where there is an increased risk that explanations will be nonsensical or vague, SV's explanatory power may be decreased or eliminated. It is one thing to say that SV does or does not exist, it is another thing to explain why this is the case. A lack of contextual evidence (as was the case with diet and labour) will also impact the strength of explanations for SV. Strong explanations for SV expose the physical mechanisms conditioning harm, i.e., explanations do not only rely on underlying beliefs discussed while contextualising but bring to the foreground the relationships engendered by these beliefs. Many archaeological contexts may not have the level of detail required to make "strong" explanations, but it does not mean that links between social structures and differential health outcomes cannot be made and supported.

In short, explanations of SV in Euroamerican and capitalist-style political economies with their accompanying textual records will be stronger than those from other contexts due to their modernity, not because of aspects of their social structure or political economies. The sheer amount of information and the level of detail we have about "modern" societies facilitates research highlighting the much finer threads that connect victims and

perpetrators. This is not to say analysing modern groups is easy, information saturation brings its own problems for research, but it is far more feasible to find and explore the physical mechanisms of violence in modern communities compared to archaeological ones.

7.2.2 Point Two: Health and Hierarchy

In the introduction to this thesis, I suggested that a softening of the language for Klaus' (2012) second point – SV may only occur in rigidly hierarchical societies – would be necessary. In light of the research done here, I disagree with Klaus' statement I think that focusing on the rigidity of a hierarchy is wrong, rather, his statement should focus on its complexity. In explaining why there was not resource-based SV via NSSMs, I discussed how the dispersal of power made the *curaca* responsible to the community and that they had the power to legitimise the *curara's* control based on the latter's fulfilment of their reciprocal obligations. In contrast, in explaining why human sacrifice and *tinku* were perpetuated, the raising of the causes and consequence of violence to divine was an important means of normalising violence, in this case, against nonadults. The difference between these two scenarios, is the layers of obfuscation between the potential perpetrator of violence and those who would be victims. For the former, there are no layers between the *curaca* and the community, any action taken by former to the detriment of the latter would immediately be filtered through the lens of reciprocal obligations and be seen abnormal and a violation of the leader's responsibilities. As for *tinku* and sacrifice, appealing to the needs of the gods acts as a layer through which the leaders can justify their acts and provides them with an individual or group (in this case an unquestionable one) they can shift blame on to. The smoke screens used by leadership work because they are couched in the same terms and have a similar shape to principles governing everyday life – the gods required blood, and human life in fulfilment of reciprocal obligations – and the change the relationship the leader has to responsibility (to the eyes of the people) by either obscuring it or by shifting it, e.g., the *curaca* responsible for fulfilling their obligations to the community, this in part also means they have a

responsibility to fulfil the community's obligations to the gods. Finally, the smoke screens work by changing the value or nature of the victim's status. For example, previous SV research on patterns of dissection, autopsy, experimentation, and scientific subject making had made clear that a key part of normalising violence was the devaluation of marginalised bodies as human beings and re-identification of these individuals as "research material" (Nystrom, 2014; Nystrom et al., 2017; Watkins, 2018). In the case of *tinku* and human sacrifice, an individual's status as a human being was not devalued, rather their status as members of a specific community was enhanced above their individual identity by those seeking to reproduce the Andean world (Klaus & Toyne, 2016a; Toyne, 2015; Verano, 1995). Such obfuscations require more complex social hierarchies so that there are more layers that leadership can use as smoke screens to normalise their actions.

In all, the development of SV will not rest on the rigidity of a social hierarchy. Ridigity may prevent those without power from exercising agency, but it does not provide the means of normalising violence. Social complexity however will impact the development of SV as the degree of complexity will determine how much leadership can obfuscate their actions, obscure, or shift the nature of their responsibilities, and manipulate the identities of the victims. Thus, *Structural violence may only occur in societies with a high enough degree of social complexity that the various social strata can be used to normalise violence.*

Chapter 8

8 Conclusion

8.1 Research Context

Individuals from the MUNA cemetery were analysed for evidence of structural violence. Several possible mechanism of violence were analysed; these were resource distribution (non-specific stress markers and dental health), labour distribution (osteoarthritis), and physical trauma. The MUNA cemetery is located within the protected zone of the Pachacamac Monumental archaeological site. It was in sector 3, a sandy area to the northwest of the sanctuary, and excavated as part of a cultural management project preceding the construction of the *Museo Nacional de Arqueología* (MUNA) (Baldeos, 2015; García & Baldeos, 2020). The cemetery's use likely began at the end of the Middle Horzion (600-1100 CE), however, $\delta^{13}C$ dating indicates those analysed here were from the Late Intermediate Period (1100-1470 CE) to the beginning of the Late Horizon (1470-1534 CE) during the Ychsma-Inca transition (Baldeos, 2015; A. J. Nelson et al., in press). The cemetery consisted of intact and disturbed *fardos,* the latter were disturbed as a consequence of modern industrial and urban activity in the area of the cemetery (Baldeos, 2015; García & Baldeos, 2020).

Several of the intact *fardos* have been analysed as part of the joint Peruvian-Canadian project 'Mummies as Microcosms,' which aims to use non-destructive, paleoradiographic methods to better understand processes and variation in funerary treatment within the burial community, and over time (A. J. Nelson et al., 2021). Funerary treatment reflects the beliefs, the social, political, and religious structures, as well as the relationships between individuals (including the deceased) (Owens, 2017). Thus, part of understanding continuity and change in funerary treatment is also investigating cultural continuity and change at the site more broadly. My research, alongside Nakahodo's (2023) analysis of cranial modification, represents an expansion of MAM to incorporate the skeletonised

individuals from the disturbed *fardos* (previously analysed by Owens, 2017; Owens & Vlémincq, 2015).

Located 24km south of Lima on Perú's central coast (central coast), Pachacamac was an important religious and political center during the Late Intermediate Period (LIP) and Late Horizon (LH) (Eeckhout, 2004a; Marcone, 2022b; Rostworowski, 2016, 2022). During the LIP, the site was the seat of the Ychsma polity, a stratified society organised along kinship ties (Dulanto, 2008; Rostworowski, 2016). It has been suggested that this traditional kin-based organisation was replaced in the LIP by a system organised along economic or political lines (Covey, 2008). Religiously, Pachacamac was the site of the eponymous God and his oracle and thus was a site of local pilgrimage. Co-option of the god Pachacamac into the Inca pantheon saw the site expand to become a place of pan-Andean pilgrimage during the LH (Eeckhout, 2008; Rostworowski, 2016, 2022).

Part of the intrigue of Pachacamac is its continuous occupation since the Early Intermediate Period (c.100-600 BCE), something that is rare in the Andes. Also interesting is the apparent seamless transitions that occurred between the four successive cultures – Lima, Wari, Ychsma, and Inca – that occupied the site (Eeckhout, 2013). Thus, there is some interest in tracing the mechanisms of social continuity and change at Pachacamac and the area surrounding it (Eeckhout, 2013; Eeckhout & López-Hurtado, 2018). One way to look at these social mechanisms is to focus on violence because the phenomenon is intimately tied to power and agency, and it is paradoxical – a force of both destruction and cultural renewal and rejuvenation (Martin et al., 2012).

Ychsma society was organised along the cosmological principles of asymmetrical duality, reciprocity and kinship (Rostworowski, 2016). Ergo, there were those with power to redistribute resources, labour and land inequitably in Ychsma society, their power, was limited, firstly by the dispersal of power to among discrete identities, e.g., gender duality means that men and women had their own independent lines of authority (Silverblatt, 1987), and secondly, by the agency the wider community had, grounded in the principles of reciprocity, to legitimise or delegitimise a leader's authority (Espinoza Soriano, 2015; Rostworowski, 2016; Villacorta, 2004). Thus, communities in the Ychsma *señorio*

existed in a context where those not in power had more agency to subvert the effects of resources deprivation, leading to more subtle or preventing the manifestation of resourced-based SV in their remains.

The MUNA burial community there also represented the possibility to gain a better understanding of the limits of using SV outside of modern industrial, and rigidly hierarchical contexts, something which Klaus (2012) identified as a possible limitation of the SV framework.

Understanding the limitations of SV as an analytical framework is important as it is a means of gaining insight into the more complex, subtle, and paradoxical aspects of violence. SV does this by expanding the definition of violence to include non-trauma harms and tracing how these harms are connected to, and hidden by, mundane societal structures (Farmer, 2003, 2004; Galtung, 1969). Consequently, SV should allow researchers to capture not only the physical, sudden, and disruptive episodes of violence but also those that are slow to manifest, have more subtle forms, but are still integral to the formation and reproduction of sociopolitical structures, and have real impacts on how people live (Farmer, 2003; Galtung, 1969). This is the context which guided the formulation of my research questions:

1. Can SV identify and explain, if present, the nature, and mechanisms of violence experienced during life and after death by those buried in the MUNA cemetery during the LIP?
2. Via this exploration of violence amongst the MUNA burial community, can any of the claims made by Klaus (2012) regarding the specificity of analysing SV in the bioarchaeological record be addressed?

To answer these questions, 59 individuals (34 adults and 25 nonadults) for whom age and/or sex could be estimated had their prevalence and states of nonspecific stress markers (NSSM – cribra orbitalia, porotic hyperostosis, and periosteal new bone), dental

health (caries, antemortem tooth loss, and abscesses), osteoarthritis, and the presence and type of physical trauma recorded. These prevalences were first compared to data from Ancón to establish that the MUNA community did not have life experiences substantially different from other communities on the central coast. Then, Fisher's Exact tests by age, sex and/or status. The relationships found were then contextualised in terms of the nature of power, and the impact of identity on potential risk of violence that had been previously identified in the Spanish Chronicles (Cieza de Leon, 1553/1864, 1883; Cobo, 1556/1963, 1653/1990; Guaman Poma de Ayala, 1615/2009), and ethnohistorical (e.g., Bolin, 1998; Rostworowski, 2016, 2022; Urton, 1993) and archaeological research (e.g., Gero, 2001; Silverblatt, 1987; J. R. Topic & Topic, 1997).

8.2 Thesis Findings

8.2.1 Question One: Structural Violence in the MUNA Community

Contextual evidence highlighted the importance of gender and age in conditioning a group's risk of experiencing violence as they shaped the activities a person would be doing, their integration into the larger community and mortality risks as they relate to biological development and degradation over the lifetime (Campuzano, 2008; Cobo, 1556/1963, 1653/1990; Dean, 2001; Guaman Poma de Ayala, 1615/2009; Horswell, 2020; Silverblatt, 1987). Status was also identified as an aspect of identity that could condition access to resources (Díaz, 2015; Eeckhout, 1999; Lockhard, 2013; Pacifico, 2021; Prieto, 2014; Tung, 2021; van Dalen Luna, 2004; Watson, 2016), however, the image painted was much less clear than gender and age.

Overall, rates of nonspecific stress markers and osteoarthritis did not suggest that those in the MUNA cemetery were subject to resource or labour-based SV. It was inconclusive for dental health. The prevalence of NSSMs and changes to their state fit what would be expected from physical and immunological development in an environment with periodic nutritional stress, and the timing of marrow conversion (Bogin, 2012; Bogin & Smith, 1996; Brickley, 2018; Lewis, 2018). Among adults, males were significantly more likely

to develop osteoarthritis in young adulthood, those of lower status were also more likely to develop OA in young adulthood, but this not significant. In middle adulthood males and females were equally as likely to have osteoarthritis. As both men and women did repetitive physical labour from young age, it is possible that this pattern reflects underlying biological differences (e.g., in immune system functioning, hormones and genetic pathways) (Baldeos, 2015; Guaman Poma de Ayala, 1615/2009; Peshkova et al., 2022; Vina & Kwoh, 2018; Wood et al., 1992). As noted in the comparison of dental health was inconclusive, men and those of low status were more likely to experience AMTL and have abscesses, but only the former was significant. The chronicles suggest that diet did not differ by sex, but other bioarchaeological research has indicated that sex and status my impact diet – a major contributor to dental health (Gagnon & Juengst, 2019; Indriati & Buikstra, 2001; Lanfranco & Eggers, 2010; Lockhard, 2013; Prieto, 2014; Tung, 2021). Analysis by Nakahodo (2023) did not find any evidence of sex based differences in diet, and in general diets amongst the MUNA community were consistent with others on the coast and there was no evidence of coca consumption. More data is needed about potential dietary variation and homogeny amongst the community before conclusions about SV can be made.

There were several instances of physical and accidental trauma in the MUNA burial community, however no one group was significantly more likely to experience trauma. Only E84 and E21A – an *adolescent* and *juvenile* respectively – were identified as experiencing SV. E21A was likely a victim of sacrifice whereas E84 was likely a participant in *tinku* based on the nature and position of their trauma, their age, and their funerary treatment. Unlike resource-based SV which operates on a more individual level, human sacrifice and *tinku* are mechanisms of establishing and reenforcing community identity and relationships (Klaus & Toyne, 2016a; J. R. Topic & Topic, 1997; T. L. Topic & Topic, 2009; Toyne, 2015). In the context of the Andes, that SV would take this more physical, community-centered, form is more sensible – society was organised along kinship lines thus mechanisms aimed at reproducing the social structure should also fall along these, communally-oriented, lines.

As it relates to continuity and change at Pachacamac, the health of the MUNA community and patterns of physical trauma highlighted how both violent and non-violent structures may operate at the same time. Future research should have more temporal depth and look at how resource distribution may shift during periods of political centralisation versus political decentralisation. Doing so will allow us to assess the extent reciprocity prevents the development of SV, i.e., when societies are more politically complex and power becomes more centralised, does this allow those in power to violate their reciprocal obligations? This research could complement Vega Dulanto's (2016) research on 3000 years of physical violence on the central coast which has a deep temporal perspective, through the expansion of the definition of violence.

Another avenue of future research, also requiring more time depth, would be to look at when sacrifice versus *tinku* is conducted in the cycle of a space or community. Is use of the former only restricted to the beginning and end of a uses space while *tinku* is conducted throughout its use? Or are both sacrifice and *tinku* conducted throughout time? The hypothesis underlying this question is that sacrifice is a method of creating and defining social boundaries while *tinku* sustains them. Identifying and separating *tinku*, sacrifice, and physical trauma in the archaeological record will be the first hurdle in investigating this question. Further analysis of E84 and comparison of trauma with others in the same burial position (e.g, there are three at Ancón) may shed more light on the nature of violence and experienced by the adolescent. Arguably, the work on human sacrifice (see Table 3.4 for a summary; Eeckhout, 2004b; Eeckhout & Owens, 2008; Owens, 2017) within the sanctuary at Pachacamac could provide a starting for point for identifying sacrifice, and a broader survey of sacrifice in the Lurín and Rímac valleys, and varying sizes of sites within them is needed.

8.2.2 Question Two: The Applicability of Structural Violence

To identify and explain why the instances of physical trauma amongst the MUNA burial community were or were not SV operating via a particular mechanism (specifically

nonspecific stress markers and physical trauma), I related osteological evidence to contextual information about the maintenance of social bonds. In doing so I showed that SV is applicable to a broad range of contexts. However, there are aspects of the research context that need to be considered before employing SV. Firstly, SV may not be suitable for contexts with limited contextual information. My ability to identify violence from markers of dental was hampered by the amount and specificity of contextual information I had. Similarly with OA, while I argue that the pattern of OA in the MUNA community was a result of underlying biological factors rather than increased labour demands on males, the sparseness of contextual evidence meant that my explanation was not as strong as it was for the nonspecific stress markers. More broadly, lack of contextual evidence will make it harder for researchers to identify groups at risk of violence as well as decrease the explanatory power of SV as an analytical framework. Care should also be taken to make sure that research question can be answered by the burial community being analysed, by this I mean that research questions looking at intra-site health outcome may not be suitable for burial communities that are comingled or highly fragmentary, however, inter-site comparisons may be feasible. Changing the scale of research, i.e., intra to inter-site, or changing the research question are possible solutions that will still allow SV to be used in a broad range of contexts.

Finally, I have argued that for the development of SV, Klaus' focus on the rigidity of a hierarchy is misplaced. Social complexity should be his focus because, while rigidity may prevent groups from exercising agency, it does not normalise violence. In such, his statement should have been that *SV may only occur in societies with a high enough degree of social complexity that the various social strata can be used to normalise violence*. The normalisation of violence requires multiple layers of social strata so that leaders can a) obfuscate their action or blame someone else, b) obscure or shift the nature of their responsibility, and c) change the identity of the victim in a way that justifies the violence being done to them. This is evident at MUNA if you compare why there wasn't resource-based SV there but was physical trauma-based SV. For the former, there were no layers between the *curaca* and the people, thus their action would be immediately filtered through the lens of reciprocity and judged accordingly. In contrast, for the latter, "the gods" provided a layer through which physical violence could be justified, carrying

it out was part of their larger responsibility to the community, and the victims' identity was changed so they were a symbol of the wider community.

8.3 Future directions

During research the lack of old adults and the site centered focus of research came up as limitations that would also be productive sources of future research. It is unclear, as of present, why there were so few old adults included in my thesis. Individuals excavated in 2015 and in 2016-2019 who were not included in this research should be analysed to confirm whether the dearth of old adults is an artifact of my thesis' design.

The MUNA cemetery and Pachacamac do not exist in isolation. To gain further understanding on life around Pachacamac and the role of the larger site in the Ychsma polity future research should aim to also increase the geographical breadth of research by:

1. Comparing health markers, trauma, and burial goods between those buried in the MUNA cemetery with those buried within Pachacamac's sanctuary from the same period, and
2. Conducting analysis of SV at various levels in the Ychsma *señorio* – looking at Pachacamac's relationship with other sites within the Lurín valley and the relationship between the valleys on the central coast.

Overall, SV is a very flexible framework that has shown its potential to tease out the complex relationships between physical and structural violence in the MUNA community, particularly in that grey area where physical and structural violence are one in the same. Continued use of SV in non-Western contexts will expand the framework's utility, especially as our understanding about how the nature of power and identity shape the mechanisms and nature of harm in different groups grows.

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Appendices

Appendix A: Individuals from MUNA Cemetery Analysed for this Thesis.

Skeletal / Intact *Fardo*	*Entierro*	MNI	Individual	Adult / Nonadult	Age Cohort	Numerical Age[1] (years)	Sex[2]
Skeletal	E20	4	A	Nonadult	Child	1-2.5	n/a
			C	Nonadult	*Juvenile*	5-10	n/a
			B	Nonadult	*Infant*	0.5-1	n/a
Fardo	E21A	1	n/a	Nonadult	*Juvenile*	8-11	n/a
Skeletal	E21A-21B	4	A	Adult	MA		M
			C	Nonadult	Child	2-4	n/a
Fardo	E26A	1	n/a	Adult	YA		M
Fardo	E26B	1	n/a	Adult	YA		M
Skeletal	E37	3	A	Adult	YA		M
Skeletal	E46	3	A	Adult	Undefined Adult		M
			B	Nonadult	*Adolescent*	12-16	n/a
Skeletal	E48	2	B	Adult	YA		F
			A	Adult	MA		M
Skeletal	E50	5	D	Nonadult	Child	2-4	n/a
Skeletal	E54	4	D	Adult	Undefined Adult		M
			C	Nonadult	*Infant*	0-0.5	n/a
Skeletal	E67	3	A	Adult	YA		I
Fardo	E68	1	n/a	Nonadult	*Juvenile*	5-12	n/a
Fardo	E69	1	n/a	Adult	YA		M
Fardo	E70	1	n/a	Nonadult	*Juvenile*	8-12	n/a
Skeletal	E74	1	n/a	Nonadult	*Juvenile*	10-12	n/a
Fardo	E76E	2	A	Adult	YA		F
			B	Nonadult	Child	3-5	n/a
Fardo	E76H	1	n/a	Nonadult	*Infant*	0.5-1	n/a
Fardo	E77A	1	n/a	Nonadult	*Juvenile*	9-12	n/a
Fardo	E77B	3	A	Adult	MA		F
			B	Adult	YA		M
Fardo	E77C	1	n/a	Adult	YA		M
Fardo	E79	1	n/a	Adult	YA		M

Skeletal	E80	1	n/a	Adult	OA		I
Fardo	E81	1	n/a	Adult	MA		F
Skeletal	E82	2	A	Nonadult	*Infant*	0.5-1	n/a
Fardo	E82A	1	n/a	Nonadult	*Adolescent*	15-18	n/a
Fardo	E82B	1	n/a	Nonadult	*Juvenile*	5-12	n/a
Fardo	E82C	1	n/a	Adult	YA		M
Fardo	E82F	1	n/a	Adult	YA		M
Fardo	E82H	1	n/a	Adult	YA		F
Fardo	E82I	1	n/a	Adult	YA		M
Fardo	E82J	1	n/a	Adult	YA		F
Skeletal	E82K	1	n/a	Nonadult	*Juvenile*	9-10	n/a
Fardo	E82R	1	n/a	Nonadult	*Infant*	1-3	n/a
Fardo	E82S	1	n/a	Adult	MA		F
Fardo	E82T	1	n/a	Adult	YA		I
Fardo	E82U	1	n/a	Adult	YA		F
Skeletal	E82X	1	n/a	Adult	MA		F
Fardo	E82Y	1	n/a	Nonadult	*Juvenile*	5-11	n/a
Skeletal	E83	2	A	Adult	MA		I
		2	B	Adult	MA		M
Fardo	E84	1	n/a	Nonadult	*Adolescent*	10-15	n/a
Fardo	E88	2	A	Nonadult	Child	1-3	n/a
Skeletal	E88A	2	A	Nonadult	Child	4-7	n/a
Skeletal	E90A	2	A	Adult	YA		F
Skeletal	E90B	1	n/a	Adult	YA		M
Skeletal	E94	7	A	Adult	MA		M
			D	Nonadult	*Juvenile*	8-14	n/a
			F	Nonadult	*Infant*	0-0.5	n/a
Fardo	*Fardo* 4	1	n/a	Adult	YA		I
Fardo	*Fardo* 8	1	n/a	Adult	YA		F
Fardo	*Fardo* 9	1	n/a	Adult	MA		M

[1] Nonadults Only

[2] M = Male, I = Indeterminate, F = Female

Appendix B: Descriptions of Pathological Conditions Used and Categories of Trauma

Description of Pathological Conditions

Condition	Description or Operational Definition
Cribra Orbitalia	Porous lesions on the orbital roof (Brickley, 2018; Ortner, 2003)
Porotic Hyperostosis	Porous lesions on the cranial vault (Brickley, 2018; Ortner, 2003)
Periosteal New Bone (PNB)	The deposition of new bone on the cortical surface as a reaction to changes to the underlying bone (e.g., trauma or infection) (Ortner, 2003; Roberts, 2019)
Harris Lines	Opaque transverse lines of increased bone mineral density on the diaphysis and metaphasis of long bones (Harris, 1931; Villa et al., 2019)
Osteoarthritis	Identified by: The presence of eburnation, OR at least two of the following: marginal osteophytes, presence of new bone on the joint surface, pitting on the joint surface, alteration of the joint contour (Waldron, 2019, p. 725)
Caries	The progressive demineralisation of dental tissues (enamel, centum and dentine) by organic acids produced by plaque bacteria during the fermentation of dietary carbohydrates (Hillson, 2018)
Abscesses	An alveolar lesion that develops during the inflammatory response to infection of the pulp chamber of a tooth. Radiologically, abscesses can be seen as a translucent area around the apex of the tooth, otherwise, abscesses can only be seen after they have progressed far enough that a sinus in the mandible or maxilla has formed. (Hillson, 2018; Roberts & Manchester, 2013)
Antemortem Tooth Loss (AMTL)	The loss of teeth during a person's life for various reasons including, but not limited to: caries, periodontal disease, alveolar abscesses, and trauma. Healing of edges of the tooth socket or infilling of the socket with new bone are required to identify AMTL (Hillson, 2018; Roberts & Manchester, 2013)

Description of Categories of Causes of Trauma

Abuse
(Gaither, 2012; Galloway & Wedel; 2013; Lovell & Grauer, 2018; Redfern & Roberts, 2018)
Note. Trauma should only be categorised as abuse if more than characteristic is consistent with it (Lovell & Grauer, 2018).
Common to all types of abuse is the presence of multiple fractures in different state of healing

Child Abuse
In children < 5 years old trauma without abuse is uncommon however the number of accidental injuries will increase after 5 years into adolescence.
In children < 1 years long bones fractures (particular spiral or oblique fractures) suspicious because of behaviours the *infant* would be capable of, but, for neonates also have to consider birth trauma (see below).
Common injuries include: transverse fractures to long bones, bilateral posterior rib fracture (to sequential ribs), bilateral endocranial bone deposition
Health (i.e., nutritionally) may also be impacted

Intimate Partner Violence (Domestic Abuse)
Injuries tend to be concentrated on the cranium, face, neck, and arms (particularly the shoulder)

Elder Abuse
From clinical studies, most common sites of injury are the upper extremities followed by the maxillofacial region, then dentition, neck, cranium, lower extremities, and then torso.
Neglect is common so physical health so also be examined.

Structural Violence

***Tinku* (Arkush & Stanish, 2005; Bogin, 1998; Chacon et al., 2007)**
Age of participation not clear, but seems young to middle adult most likely participant with those >6 years old adjacent to combat
Males most likely combatants
Injuries are likely to be on the anterior of the body with the focus of injuries depending on the type of combat

Human Sacrifice (Eeckhout & Owens, 2008; Guaman Poma de Ayala, 1616/2009; Toyne, 2015; Tung, 2014; Verano, 1995, 2001)
Invariably successful – injuries will be perimortem or postmortem
Victims likely have differential treatment – types of burial goods, burial position, and location
At Pachacamac:
Injuries were focused on cranium and burial likely associated with the beginning or end of an area's use.

Description of Categories of Causes of Trauma Continued

Physical Violence
(Galloway & Wedel, 2013; Judd, 2008; Lovell & Grauer, 2018; Redfern & Roberts, 2018)

Commonly results in cranial fractures, especially the nasal bones, zygomatics and mandible, parry fractures, and fractures of the ribs, vertebral spinal processes, and bones of the hands and feet

Cranial fractures are more likely to be on the left side of cranium (if strike is from the anterior), have a high degree of fragmentation, and more likely to be above the 'hat brim line' - A 3cm band parallel to the Frankfort Horizontal plane. The upper margin of the area passes through glabella and the inferior passes through porion (Galloway & Wedel, 2013).

Palmar surface of the manual phalanges may have healed or unhealed cut marks

Accidents
(Galloway & Wedel, 2013; Judd, 2008)

Falls From Standing

Common in younger nonadults and old adulthood

Forearm fracturs common but type will depend on age:

< 5 years old – supracondylar fracture of humerus

5-10 years – transverse fracture of the distal radius

Mid-teens – epiphyseal separation of the distal radius

Late teens to early adulthood – fracture of carpal bones, especially scaphoid

> 40 years – Colle's fracture

Advanced old age – Colle's fracture and fracture of proximal humerus

Cranial fractures tend to be below the hat brim line and focused on the nose, dental-alveolar region, and mandibular condyles

Falls From Height

Falls from low heights (< 35m) tend to result in injuries to forearms e.g., paired rotational fracture. Falls from high heights (> 35m) tend to result in trauma to the torso and spinal fractures. Cranial fractures more common amongst nonadults because of larger proportional size of head to body and inability to brace as effectively as older nonadults/adults. Pattern of injuries may be erratic because of impacts of body with other surfaces or corners during fall

Other

Birth Trauma (Galloway & Wedel, 2013)

Fractures usually to humeri, femora or clavicles of neonates

Trepanation (Verano, 2016)

The surgical removal of a piece of bone from the cranial vault.

Common methods include:

(1) Scraping – the removal of the outer table, diploe and inner table through abrasion. (2) Grooving – the use of repeated cuts to circumscribe a circular or oval portion of bone for removal. (3) Intersecting linear cuts – similar to grooving method however piece of cranium to be removed is a square or rectangle. (4) Boring and Cutting – a ring of small burr holes are made and the bridge of bone between holes are cut to remove the circle of bone in the centre

Trepanations will not have radiating fracture lines

Appendix C: Statistics

Significant p-values ($\alpha < 0.05$) are bolded.
Continued is abbreviated to Cont. in table titles.

Burial Goods

Comparison of the Prevalence of Burial Goods Amongst Intact *Fardos* Using Fisher's Exact Test.

		n	Observed		Prevalence	p-value
			Present	Absent	Present	
Burial Community	**Adult**	20	18	2	0.90	0.030
	Nonadult	12	6	6	0.50	
Age Cohort	**Child**	3	2	1	0.67	1.000
	Juvenile	6	3	3	0.50	
	Child	3	2	1	0.67	1.000
	Adolescent	3	1	2	0.33	
	Juvenile	6	3	3	0.50	1.000
	Adolescent	3	1	2	0.33	
	YA	14	13	1	0.93	0.521
	MA	6	5	1	0.83	
Estimated Sex	**Male**	10	9	1	0.90	1.000
	Female	8	7	1	0.88	
Estimated Age and Sex	**YA Male**	7	6	1	0.86	1.000
	YA Female	5	5	0	1.00	
	MA Male	3	3	0	1.00	1.000
	MA Female	3	2	1	0.67	

Comparison of the Prevalence of Sumptuary Goods Amongst Intact *Fardos* Using Fisher's Exact Test.

		n	Observed		Prevalence	p-value
			Present	Absent	Present	
Burial Community	**Adult**	20	16	4	0.80	0.119
	Nonadult	12	6	6	0.50	
Age Cohort	**Child**	3	2	1	0.67	1.000
	Juvenile	6	3	3	0.50	
	Child	3	2	1	0.67	1.000
	Adolescent	3	1	2	0.33	

Comparison of the Prevalence of Sumptuary Goods Amongst Intact *Fardos* cont.

Age Cohort	**Juvenile**	6	3	3	0.50	1.000
	Adolescent	3	1	2	0.33	
	YA	14	12	2	0.86	0.549
	MA	6	4	2	0.67	
Estimated Sex	**Male**	10	8	2	0.80	1.000
	Female	8	6	2	0.75	
Estimated Age and Sex	**YA Male**	7	5	2	0.71	0.470
	YA Female	5	5	0	1.00	
	MA Male	3	3	0	1.00	0.400
	MA Female	3	1	2	0.33	

Comparison of Markers of SV Between MUNA and Ancón

Descriptive Statistics for Estimated Stature (in cm) for the MUNA Burial Community.

	Estimated Sex		
	Female[1]	**Indeterminate**	**Male**
Mean	144.34	149.91	155.92
Standard Error	1.62	5.61	1.20
Median	143.48	154.31	156.50
Mode	N/A	N/A	N/A
Standard Deviation	5.13	9.72	4.14
Sample Variance	26.32	94.56	17.14
Kurtosis	-0.09	N/A	-0.70
Skewness	-0.12	-1.62	0.19
Range	17.66	17.89	13.01
Minimum	135	139	150
Maximum	153	157	163
Sum	1443.41	449.72	1871.02
Count	10	3	12

[1] Height for E82X (Female) could not be assessed due to mummified tissue obscuring the joint surface.

T-Test: Comparison of Mean Height (cm) by Sex – MUNA and Ancón

		n	Mean Height	Standard Deviation	t	p-value
Female	**MUNA**	10	144.34	5.13	2.878	**0.009**
	Ancon	12	150.36	4.57		
Male	**MUNA**	12	155.92	4.14	3.706	**0.001**
	Ancon	14	161.24	2.98		

Comparison of Prevalence of Non-Specific Stress Markers – MUNA and Ancón using Fisher's Exact Test

		n	Observed		Prevalence	p-value
			Present	Absent	Present	
Cribra Orbitalia						
Adult	**MUNA**	30	7	23	0.23	0.733
	Ancon	17	5	12	0.29	
Male	**MUNA**	17	6	11	0.35	1.000
	Ancon	7	2	5	0.29	
Female	**MUNA**	9	1	8	0.11	1.000
	Ancon	10	1	9	0.10	
Nonadult	**MUNA**	22	6	16	0.27	0.716
	Ancon	14	5	9	0.36	
Porotic Hyperostosis						
Adult	**MUNA**	30	8	22	0.27	0.206
	Ancon	17	8	9	0.47	
Male	**MUNA**	17	6	11	0.35	0.393
	Ancon	7	4	3	0.57	
Female	**MUNA**	9	1	8	0.11	1.000
	Ancon	10	1	9	0.10	
Nonadult	**MUNA**	22	6	16	0.27	1.000
	Ancon	14	3	11	0.21	
Periosteal New Bone						
Adult	**MUNA**	31	12	19	0.39	0.760
	Ancon	17	8	9	0.47	
Male	**MUNA**	16	8	8	0.50	0.405
	Ancon	7	5	2	0.71	
Female	**MUNA**	11	2	9	0.18	0.635
	Ancon	10	3	7	0.30	

Comparison of Prevalence of Non-Specific Stress Markers – MUNA and Ancón Cont.

Nonadult	**MUNA**	25	13	12	0.52	1.000
	Ancon	14	8	6	0.57	

Comparison of the Prevalence of Pathological Dental Conditions – MUNA and Ancón using Fisher's Exact Test[1]

		n	**Observed**		**Prevalence**	**p-value**
			Present	**Absent**	**Present**	
Caries						
Adults	**MUNA**	42	32	10	0.76	1.000
	Ancón	25	19	6	0.76	
Males	**MUNA**	27	21	6	0.78	0.262
	Ancón	12	7	5	0.58	
Females	**MUNA**	15	11	4	0.73	0.333
	Ancón	13	12	1	0.92	
Antemortem Tooth Loss						
Adults	**MUNA**	42	33	9	0.79	0.566
	Ancón	25	18	7	0.72	
Males	**MUNA**	27	21	6	0.78	1.000
	Ancón	12	9	3	0.75	
Females	**MUNA**	15	12	3	0.80	0.670
	Ancón	13	9	4	0.69	
Abscesses						
Adults	**MUNA**	42	18	24	0.43	**0.011**
	Ancón	25	19	6	0.76	
Males	**MUNA**	27	14	13	0.52	0.291
	Ancón	12	9	3	0.75	
Females	**MUNA**	15	4	11	0.27	**0.021**
	Ancón	13	10	3	0.77	

[1] Adults Only

Comparison of OA prevalence by Joint – MUNA and Ancón using Fisher's Exact Test

		n	**Observed**		**Prevalence**	**p-value**
			Present	**Absent**	**Present**	
C1/C2						
All Adults	**MUNA**	8	0	8	0.00	**0.036**
	Ancon	29	12	17	0.41	
Male	**MUNA**	4	0	4	0.00	0.234
	Ancon	12	6	6	0.50	

Comparison of OA prevalence by Joint – MUNA and Ancón

Female	**MUNA**	4	0	4	0.00	0.281
	Ancon	17	6	11	0.35	
C2/C3						
All Adults	**MUNA**	8	0	8	0.00	0.166
	Ancon	27	7	20	0.26	
Male	**MUNA**	4	0	4	0.00	0.221
	Ancon	10	5	5	0.50	
Female	**MUNA**	4	0	4	0.00	1.000
	Ancon	17	2	15	0.12	
C3/C4						
All Adults	**MUNA**	8	0	8	0.00	0.309
	Ancon	28	7	21	0.25	
Male	**MUNA**	4	0	4	0.00	0.231
	Ancon	11	5	6	0.45	
Female	**MUNA**	4	0	4	0.00	1.000
	Ancon	17	2	15	0.12	
C4/C5						
All Adults	**MUNA**	8	0	8	0.00	0.077
	Ancon	30	11	19	0.37	
Male	**MUNA**	4	0	4	0.00	0.082
	Ancon	13	8	5	0.62	
Female	**MUNA**	4	0	4	0.00	1.000
	Ancon	17	3	14	0.18	
C5/C6						
All Adults	**MUNA**	8	0	8	0.00	**0.013**
	Ancon	30	15	15	0.50	
Male	**MUNA**	4	0	4	0.00	**0.006**
	Ancon	13	11	2	0.85	
Female	**MUNA**	4	0	4	0.00	0.546
	Ancon	17	4	13	0.24	
C6/C7						
All Adults	**MUNA**	8	0	8	0.00	**0.017**
	Ancon	30	14	16	0.47	
Male	**MUNA**	4	0	4	0.00	**0.023**
	Ancon	14	10	4	0.71	
Female	**MUNA**	4	0	4	0.00	0.538
	Ancon	16	4	12	0.25	

Comparison of Prevalence of OA by Joint – MUNA and Ancón Cont.

C7/T1						
All Adults	**MUNA**	8	0	8	0.00	0.308
	Ancon	29	7	22	0.24	
Male	**MUNA**	4	0	4	0.00	0.519
	Ancon	13	4	9	0.31	
Female	**MUNA**	4	0	4	0.00	1.000
	Ancon	16	3	13	0.19	
T1/T2						
All Adults	**MUNA**	8	0	8	0.00	0.077
	Ancon	30	11	19	0.37	
Male	**MUNA**	4	0	4	0.00	0.119
	Ancon	14	7	7	0.50	
Female	**MUNA**	4	0	4	0.00	0.538
	Ancon	16	4	12	0.25	
T2/T3						
All Adults	**MUNA**	8	0	8	0.00	0.076
	Ancon	29	11	18	0.38	
Male	**MUNA**	4	0	4	0.00	0.245
	Ancon	14	6	8	0.43	
Female	**MUNA**	4	0	4	0.00	0.530
	Ancon	15	5	10	0.33	
T3/T4						
All Adults	**MUNA**	8	0	8	0.00	0.076
	Ancon	29	11	18	0.38	
Male	**MUNA**	4	0	4	0.00	0.119
	Ancon	14	7	7	0.50	
Female	**MUNA**	4	0	4	0.00	0.530
	Ancon	15	4	11	0.27	
T4/T5						
All Adults	**MUNA**	8	0	8	0.00	**0.017**
	Ancon	30	14	16	0.47	
Male	**MUNA**	4	0	4	0.00	**0.015**
	Ancon	13	10	3	0.77	
Female	**MUNA**	4	0	4	0.00	0.546
	Ancon	17	4	13	0.24	

Comparison of Prevalence of OA by Joint – MUNA and Ancón Cont.

T5/T6						
All Adults	**MUNA**	8	0	8	0.00	**0.034**
	Ancon	30	13	17	0.43	
Male	**MUNA**	4	0	4	0.00	0.082
	Ancon	13	8	5	0.62	
Female	**MUNA**	4	0	4	0.00	0.532
	Ancon	17	5	12	0.29	
T6/T7						
All Adults	**MUNA**	8	0	8	0.00	**0.015**
	Ancon	29	14	15	0.48	
Male	**MUNA**	4	0	4	0.00	0.077
	Ancon	12	8	4	0.67	
Female	**MUNA**	4	0	4	0.00	0.281
	Ancon	17	6	11	0.35	
T7/T8						
All Adults	**MUNA**	8	0	8	0.00	**0.005**
	Ancon	30	17	13	0.57	
Male	**MUNA**	4	0	4	0.00	**0.006**
	Ancon	13	11	2	0.85	
Female	**MUNA**	4	0	4	0.00	0.281
	Ancon	17	6	11	0.35	
T8/T9						
All Adults	**MUNA**	8	0	8	0.00	**0.017**
	Ancon	30	14	16	0.47	
Male	**MUNA**	4	0	4	0.00	**0.029**
	Ancon	13	9	4	0.69	
Female	**MUNA**	4	0	4	0.00	0.532
	Ancon	17	5	12	0.29	
T9/T10						
All Adults	**MUNA**	8	0	8	0.00	**0.006**
	Ancon	31	17	14	0.55	
Male	**MUNA**	4	0	4	0.00	**0.011**
	Ancon	14	11	3	0.79	
Female	**MUNA**	4	0	4	0.00	0.281
	Ancon	17	6	11	0.35	

Comparison of Prevalence of OA by Joint – MUNA and Ancón Cont.

T10/T11						
All Adults	**MUNA**	8	0	8	0.00	**0.001**
	Ancon	31	20	11	0.65	
Male	**MUNA**	4	0	4	0.00	**0.005**
	Ancon	14	12	2	0.86	
Female	**MUNA**	4	0	4	0.00	0.131
	Ancon	17	8	9	0.47	
T11/T12						
All Adults	**MUNA**	8	0	8	0.00	**0.003**
	Ancon	31	19	12	0.61	
Male	**MUNA**	4	0	4	0.00	**0.011**
	Ancon	14	11	3	0.79	
Female	**MUNA**	4	0	4	0.00	0.131
	Ancon	17	8	9	0.47	
T12/L1						
All Adults	**MUNA**	8	1	7	0.13	0.106
	Ancon	31	16	15	0.52	
Male	**MUNA**	4	1	3	0.25	0.275
	Ancon	14	9	5	0.64	
Female	**MUNA**	4	0	4	0.00	0.255
	Ancon	17	7	10	0.41	
L1/L2						
All Adults	**MUNA**	8	1	7	0.13	**0.020**
	Ancon	31	19	12	0.61	
Male	**MUNA**	4	1	3	0.25	0.083
	Ancon	14	11	3	0.79	
Female	**MUNA**	4	0	4	0.00	0.131
	Ancon	17	8	9	0.47	
L2/L3						
All Adults	**MUNA**	8	1	7	0.13	**0.013**
	Ancon	30	20	10	0.67	
Male	**MUNA**	4	1	3	0.25	0.245
	Ancon	14	10	4	0.71	
Female	**MUNA**	4	0	4	0.00	0.087
	Ancon	16	10	6	0.63	

Comparison of Prevalence of OA by Joint – MUNA and Ancón Cont.

L3/L4						
All Adults	**MUNA**	8	2	6	0.25	**0.016**
	Ancon	31	23	8	0.74	
Male	**MUNA**	4	1	3	0.25	**0.044**
	Ancon	14	12	2	0.86	
Female	**MUNA**	4	1	3	0.25	0.272
	Ancon	17	11	6	0.65	
L4/L5						
All Adults	**MUNA**	8	0	8	0.00	**0.0002**
	Ancon	31	23	8	0.74	
Male	**MUNA**	4	0	4	0.00	**0.011**
	Ancon	14	11	3	0.79	
Female	**MUNA**	4	0	4	0.00	**0.011**
	Ancon	17	12	5	0.71	
L5/S1						
All Adults	**MUNA**	8	0	8	0.00	**0.005**
	Ancon	30	17	13	0.57	
Male	**MUNA**	4	0	4	0.00	0.082
	Ancon	13	8	5	0.62	
Female	**MUNA**	4	0	4	0.00	0.104
	Ancon	17	9	8	0.53	
Shoulder						
All Adults	**MUNA**	8	3	5	0.38	0.223
	Ancon	30	20	10	0.67	
Male	**MUNA**	4	1	3	0.25	0.099
	Ancon	13	10	3	0.77	
Female	**MUNA**	4	2	2	0.50	1.000
	Ancon	17	10	7	0.59	
Elbow						
All Adults	**MUNA**	8	1	7	0.13	**0.004**
	Ancon	31	22	9	0.71	
Male	**MUNA**	4	0	4	0.00	**0.011**
	Ancon	14	11	3	0.79	
Female	**MUNA**	4	1	3	0.25	0.272
	Ancon	17	11	6	0.65	

Comparison of Prevalence of OA by Joint – MUNA and Ancón Cont.

Wrist						
All Adults	**MUNA**	8	0	8	0.00	**0.012**
	Ancon	30	16	14	0.53	
Male	**MUNA**	4	0	4	0.00	0.082
	Ancon	13	8	5	0.62	
Female	**MUNA**	4	0	4	0.00	0.131
	Ancon	17	8	9	0.47	
Hip						
All Adults	**MUNA**	8	0	8	0.00	**0.0001**
	Ancon	31	24	7	0.77	
Male	**MUNA**	4	0	4	0.00	**0.005**
	Ancon	14	12	2	0.86	
Female	**MUNA**	4	0	4	0.00	**0.021**
	Ancon	17	12	5	0.71	
Knee						
All Adults	**MUNA**	8	2	6	0.25	0.423
	Ancon	29	14	15	0.48	
Male	**MUNA**	4	1	3	0.25	0.576
	Ancon	13	7	6	0.54	
Female	**MUNA**	4	1	3	0.25	0.619
	Ancon	16	7	9	0.44	
Ankle						
All Adults	**MUNA**	8	0	8	0.00	**0.0003**
	Ancon	29	21	8	0.72	
Male	**MUNA**	4	0	4	0.00	**0.006**
	Ancon	13	11	2	0.85	
Female	**MUNA**	4	0	4	0.00	0.087
	Ancon	16	10	6	0.63	

Comparison of Trauma Prevalence – MUNA and Ancón using Fisher's Exact Test

		n	**Observed**		**Prevalence**	**p-value**
			Present	**Absent**	**Present**	
Cranium						
Adults	**MUNA**	34	7	27	0.21	0.080
	Ancón	17	0	17	0.00	
Males	**MUNA**	18	4	14	0.22	0.294
	Ancón	7	0	7	0.00	

Comparison of Trauma Prevalence – MUNA and Ancón Cont.

Cranium						
Females	**MUNA**	5	1	4	0.20	0.333
	Ancón	10	0	10	0.00	
Nonadults	**MUNA**	25	3	22	0.12	0.314
	Ancón	31	1	30	0.03	
Ribs						
Adults	**MUNA**	34	1	33	0.03	**0.012**
	Ancón	17	5	12	0.29	
Males	**MUNA**	18	0	18	0.00	**0.015**
	Ancón	7	3	4	0.43	
Females	**MUNA**	5	0	5	0.00	0.524
	Ancón	10	2	8	0.20	
Nonadults	**MUNA**	25	0	25	0.00	1.000
	Ancón	31	1	30	0.03	
Vertebrae						
Adults	**MUNA**	34	0	34	0.00	**0.003**
	Ancón	17	5	12	0.29	
Males	**MUNA**	18	0	18	0.00	0.280
	Ancón	7	1	6	0.14	
Females	**MUNA**	5	0	5	0.00	0.524
	Ancón	10	2	8	0.20	
Nonadults	**MUNA**	25	0	25	0.00	Could not be Calculated
	Ancón	31	0	31	0.00	
Colles' Fracture						
Adults	**MUNA**	34	2	32	0.06	0.593
	Ancón	17	2	15	0.12	
Males	**MUNA**	18	0	18	0.00	Could not be Calculated
	Ancón	7	0	7	0.00	
Females	**MUNA**	5	1	4	0.20	1.000
	Ancón	10	2	8	0.20	
Nonadults	**MUNA**	25	0	25	0.00	Could not be Calculated
	Ancón	31	0	31	0.00	

Comparison of Trauma Prevalence – MUNA and Ancón Cont.

Parry Fracture						
Adults	**MUNA**	34	1	33	0.03	1.000
	Ancón	17	0	17	0.00	
Males	**MUNA**	18	0	18	0.00	Could not be Calculated
	Ancón	7	0	7	0.00	
Females	**MUNA**	5	1	4	0.20	0.333
	Ancón	10	0	10	0.00	
Nonadults	N/A - Not Assessed at Ancón					
Hand						
Adults	**MUNA**	34	0	34	0.00	0.333
	Ancón	17	1	16	0.06	
Males	**MUNA**	18	0	18	0.00	Could not be Calculated
	Ancón	7	0	7	0.00	
Females	**MUNA**	5	0	5	0.00	1.000
	Ancón	10	1	9	0.10	
Nonadults	**MUNA**	25	0	25	0.00	Could not be Calculated
	Ancón	31	0	31	0.00	
Other						
Adults	**MUNA**	34	4	30	0.12	1.000
	Ancón	17	2	15	0.12	
Males	**MUNA**	18	2	16	0.11	1.000
	Ancón	7	1	6	0.14	
Females	**MUNA**	5	0	5	0.00	Could not be Calculated
	Ancón	10	0	10	0.00	
Nonadults	**MUNA**	25	1	24	0.04	1.000
	Ancón	31	1	30	0.03	

Structural Violence in the MUNA Burial Community

Comparison of Prevalence of Nonspecific Stress Markers Amongst Disturbed *Fardos* using Fisher's Exact Test

	n	Observed		Prevalence	p-value
		Present	Absent	Present	
Cribra Orbitalia					
Nonadult	10	6	4	0.60	0.670
Adult	11	5	6	0.45	
Male	8	5	3	0.63	0.444
Female	1	0	1	0.00	
Porotic Hyperostosis					
Nonadult	10	6	4	0.60	1.000
Adult	11	7	4	0.64	
Male	8	6	2	0.75	0.333
Female	1	0	1	0.00	
Periosteal New Bone					
Nonadult	13	11	2	0.85	0.378
Adult	12	8	4	0.67	
Male	7	6	1	0.86	0.183
Female	3	1	2	0.33	

Comparison of Prevalence of the State of NSSMs Amongst Disturbed *Fardos* using Fisher's Exact

		n	Observed		Prevalence	p-value
			Active	Not Active	Active	
Cribra Orbitalia	**Nonadult**	10	4	6	0.40	**0.035**
	Adult	11	0	11	0.00	
Porotic Hyperostosis	**Nonadult**	10	2	8	0.20	0.214
	Adult	11	0	11	0.00	
			Healing	**Not Healing**	**Healing**	
Cribra Orbitalia	**Nonadult**	10	1	9	0.10	0.586
	Adult	11	3	8	0.27	
Porotic Hyperostosis	**Nonadult**	10	4	6	0.40	**0.035**
	Adult	11	0	11	0.00	
			Healed	**Not Healed**	**Healed**	
Cribra Orbitalia	**Nonadult**	10	1	9	0.10	1.000
	Adult	11	2	9	0.18	

Comparison of the State of NSSMs Amongst Disturbed *Fardos* Cont.

Porotic Hyperostosis	**Nonadult**	10	0	10	0.00	**0.004**
	Adult	11	7	4	0.64	
			Systemic	**Not Systemic**	**Systemic**	
Periosteal New Bone	**Nonadult**	13	8	5	0.62	**0.002**
	Adult	12	0	12	0.00	
			Localised	**Not Localised**	**Localised**	
	Nonadult	13	1	12	0.08	**0.011**
	Adult	12	7	5	0.58	

Comparison of Prevalence and Number of Harris Lines Amongst Intact *Fardos* using Fisher's Exact Test

Prevalence of Harris Lines					
	n	**Observed**		**Prevalence**	**p-value**
		Present	**Absent**	**Present**	
Burial Community					
Male	9	4	5	0.44	1.000
Female	8	4	4	0.50	
No Sumptuary Goods	10	4	6	0.40	0.458
Sumptuary Goods	21	12	9	0.57	
Male					
No Sumptuary Goods	2	1	1	0.50	1.000
Sumptuary Goods	7	3	4	0.43	
Female					
No Sumptuary Goods	2	1	1	0.50	1.000
Sumptuary Goods	6	3	3	0.50	
No Sumptuary Goods					
Male	2	1	1	0.50	1.000
Female	2	1	1	0.50	
Sumptuary Goods					
Male	7	3	4	0.43	1.000
Female	6	3	3	0.50	
Number of Harris Lines					
	n	**Number of Lines**		**Prevalence**	**p-value**
		1 or 2	**3 or 4**	**1 or 2**	
Burial Community					
Male	4	3	1	0.75	1.000
Female	4	4	0	1.00	
No Sumptuary Goods	4	3	1	0.75	1.000
Sumptuary Goods	12	10	2	0.83	

Comparison of Prevalence and Number of Harris Lines Amongst Intact *Fardos* Cont.

Male					
No Sumptuary Goods	1	0	1	0.00	0.250
Sumptuary Goods	3	3	0	1.00	
Female					Could not
No Sumptuary Goods	1	1	0	1.00	be
Sumptuary Goods	3	3	0	1.00	Calculated
No Sumptuary Goods					
Male	1	0	1	0.00	1.000
Female	1	1	0	1.00	
Sumptuary Goods					Could not
Male	3	3	0	1.00	be
Female	3	3	0	1.00	Calculated

Comparison of the Prevalence of Pathological Dental Conditions using Fisher's Exact Test

	n	**Observed**		**Prevalence**	**p-value**
		Present	**Absent**	**Present**	
		Caries			
Burial Community					
YA	23	19	4	0.83	0.665
MA	23	21	2	0.91	
Male	27	21	6	0.78	1.000
Female	15	11	4	0.73	
No Sumptuary Goods	5	5	0	1.00	Cannot be
Sumptuary Goods	10	10	0	1.00	Calculated
Age and Sex					
YA Male	12	11	1	0.92	1.000
YA Female	6	5	1	0.83	
MA Male	10	10	0	1.00	0.375
MA Female	7	5	1	0.71	
		AMTL			
Burial Community					
YA	23	14	9	0.61	0.337
MA	23	18	5	0.78	
Male	27	21	6	0.78	1.000
Female	15	12	3	0.80	
No Sumptuary Goods	5	5	0	1.00	0.524
Sumptuary Goods	10	8	2	0.80	

Comparison of the Prevalence of Pathological Dental Conditions Cont.

Age and Sex					
YA Male	12	8	4	0.67	1.000
YA Female	6	4	2	0.67	
MA Male	10	8	2	0.80	1.000
MA Female	7	6	1	0.86	
		Abscesses			
Burial Community					
YA	23	6	17	0.26	**0.017**
MA	23	15	8	0.65	
Male	27	14	13	0.52	0.193
Female	15	4	11	0.27	
No Sumptuary Goods	5	3	2	0.60	0.608
Sumptuary Goods	10	4	6	0.40	
Age and Sex					
YA Male	12	4	8	0.33	0.245
YA Female	6	0	6	0.00	
MA Male	10	7	2	0.70	1.000
MA Female	7	6	3	0.86	

Comparison of Severity (Caries and Abscesses) and State of Resorption (ATML) Using Fisher's Exact

	n	**Observed**		**Prevalence**	**p-value**
		Small	**Not Small**	**Small**	
		Caries			
Burial Community					
Male	79	25	54	0.32	0.838
Female	41	12	29	0.29	
No Sumptuary Goods	19	2	17	0.11	0.255
Sumptuary Goods	38	1	37	0.03	
Age and Sex					
YA Male	48	14	34	0.29	1.000
YA Female	24	7	17	0.29	
MA Male	31	11	20	0.35	0.757
MA Female	17	5	12	0.29	
		Abscesses			
Burial Community					
Male	38	8	30	0.21	0.031
Female	8	5	3	0.63	
No Sumptuary Goods	3	2	1	0.67	0.152
Sumptuary Goods	8	1	7	0.13	

Comparison of Severity (Caries and Abscesses) and State of Resorption (ATML) Cont.

Age and Sex					
YA Male	9	1	8	0.11	Cannot be Calculated
YA Female	0	0	0	0.00	
MA Male	24	5	19	0.21	0.072
MA Female	8	5	3	0.63	
		Moderate	**Not Moderate**	**Moderate**	
		Caries			
Burial Community					
Male	79	33	46	0.42	0.340
Female	41	21	20	0.51	
No Sumptuary Goods	19	14	5	0.74	0.763
Sumptuary Goods	38	25	13	0.66	
Age and Sex					
YA Male	48	24	24	0.50	0.618
YA Female	24	14	10	0.58	
MA Male	31	9	22	0.29	0.524
MA Female	17	7	10	0.41	
		Abscesses			
Burial Community					
Male	38	20	18	0.53	0.247
Female	8	2	6	0.25	
No Sumptuary Goods	3	0	3	0.00	1.000
Sumptuary Goods	8	2	6	0.25	
Age and Sex					
YA Male	9	3	6	0.33	Cannot be Calculated
YA Female	0	0	0	0.00	
MA Male	24	14	10	0.58	0.220
MA Female	8	2	6	0.25	
		Severe	**Not Severe**	**Severe**	
		Caries			
Burial Community					
Male	79	21	58	0.27	0.502
Female	41	8	33	0.20	
No Sumptuary Goods	19	3	16	0.16	0.339
Sumptuary Goods	38	12	26	0.32	

Comparison of Severity (Caries and Abscesses) and State of Resorption (ATML) Cont.

Age and Sex					
YA Male	48	10	38	0.21	0.522
YA Female	24	3	21	0.13	
MA Male	31	11	20	0.35	0.757
MA Female	17	5	12	0.29	
		Abscesses			
Burial Community					
Male	38	10	28	0.26	0.658
Female	8	1	7	0.13	
No Sumptuary Goods	3	1	2	0.33	0.545
Sumptuary Goods	8	5	3	0.63	
Age and Sex					
YA Male	9	5	4	0.56	Cannot be
YA Female	0	0	0	0.00	Calculated
MA Male	24	5	19	0.21	1.000
MA Female	8	1	7	0.13	
		Active	**Complete**	**Active**	
		Antemortem Tooth Loss			
Burial Community					
Male	66	21	45	0.32	0.536
Female	14	3	11	0.21	
No Sumptuary Goods	22	6	16	0.27	1.000
Sumptuary Goods	27	7	20	0.26	
Age and Sex					
YA Male	33	10	23	0.30	0.698
YA Female	10	2	8	0.20	
MA Male	33	11	22	0.33	1.000
MA Female	4	1	3	0.25	

Comparison of Number of Teeth or Alveoli Impacted by Pathological Dental Conditions using Fisher's Exact Test

	n	Observed		Prevalence	p-value
		Present	Absent	Present	
Caries[1]					
Female	177	38	139	0.21	0.736
Male	315	73	242	0.23	
Antemortem Tooth Loss[2]					
Female	480	57	423	0.12	**0.003**
Male	896	161	735	0.18	
Abscesses[2]					
Female	480	9	471	0.02	**0.026**
Male	864	36	828	0.04	

[1] n = the number of observable teeth
[2] n = the number of observable alveoli

Comparison of Prevalence of OA by Joint Type Using Fisher's Exact Test

	n	Observed		Prevalence	p-value
		Present	Absent	Present	
All Types					
Male	15	9	6	0.60	0.051
Female	11	2	9	0.18	
YA	19	6	13	0.32	0.415
MA	8	4	4	0.50	
No Sumptuary Goods	4	2	2	0.50	0.272
Sumptuary Goods	15	3	12	0.20	
YA Male	10	6	4	0.60	**0.035**
YA Female	7	0	7	0.00	
MA Male	4	2	2	0.50	1.000
MA Female	4	2	2	0.50	
Vertebrae					
Male	9	3	6	0.33	1.000
Female	2	1	1	0.50	
YA	6	2	4	0.33	1.000
MA	4	2	2	0.50	
No Sumptuary Goods	2	1	1	0.50	1.000
Sumptuary Goods	3	1	2	0.33	
YA Male	6	2	4	0.33	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	1	1	0.50	1.000
MA Female	2	1	1	0.50	

Comparison of Prevalence of OA by Joint Type Cont.					
Shoulder					
Male	9	6	3	0.67	1.000
Female	2	1	1	0.50	
YA	6	5	1	0.83	0.500
MA	4	2	2	0.50	
No Sumptuary Goods	2	1	1	0.50	1.000
Sumptuary Goods	3	2	1	0.67	
YA Male	6	5	1	0.83	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	1	1	0.50	1.000
MA Female	2	1	1	0.50	
Elbow					
Male	9	0	9	0.00	Cannot be
Female	2	0	2	0.00	Calculated
YA	6	0	6	0.00	Cannot be
MA	4	0	4	0.00	Calculated
No Sumptuary Goods	2	0	2	0.00	Cannot be
Sumptuary Goods	3	0	3	0.00	Calculated
YA Male	6	0	6	0.00	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	0	2	0.00	Cannot be
MA Female	2	0	2	0.00	Calculated
Wrist					
Male	9	0	9	0.00	Cannot be
Female	2	0	2	0.00	Calculated
YA	6	1	5	0.17	1.000
MA	4	0	4	0.00	
No Sumptuary Goods	2	0	2	0.00	Cannot be
Sumptuary Goods	3	0	3	0.00	Calculated
YA Male	6	0	6	0.00	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	0	2	0.00	Cannot be
MA Female	2	0	2	0.00	Calculated
Hip					
Male	9	0	9	0.00	Cannot be
Female	2	0	2	0.00	Calculated
YA	6	0	6	0.00	Cannot be
MA	4	0	4	0.00	Calculated
No Sumptuary Goods	2	0	2	0.00	Cannot be
Sumptuary Goods	3	0	3	0.00	Calculated
YA Male	6	0	6	0.00	Cannot be
YA Female	0	0	0	N/A	Calculated

Comparison of Prevalence of OA by Joint Type Cont.

MA Male	2	0	2	0.00	Cannot be
MA Female	2	0	2	0.00	Calculated
Knee					
Male	9	2	7	0.22	0.491
Female	2	1	1	0.50	
YA	6	1	5	0.17	0.500
MA	4	2	2	0.50	
No Sumptuary Goods	2	0	2	0.00	Cannot be
Sumptuary Goods	3	0	3	0.00	Calculated
YA Male	6	1	5	0.17	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	1	1	0.50	1.000
MA Female	2	1	1	0.50	
Ankle					
Male	9	1	8	0.11	1.000
Female	2	0	2	0.00	
YA	6	0	6	0.00	Cannot be
MA	4	0	4	0.00	Calculated
No Sumptuary Goods	2	0	2	0.00	Cannot be
Sumptuary Goods	3	0	3	0.00	Calculated
YA Male	6	0	6	0.00	Cannot be
YA Female	0	0	0	N/A	Calculated
MA Male	2	0	2	0.00	Cannot be
MA Female	2	0	2	0.00	Calculated

Comparison of the Prevalence and Lethality of Physical Trauma, the Type of Violence (Intentional/Unintentional and Structural/Physical), and the presence of NSSMs

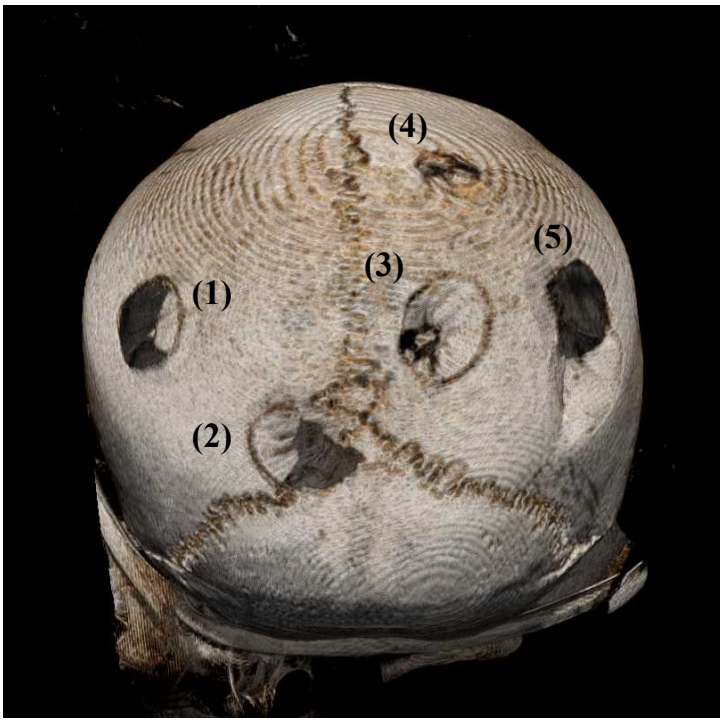
	n	**Observed**		**Prevalence**	**p-value**
		Present	**Absent**	**Present**	
Nonadult	25	3	22	0.12	0.020
Adult	32	13	19	0.41	
Male	17	5	12	0.29	1.000
Female	11	4	7	0.36	
YA Male	10	4	6	0.40	1.000
YA Female	7	2	5	0.29	
MA Male	5	1	4	0.20	0.524
MA Female	4	2	2	0.50	
No Sumptuary Goods	11	5	6	0.45	0.442
Sumptuary Goods	21	6	15	0.29	

Comparison of the Trauma Cont.

		Lethality			
		Nonfatal (1-3)	Fatal (4-5)	Nonfatal (1-3)	
Nonadults	3	0	3	0.00	0.007
Adults	13	12	1	0.92	
Male	5	4	1	0.80	1.000
Female	4	4	0	1.00	
No Sumptuary Goods	5	3	2	0.60	0.545
Sumptuary Goods	6	5	1	0.83	
		Intentionality			
		Intentional	**Unintentional**	**Intentional**	
Nonadults	3	3	0	1.00	0.213
Adults	13	6	7	0.46	
Male	5	3	2	0.60	1.000
Female	4	2	2	0.50	
No Sumptuary Goods	5	2	3	0.40	1.000
Sumptuary Goods	6	3	3	0.50	
		Structural or Physical Violence			
		Structural Violence	**Physical Violence**	**Structural Violence**	
Nonadults	3	2	1	0.67	0.083
Adults	6	0	6	0.00	
Male	3	0	3	0.00	1.000
Female	2	0	2	0.00	
No Sumptuary Goods	2	1	1	0.50	1.000
Sumptuary Goods	3	1	2	0.33	
		Presence of NSSMs			
		Violence	**No Violence**	**Violence**	
Disturbed Fardos					
Presence of NSSMS	22	4	18	0.18	1.000
Absence of NSSMS	4	1	3	0.25	
Intact Fardos					
Presence of Harris Lines	20	8	12	0.40	0.456
Absence of Harris Lines	13	3	10	0.23	

Appendix D: Individuals in MUNA Burial Community with Cranial Trauma (Photos taken and 3D reconstructions gathered by author)

E21A – *Juvenile* (8-11 years old)



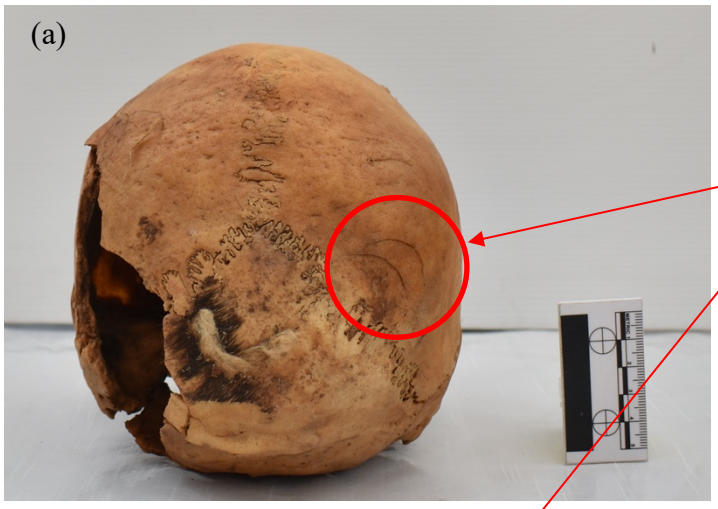
At least five instances of trauma.

Lesion diameters:

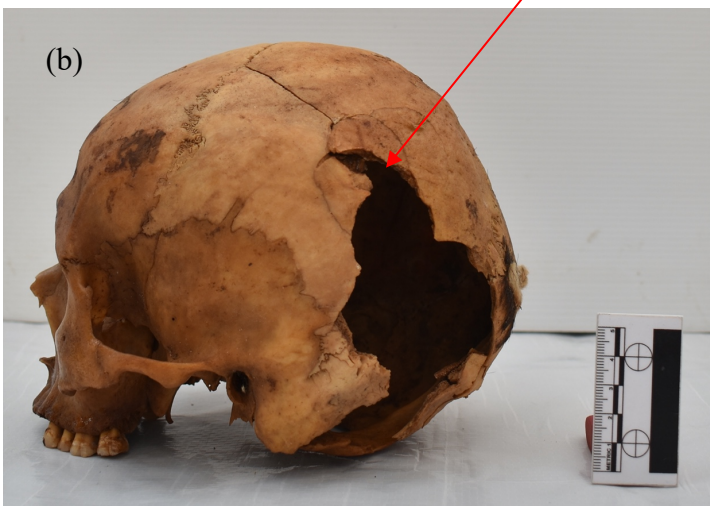
1) 17.17mm
2) 21.38mm
3) 18.88mm
4) 14.82mm
5) 17.06mm

(a) 3D Model: Anterior cranium with massive blunt force trauma to the left frontal
(b) 3D Model: Posterior cranium with five instances of blunt force trauma

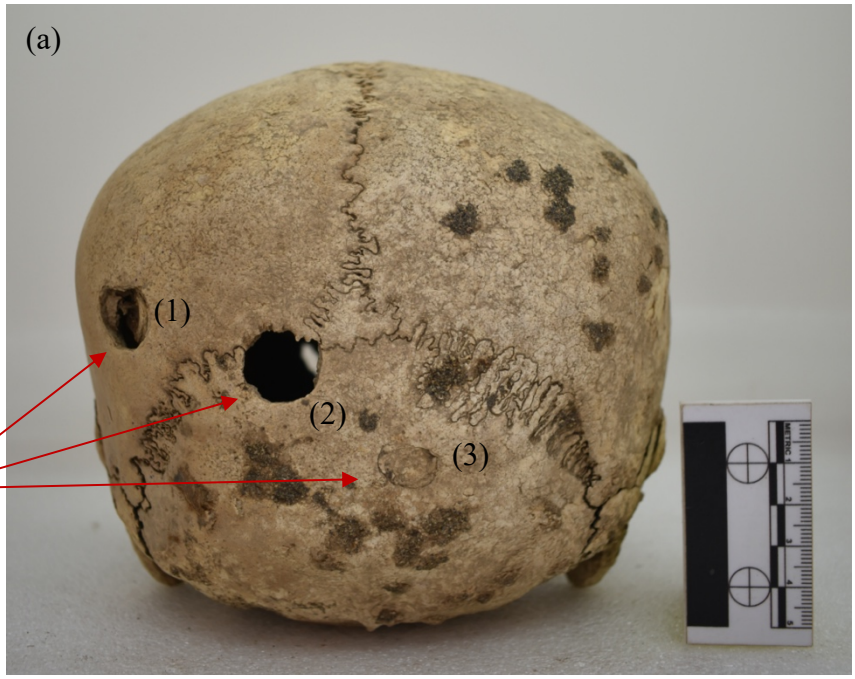
E37 – YA Male



Possible instances of BFT



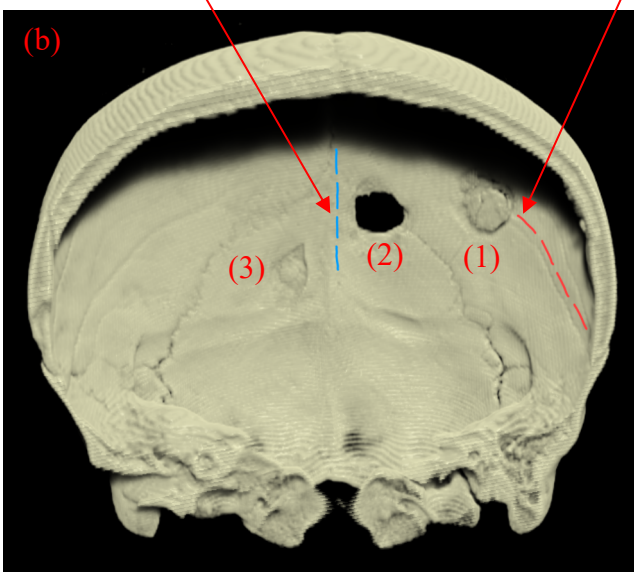
E67 – YA Indeterminate

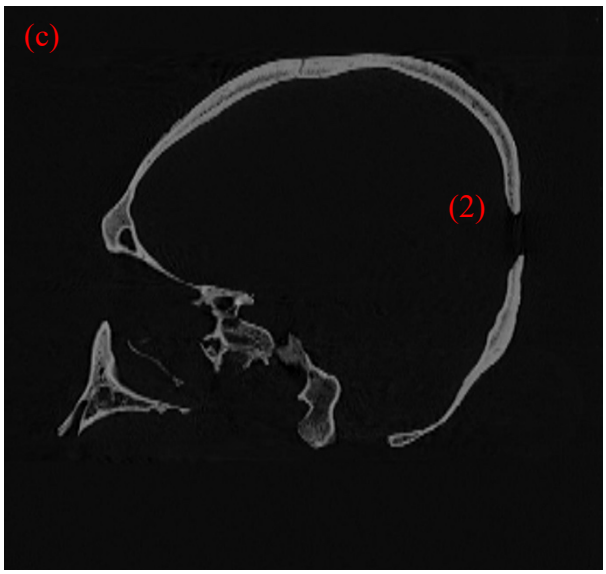


No radiating fracture lines.

Superior Sagittal Sinus

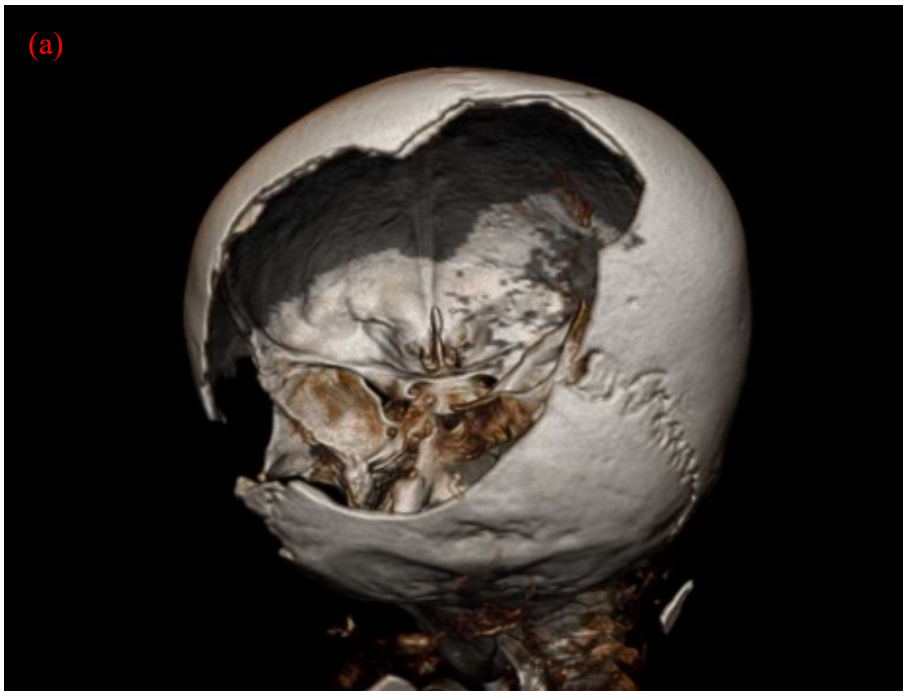
Meningeal artery





(a) posterior cranium with trepanations (2 complete, 1 partial)
(b) Endocranial view of trepanations
(c) 2D slice: Mediolateral view of trepanation 2

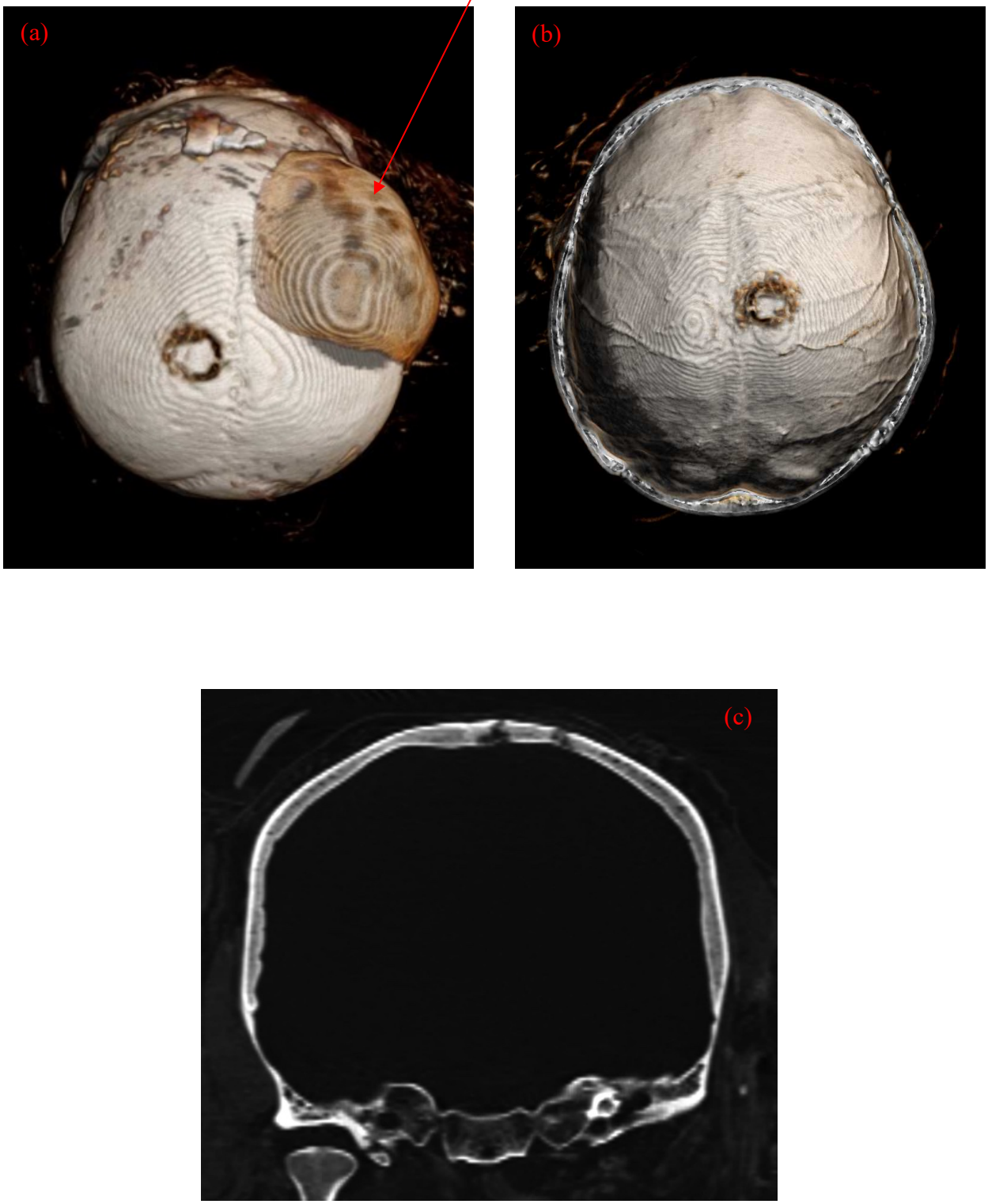
E70 – *Juvenile* (8-12 years old)



(a) 3D Model: Posterior of cranium with massive trauma
(b) 3D Model: Radiating fracture line terminating on right parietal

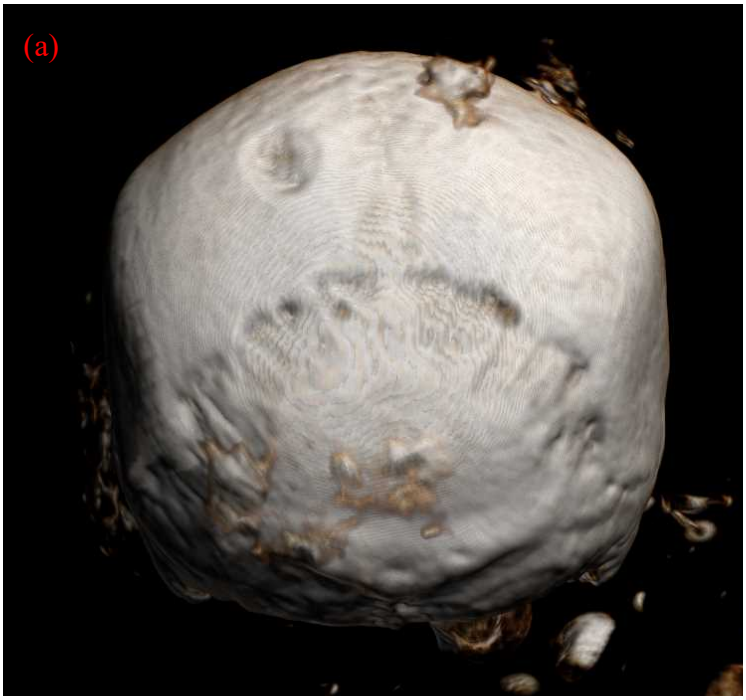
E77C – YA Male

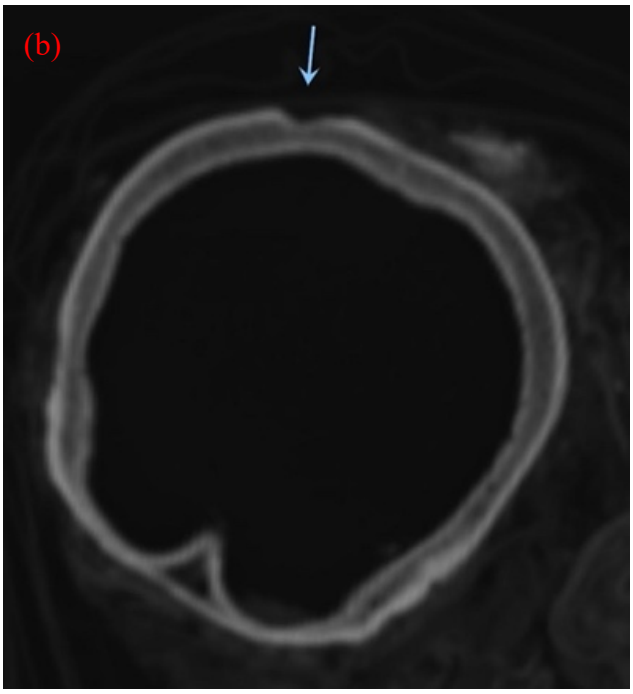
Parietal bone of Infant

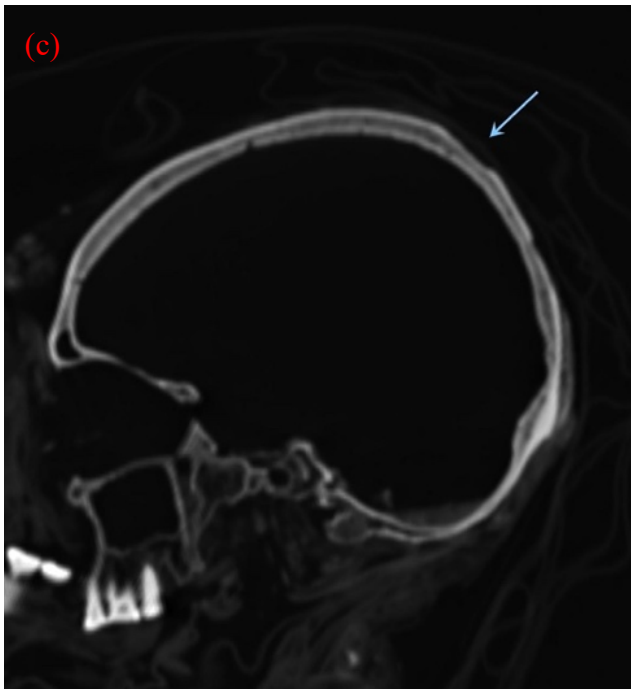


(a) 3D Model: Superior view of trepanation on superior left parietal
(b) 3D Model: View from endocranium of trepanation
(c) 2D Slice: Anterior-Posterior view of trepanation on superior left parietal

E81 – MA Female



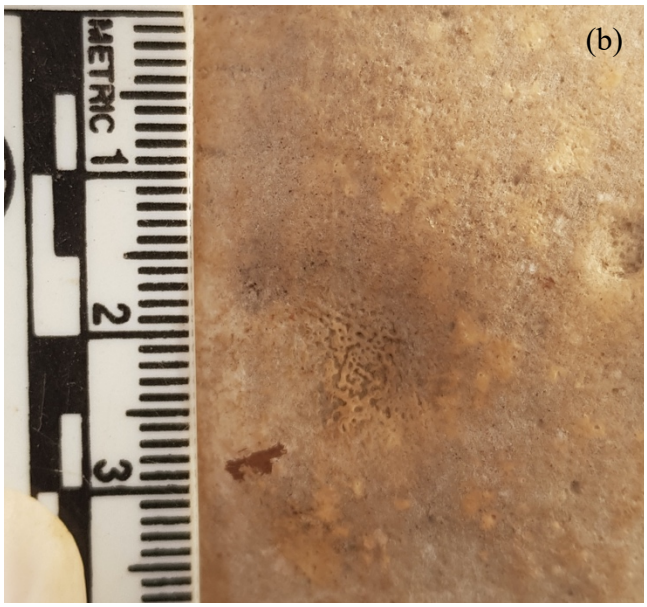


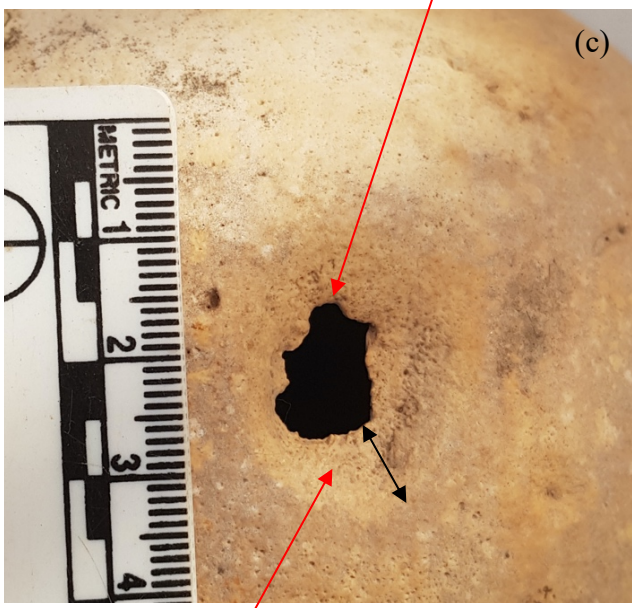


(a) 3D Model: Posterior cranium with depression fracture on posterior right parietal
(b) 2D Slice: Superior-inferior view of depression fracture (pointed to with blue arrow)
(c) 2D Slice: Mediolateral view of depression fracture (pointed to with blue arrow)

E83 – MA Indeterminate

Extensive remodelling of edges of trepanation (5+ years since procedure)





Margin of legion sloped so that margin of lesion larger than opening to endocranium consistent with scraping method of trepanning.

(a) Posterior view of cranium showing healed depression fracture (1), and trepanation (2)
(b) Close up of healed depression fracture on posterior left parietal with periosteal activity in trauma
(c) Close up of healed trepanation on posterior right parietal, note remodelled edges of lesions

E84 – *Adolescent* (10-18 years old)

(a) Massive blunt force trauma to frontal
(b) Wooden club from E21B (Photo Taken by A.J. Nelson), head of club is the same size as the BFT on E84

Curriculum Vitae

Name: Ashley Caitlyn Ward

Post-secondary Education and Degrees:
University of Auckland
Auckland, New Zealand
2016-2020 B.A. (Hons)

Honours and Awards:
Western Graduate Research Scholarship
2021-2023

Graduate Research Award Fund
2022

Canada Graduate Scholarship – Masters (CGS-M)
2022-2023

Related Work Experience
Teaching Assistant
The University of Western Ontario
2021-2023

Research Assistant
University of Auckland
2019

Publications:

Nelson, A. J., Motley, J., Watson, L., Williams, J. S., Kirgis, P., Huchet, J.-B., Gauld, S., Poeta, L., Ward, A. C., Nakahodo Moromizato, T. N., Woodley, K., Andersen, H., Rountree, S., Succee, R., Baldeos, J. A., Fuentes, S., & Pozzi-Escot, D. (in press). Headless Burials from Pachacamac, Perú: A taphonomic approach to reconstructing mortuary ritual. *Bioarchaeology International*.

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