BIOARCHAEOLOGICAL AND MORTUARY PATTERNS AT HOLTUN, GUATEMALA: INTEGRATING A COMPARATIVE OSTEOBIOGRAPHIC APPROACH

By

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ABSTRACT

Bioarchaeological analysis can help identify patterns of mortuary ritual and social experience of ancient Maya peoples. However, there is limited bioarchaeological and mortuary evidence for the relationship between the development of social complexity and social experience. Particularly, how is social organization reflected in patterns of burial practice and skeletal markers of stress. This thesis uses osteobiographies to contextualize the mortuary and biological profiles of 20 individuals interred at the Maya site of Holtun, Guatemala to examine bioarchaeological variation during the Preclassic (800 B.C. – 250 A.D.) and Late Classic (550 A.D. – 900 A.D.) periods. This work highlights the integration of comparative osteobiographic analyses from small samples into the exploration of individual identities and social experiences. By incorporating architectural contexts, mortuary evidence, and osteology, the individual becomes the focus of study. When each individual is examined for mortuary features, sex, age, and evidence of stress, these lives in focus become salient portraits of ancient humans as complex social beings with intertwined identities at Holtun, essentially deploying a bioarchaeology of personhood.

Results of this thesis identified common trends of the mortuary program and biological health status of individuals throughout the chronology of Holtun. Individuals were most commonly interred in simple graves or cists in an extended supine position with head oriented to the north. Additionally, very few indicators of childhood stress or systemic pathology were identified, though females at Holtun seemed to disproportionately suffer from carious lesions compared to males. In addition to these trends, evidence for intentional body modification, individual mortuary assemblages, and daily activity stress markers all indicate variation in the social identities of these individuals. Overall, this study affirms the strength that a small sample

can have in contributing to the exploration of social organization and identity reflected through a contextualized osteobiographic approach. These results enhance our understanding of increasing mortuary and biological variation during the Preclassic and Late Classic period southern Maya lowlands, and offer new insight into the complex development of social organization and individual social experience at Holtun, Guatemala.

Dedicado a mis padres.

Uno de los mejores regalos que ustedes me han dado a lo largo de mi vida es la inversión de una educación completa y comprensiva. Esta tesis es una vindicación del sudor, las lágrimas y el trabajo agotador que han soportado durante años para construir un futuro brillante en nuestra pequeña esquina de América… y esto es solo el comienzo. ¡Les prometo que lo mejor todavía esta por verse!

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A?	Adult of unknown age
B	Bone
CL	Carious Lesions
C	Ceramics
CB	Ceremonial Building
Ch	Chultun
Ci	Cist Grave
CM	Cranial Modification
CO	Cribra Orbitalia
Cr	Crypt Grave
DM	Dental Modification
DISH	Diffuse Idiopathic Skeletal Hyperostosis
ELC	Early–Late Classic
GT	Grave–type
HAP	Holtun Archaeological Project
IND	Individual
I	Infant
J	Juvenile
LPC	Late Preclassic
LTC	Late–Terminal Classic
LEH	Linear Enamel Hypoplasia
L	Lithics
MA	Middle Adult
MPC	Middle Preclassic
OA	Old Adult
OA	Osteoarthritis
PT	Platform
PZ	Plaza
RS	Residential Group
RS	Residential Group
S	Shell
Si	Simple Grave
TP	Time Period
TR	Trauma
UG	Unique Burial Goods
UP	Unique Pathology
VA	Vertebral Arthritis
YA	Young Adult

CHAPTER ONE: INTRODUCTION

For the ancient Maya, like many other groups throughout time, death and burial formed a part of the complex interconnected relationship between the living and the deceased. Mortuary practices have been at the forefront of archaeological research for their ability to illuminate culturally specific societal transformation and disruption (Gillespie 2001, 2002; McAnany et al. 1999; Pearson 1999; Scherer 2020; Weiss-Krejci 2011b). Bioarchaeology is the contextual analysis of skeletal remains within their archaeological and mortuary context with the intention of examining past human life histories and social organization (Buikstra 1977; Buikstra and Beck 2006; Buikstra et al. 2004; Tiesler 2020). The systematic individual study of both the deceased and their contextualized burial environment may provide an understanding of the living's role in matters of death, the deceased's lifetime, and their embodied social experience (Agarwal and Glencross 2011; Boutin 2012; Robb et al. 2019). This thesis explores the skeletal remains and burial contexts of individuals interred at Holtun, Guatemala, through osteobiographic narratives to identify patterns of variability and social experience within the sample. This project is part of a broader investigation that explores how Preclassic period (800 B.C. – 250 A.D) households contributed to the development of initial social inequity and eventual societal complexity at Holtun, Guatemala.

Maya bioarchaeologists analyze remains through the multivariate analyses of skeletal remains, mortuary context, monumental architecture, material culture, and bone chemistry in an attempt to reconstruct population histories (Buikstra et al. 2004; Cerezo-Román and Tsukamoto 2021; Price et al. 2010; Scherer 2017). The primary anthropological question that this study attempts to answer is how is Maya social organization reflected in burial treatment and evidence

of skeletal markers of stress? Therefore, the goal of this thesis is to identify patterns of osteological and mortuary variation for burials of ancient Maya individuals who lived between 1000 B.C. and A.D. 1000 at the site of Holtun, Guatemala. These patterns are compared to each other, and other studies in the Maya area as an exploration into the broader biological and mortuary variation throughout the site and across the region. This secondary comparative analysis draws on the descriptive power of osteobiographic methods to examine the variation of social experiences that defined an embodied person over their lifetime within the landscape of Holtun (Agarwal 2016; Boutin 2008; Fowler 2004; Joyce 2007; Robb 2019). Additioanlly, a comparison by time period will also be included in an effort to examine the variation in data through the lens of the occupational periods at Holtun.

Individual life histories are produced through the bioarchaeological approach of osteobiography defined as the incorporation of an individual's daily life and activity into a cultural context via the use of osteological analyses (Hosek and Robb 2019; Robb 2002; Saul 1976). This method contextualizes the social and biological profiles of individual remains to illuminate the creation and maintenance of biological and social variation in the past and the diversity of daily life (Couoh 2015; Duncan 2011; Mayes and Barber 2008). Exploring individual identities from Holtun helps us understand the diverse life experiences of ancient people, and how the choices during both life and death affected them and their communities over time. The comparative osteobiographic analysis of this thesis draws upon the work of Robb (2019) and Pezo–Lanfranco and colleagues (2020), who extend individual osteobiographies into a comparative visual assesment of lives in the past.

Beyond the biological and mortuary data collected by this project, the theoretical framework of the bioarchaeology of personhood will be used to inform the analysis of these

individuals and provide and more vivid account of the lives of each individual particularly as it relates to social status and identity.

Research Objectives and Question

To accomplish this, the following research objectives were established:

i. Compile and collect mortuary, grave good, and skeletal data from 20 burials at the site of Holtun, Guatemala.
ii. Interpret the results from data collection to explore the variation and possible social experience of individuals at the site.
iii. Compare the results of initial data collection from individuals of Holtun to other sites within the Maya region.

While the Holtun Archaeological Project (HAP) focused primarily on the analysis of social complexity through household archaeology, 20 individuals were excavated and represent a unique opportunity to study the transition of and variation between Middle Preclassic, Late Preclassic, and Late Classic period burials at Holtun, Guatemala. Like in other parts of the Maya region, at Holtun, there are no formal Pre-Hispanic cemeteries. However, the placement of burials in a variety of locations throughout the site is not merely convenient or haphazard. Archaeologists uncover burials in a variety of both locations and mortuary treatments that illuminate the significance of each find as a contribution to our understanding of ancient Maya mortuary practices and social organization. For this reason, this study will test the hypothesis that individuals from Holtun, regardless of mortuary and biological variation, represent patterned burial practice and diverse social experiences.

The proposed research for this thesis contributes to the understanding of biological and mortuary variability in the Maya region by examining the osteological data and mortuary context of burials to identify patterns in individuals throughout the occupational period of ancient Holtun, and the growing body of literature on ancient Maya identities. Additionally the thesis will also compare mortuary treatment of individuals in plazas and in non-plaza settings in an attempt to characterize statistical differences in variation by location at the site.

Research from these individuals identified common features of the mortuary program at Holtun and the overall biological health status of individuals observed through osteological analysis. Individuals were most commonly interred in simple graves or cists in an extended supine position with head oriented to the north. Additionally, very few indicators of childhood stress or systemic pathology were identified. However, females at Holtun seemed to disproportionately suffer from carious lesions. Lastly, statistical analysis of mortuary features found no significant relationship between the examined mortuary variables and the location of the burial. Overall, results suggest that Holtun participated in broader Maya mortuary practices and represented a relatively healthy burial sample with several diverse social experiences that illuminate how a small sample can contribute to the exploration of social organization and identity reflected through a contextualized osteobiographic approach.

Research Question: How is Maya social organization reflected in burial treatment and evidence of skeletal markers of stress?

- Do these assemblages point to patterns between sexes, gender roles, or age within this particular sample?

- Is there a discernable burial pattern between individuals interred in plazas and individuals interred in non-plaza structures? Do these patterns point to a difference or similarity in social status or identity?
- Through comparative analysis to other Maya sites of the greater Maya region and beyond, do these individuals exhibit distinct patterns of mortuary composition?

Organization of the thesis

I will begin this thesis by first looking at introducing the ancient Maya and the site of Holtun (including mortuary practices) and the bioarchaeology of personhood in Chapter Two. Although this thesis will examine skeletal remains, knowledge about the social organization of the Maya and mortuary archaeology will be critical to contextualize the skeletal analysis within the site of Holtun and the Maya region more broadly. Following this, in Chapter Three I will present in detail the methods used for examining the mortuary and skeletal data presented in this work and well as the research questions and expectations for this thesis. Chapter Four will present the results from the analysis of individuals from Holtun. In Chapter Five, I will discuss the results of this study as they relate to the hypotheses identified in Chapter Three for these individuals and how these data add to our understanding of ancient Maya social organization and the manifestation of identities at Holtun. In Chapter Six I will conclude and identify limitations and future directions for this project.

CHAPTER TWO: BACKGROUND

The Ancient Maya

The Maya region lies within Mesoamerica, a cultural and geographic landscape that spans modern-day Mexico and parts of Central America, including Southeastern Mexico, Guatemala, Belize, Honduras, and El Salvador (Sharer and Traxler 2006) (Figure 1). Researchers have further divided the ancient Maya territory into three different regions: the pacific coast, the highlands, and the lowlands. Ancient Maya culture persisted from apprximately 1000 B.C. – A.D. 1450. The Preclassic period (800 B.C. – A.D 250) was marked by a move to sedentary agriculture and the initial development of sociopolitical structures that formed the foundation of Maya society and political organization (Brown and Stanton 2020). By this period, symbolic motifs of divine kingship, Maya writing, and carved stone inscriptions (stelae) are all present (Freidel and Schele 1988; Lohse 2001). The ancient Maya showed clear signs of social stratification during the Middle Preclassic (800 – 300 B.C.), which continued to develop and peak in the Late Preclassic (300 B.C. – A.D 0). The Classic period (A.D 300 – 900) was defined by rule through divine kingship, which developed at some sites during the Late Preclassic period. Sociopolitical systems collapsed and ignited major demographic and social transitions during the Terminal Classic period (A.D. 800 – 1000). From this transition, major cities in the southern lowland Maya heartland were abandoned and the Postclassic (A.D. 1000 – 1450) centers of the Yucatan peninsula emerged. This study falls within both the Preclassic and Classic periods in Maya history.

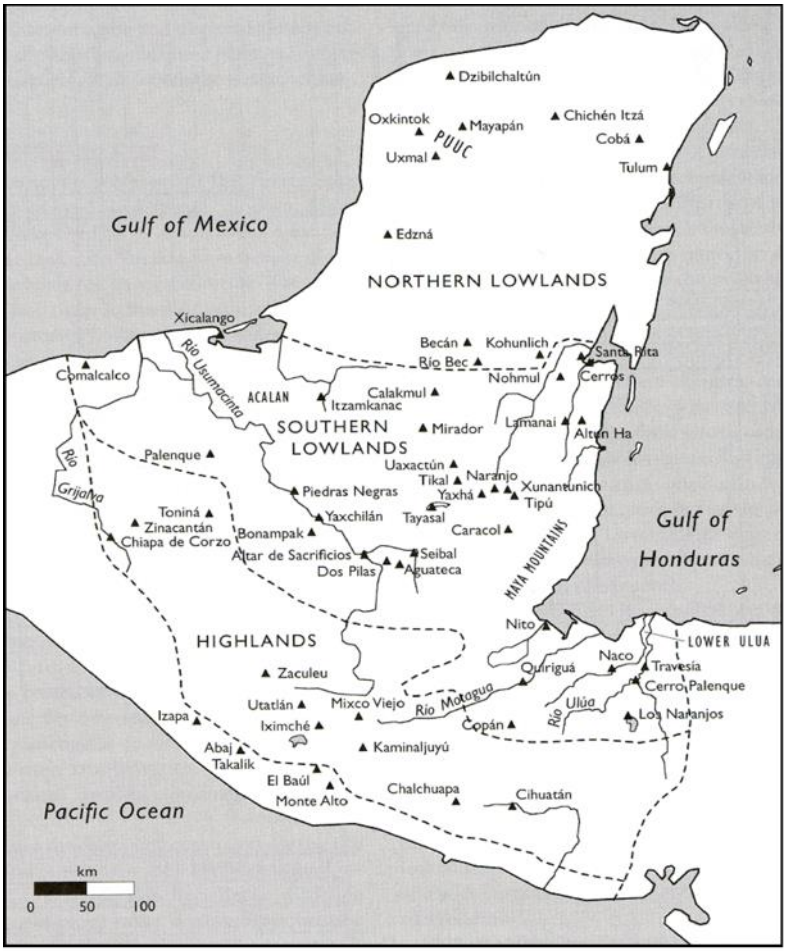

Figure 1 Map of the Maya region with the location of ancient sites (Sharer and Traxler 2006).

Holtun

The site of Holtun is located in the Petén region of Guatemala and is known for its low-rising mountains, karstic soil composition, and two major bodies of water: the Petén Itza lake and the Yaxha-Labna lagoon system (Beach et al. 2006; Kovacevich and Castillo 2011). The site of Holtun was established near the Yaxha-Labna lagoon and is one of several sites near this basin that interacted with each other including, Holmul, Yaxha, and Naranjo (Figure 2) (Ponciano 1995). As such, Holtun articulated with broader socio-political relationships that may have affected the site and its inhabitants in profound ways.

The archaeological site of Holtun sits adjacent to modern-day La Maquina, and is approximately 12 km southwest from the monumental site of Yaxha (Kovacevich and Castillo, 2011). Archaeologists Erik Ponciano (1995) and Vilma Fialko (2002, 2010) initially investigated Holtun, Guatemala. Investigations by the Proyecto Arqueológico Holtun (PAH) directed by Brigitte Kovacevich and Michael Callaghan from 2011-2017 recovered 18 burials that are the subject of this research.

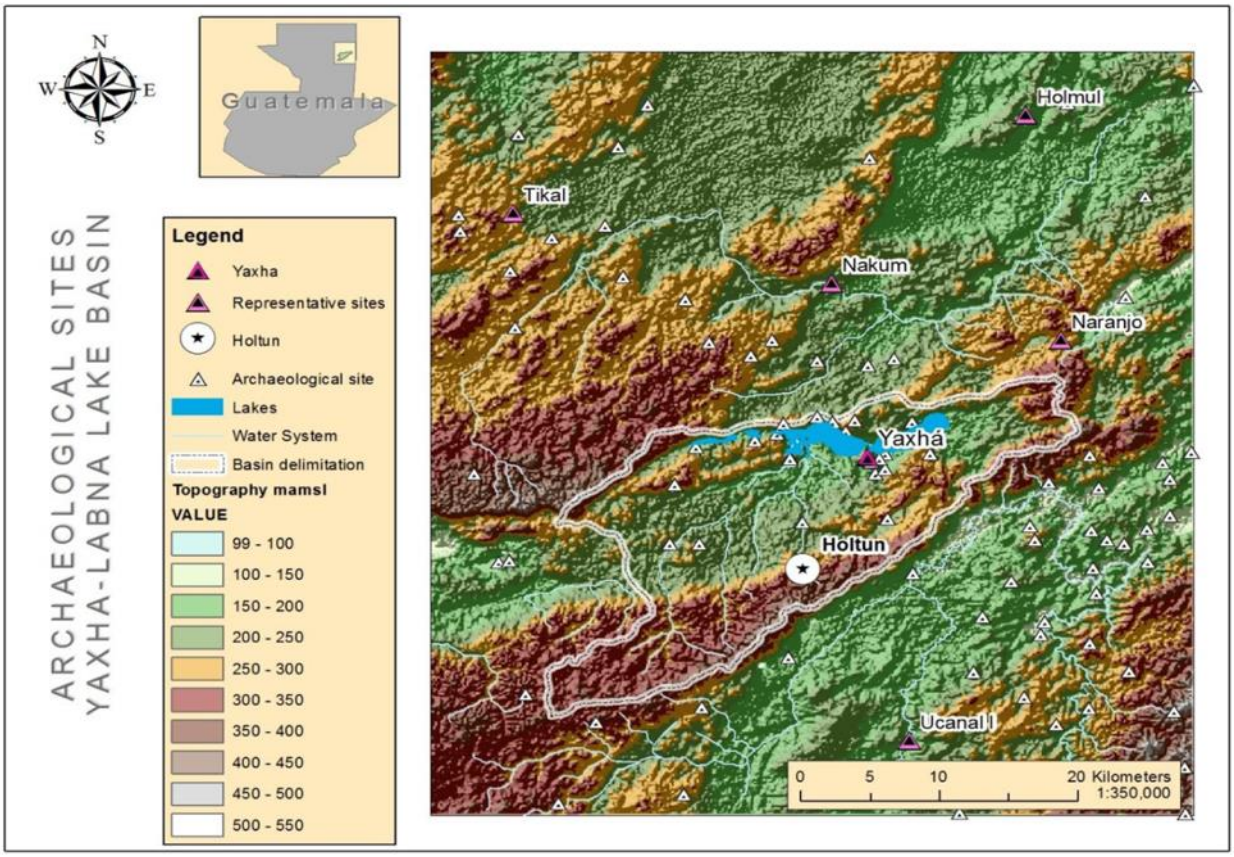

Figure 2 A regional map of the Yaxha-Labna basin featuring the topography of the area, the sites settled in it, and other large sites near the region (Figure 3; R. Guzman, 2017).

The settlement of Holtun lies in an elevated region upon a karstic ridge running northeast and southwest. Holtun is composed of approximately 300 mounds organized into both residential and ceremonial groups. Though the site is smaller than other major centers in its surrounding, it contains features of cultural and political Maya ideology (Guzman 2017). The site contains a

triadic pyramid in Group B, an E-Group, and architectural facades in groups B and F, one of which was the inspiration for the name of the site 'Holtun', head of stone, in Mayan language (Ponciano 1995). The site also contains a dedicatory cruciform cache dug into the bedrock of an E-Group (Group F at the site), which is associated with ritual activity as early as the Middle Preclassic (800 – 300 B.C.) (Callaghan et al. 2017).

Ancient Maya Social Organization

The foundational root of ancient Maya social organization and power was a kin-based lineage system associated to the control of agricultural land (Gillespie 2002; McAnany 2013; McAnany et al. 1999). Lineage rights to land ownership were reinforced by the interment of the dead within ancestral shrines in residences and cyclical rites of veneration (Gillespie 2002; Leventhal 1983; McAnany 1998). Archaeological data have revealed that these practices occurred throughout most of ancient Maya history and were used by the emerging elite class to legitimize their political control during the Late Preclassic period (300 B.C. – A.D 250) (Becker et al. 1992; Ebert 2017; Fash et al. 1992; Gamez Diaz 2013; Novotny et al. 2017; Schele and Freidel 1990). While the elites performed the apotheosis of their lineages in public and community wide rituals, concurrently, non-elite members of society venerated their dead through burial location, post-interment rites, grave goods, and memory work (Gillespie 2000, 2010; McAnany 2013; Robin 2003; Robin and Hammond 1991).

The rites and protocols of death for the ancient Maya are all anchored by their worldview. Maya worldview is a combination of the natural and supernatural realms shaped by nature, the cycle of seasons, and the physicality of biological death (Furst 1995; Houston and Stuart 1998). Reconstruction of this ideological foundation is generally dependent on the *Popol Vuh*, a colonial

period text that retells the historical origins of the Quiche Maya (Tedlock 1996). Though detailed analysis of ancient Maya cosmology and worldview are beyond the scope of this thesis, the Maya believed that thought and behavior revolved around the maintenance of equilibrium in the universe, in which they were just one relational component therein (Fischer 1999; Harrison-Buck 2020; Knab 2004). This core belief underscores the importance of the reciprocal relationship between the living members of a specific community and the dead. The living, under this framework must care for the physical and metaphysical components of the dead so that through reciprocity, the dead will assist the living. Archaeologically, this reciprocity can be investigated partly through the mortuary assemblage and location of burials (Diez-Gamez 2013; McAnany 2013; Novotny 2015).

Mortuary Archaeology

Mortuary analysis in archaeology has played a central role in our understanding of ancient groups and their funerary rituals (Pearson 1982). In the 1970's Saxe (1970) and Binford (1971) developed one of the first critical approaches to the study of mortuary remains through cross-cultural analysis. At the time this novel approach, known as the Saxe-Binford program, quantitatively demonstrated that the complexity and structure of a society were materialized in mortuary features— and, that these were valid methods to analyze and interpret ancient social identities (Binford 1971; Brown 1995). These early studies were deeply influenced by the New Archaeology, developing research questions grounded in positivists and a quantifiable analysis through ethnographic correlates that explored specific aspects of social organization like status, identity, and mortuary formation processes (Buikstra 1977, 1981; Tainter 1977). Shortly thereafter the Post-processual critique in archaeology argued that the New Archaeology

overlooked the individual agent who undoubtedly contributed to cultural variance in favor of inferences derived from social organization (Hodder 1982, 1985). This critique rejected evolutionary typologies and cross-cultural comparisons, and instead relied upon a nuanced interpretation of the historical, political, and cultural constructs within a given social group. Thus, the Post-processual approach encouraged the incorporation of belief systems, social constructs, identity, and cultural context into a synthetic mortuary analysis arguing that mortuary archaeology was a viable model to explore social organization and identity expression.

Mortuary archaeologists examine a number of features from the archaeological record to infer the social status and identity of an individual such as burial location, body positioning, processing of the body, and grave-goods analysis (Drake 2016; Novotny 2015; Weiss-Krejci 2003; Welsh 1988). Burial location would entail cataloging where burials have been identified in a site. The position of a body is examined by describing in what manner the body was placed into the grave. Processing methods may also be examined by describing (if possible) how the body was prepared for burial and could include potential aspects of body manipulation such as dismemberment, rearticulation, or cremation. Grave-goods are also examined for both quantity, quality, and provenience and may be indicators of what the living chose to associate with the interred individual. Each of these components of burial may be counted, classified, indexed and are used to interpret mortuary patterns in the past and infer identity and social status within a stratified society because access to certain spaces, practices, or goods may have been restricted.

Maya Mortuary Studies

Ancient Maya burials have been a major source of study since the start of excavations in the Maya region and resulting in several major syntheses (Rathje 1970; Ricketson 1925; Robin

1989; Saul 1972; Welsh 1988; Whittington and Reed 2006). Since the ancient Maya did not have formal or centralized cemeteries, burials are encountered throughout site excavations and practices varied greatly across temporal periods and geographic location (Coe and Houston 1966; Krejci and Culbert 1995; McAnany et al. 1999). In addition to this, most archaeological projects in the Maya region are not driven exclusively by bioarchaeological inquiries and so excavation strategies may also sometimes occlude the identification of burials. Due to this variation, there is no standardized burial definition or grave typology for the ancient Maya, though Welsh's (1988) adaptation of A.L. Smith's (1950, 1972) typology includes a useful definition of burial, and several varieties of grave–types common throughout the region. Welsh (1988) argues that any deposit holding human remains should be interpreted as a burial because it allows scholars the greatest flexibility to infer ritual mortuary behaviors, including evidence from associated objects and the grave construction itself. For example, a cist is a grave consisting of stone lining on at least one of its sidewalls, cap or floor, but rarely, if ever, being completely lined with stone; or intentional placing of stone, frequently haphazard, directly on or around the skeleton as a means of separation and protection from other graves (Saul et al. 2007; Welsh 1988). Interments can also be recovered in numerous positions including extended prone or supine, flexed, and occasionally seated (Pereira 2013; Welsh 1988). Directionality of the body and head can be investigated and was an important aspect of ancient Maya ritual and potentially even Maya urban planning, though there are only very broad regional patterns according to grave orientation (Ashmore and Geller 2005; Coe 1975; Drake 2016; Freidel et al. 1993; Novotny 2015). Grave goods are often recovered with burials and could include ceramic vessels, jade, shell, figurines, animal bones, lithics, and even human remains (Tiesler and Cucina 2007; Welsh 1988). Wealthier burials could have contained codices, stingray spines, masks, textiles, and animal pelts

(Welsh 1988). Graves often contain a single primary interment, however, collective burials that contain a combination of primary and secondary remains, are also frequently identified (Welsh 1988). Within these multiple individual burials adults could buried with several secondary individuals or with inclusion of juveniles (Baustian and Osterholtz 2014; Freiwald 2019; Storey and McAnany 2006; Welsh 1988).

Maya residences typically consisted of several platform structures (usually three or more) constructed around an open patio or residential plaza and contain burials (Chase and Chase 1998; Leventhal 1983; Sharer and Traxler 2006). Most commonly, interments are found beneath the floors or inside the walls of these residences, and in public spaces such as ceremonial platforms, plazas, or buildings (McAnany et al. 2020; McAnany et al. 1999; Scherer 2015; Storey et al. 2019; Weiss-Krejci and Sachse 2006; Welsh 1988). Often, these spaces undergo sequential phases of construction where individuals may be incorporated into the residence and sealed once construction has finished. This iterative procedure occurred usually when someone died, and the work of Patricia McAnany (1998, 2013) has synthesized mortuary practices commonly found in these households and their relationship to ancient Maya life and ideology. In these studies, McAnany argues that the burials of select relatives within the residence reifies the prominence of a lineage and through that, access to agricultural and other available resources. McAnany (2013) also states that for the ancient Maya a critical component of death was the concept of protracted funerary rites. One such example of these rites is grave re-entry. Fitzsimmons (2009), in a synthesis of data from the lowlands, has suggested that re-entry was practiced by Maya royalty during the Classic period, involved the removal of capstones, rituals of smoke and fire, and modification of the mortuary assemblage and skeleton. In one study, Tiesler (2007) investigates a skeleton from Becan, Campeche, Mexico found within the passageway of the base of a

staircase to a chamber beneath a temple. The individual had missing long bones, cut marks on their ribs and vertebrae interpreted as the extraction of the heart associated to human sacrifice. Tiesler (2007) argued that this individual was a sacrificial victim whose remains were revisited given the missing long bones. This analysis revealed that practices such as tomb re-entry were not exclusively reserved for elite members of society.

Likewise, body modification was also not exclusively reserved for the elite members of ancient Maya society. The daily lived experiences of individuals and their corresponding interactions are bidirectionally affected by their bodies and the practices performed by each person (Tiesler 2014). This is to say, that bodies are produced by cultural norms and also affect cultural norms. Iconography depicts individuals with cranial modification as having an unnatural head posture, i.e. one that is not morphologically standard in non-modified craniums (Tiesler 2014). Iconographer Karl Taube (1996) asserts that this is noteworthy since the Maya had very clear standard forms that they drew, everyone looked the same except when they were drawn to emulate a deity, a practice that could then be emulated morphologically to consecrate an association with the divine (Houston and Stuart 1998; Houston et al. 2013). This practice for the Maya may also have had identity-driven ties all of which began to foment near the time of birth of a newborn. Tiesler and Zabala (2017) note that there is no evidence that cranial modification marked social position but rather may have been a marker or internal and external beauty and reflected the ideal beauty conceptions of caregivers as a bridge from one generation to the next. The same however, cannot be said for dental modifications. Tiesler and colleagues (2017) assert that dental modification and inlays were most likely regulated by corporate or group membership into specific groups or political charges where the modification would serve as a form of social identification or distinction. This stems from the idea that dental modification occurred later in life and often times incorporated rare goods such as jade, pyrite, and, hematite inlays (Tiesler et al. 2017). This is crucial to note because it

represents one potential reason for practicing cranial and dental modifications. For the Maya cranial modification may have been a form of identity reification that some individuals practiced in an effort to affirm association to the divine or to impart ideals of beauty and membership from specific kin groups (Taube 1996; Tiesler 2014).

Evidence for individuals recovered within a series has also been identified in the Maya region. In another study, Tiesler and colleagues (2010) incorporated taphonomic, forensic, and archaeological evidence in the interpretation of a complex multi-individual mortuary deposit from Xuenkal, Yucatan, Mexico. In total, four graves were encountered, one single enclosure surrounded three individual cists and a fourth individual was in a crypt all recovered from a residential platform (Tiesler et al. 2010). The authors argue that this space was used consecutively during multiple interment events and indicated that the memory of the deceased retained through ancestor work was the likeliest motivation for the creation of this funerary space.

Individuals can also be recovered from special contexts throughout the Maya region. In one study, Duncan (2005) identified a context containing several pairs of skulls arranged into rows and a pit of postcranial remains all within a temple complex during the Postclassic period. Duncan (2005) argues through archeological, osteological, and taphonomic evidence the remains were likely those of war captives and ritually sacrificed as dedicatory offerings within the temple. In a more recent study, Duncan and Schwarz (2015) identified a mass grave in Zacpeten, Guatemala containing at least 37 individuals within a depression on the western side of the ceremonial core of the site. In this study, through bioarchaeological and spatial analysis, Duncan and Schwarz (2015) found that the grave produced by exhuming and violating enemy bodies

serving to disrupt previous inhabitant's lineage rites and create a lasting memory of their conquest.

That being said, McAnany (2013 [1995]) critiques that what we know about ancient Maya mortuary practices by in large originates from data of the elite nobility and their activities, where opulent mortuary assemblages often accompanied the dead and have been recovered by archaeologists in excess. However, elite nobility represented only but a fraction of ancient Maya society, and it is likely that there were differences in the way non-elite commoners venerated their lineages and practiced mortuary rites. At K'axob and ancient Maya farming community, McAnany (2013 [1995]) found similar evidence for grave re-entry of an ancestral shrine and argues that ancient Maya worldviews and mortuary rituals, ideologically, exist in all social groups. Since non-elite commoners are the burials we most commonly find during excavation, each individual is an important contribution to the mortuary record of a site, beyond the examination of elite noble burials. For Holtun specifically, the 20 individuals within this thesis present an excellent opportunity to examine the earliest mortuary practices of the site, dating to the Middle Preclassic period and its reoccupation during the Late Classic period.

Bioarchaeology of Personhood

There have been numerous advances to the study of bioarchaeology since Buikstra's (1977) seminal article, all of which have allowed the discipline to intersect more thoroughly with method, theory, and the archaeological record (Armelagos and Cohen 1984; DeWitte and Stojanowski 2015; Robb 2019; Scherer 2007, 2018; Scherer et al. 2007; Wood et al. 1992). Bioarchaeology has the potential to move archaeology beyond material culture into an exploration of ancient human populations as active social beings with complex identities

(Buikstra and Beck 2006). In this thesis I consider a bioarchaeology of personhood, to understand how the lived experiences of individuals were embodied in subtle ways registered physiologically or morphologically in their remains and what identities are manifested through the burial context and skeletal evidence.

The most recent theoretical developments in bioarchaeology involve an enhanced focus on contextualizing skeletal remains to facilitate a social bioarchaeology. Agarwal and Glencross (2011) coined the term "social bioarchaeology" in an attempt to encourage archaeologists to consider human remains and burials as a necessary part of analysis to understand past societies. Their definition suggests that this new bioarchaeology should attempt to transcend the skeletal body into the lived experience of individual remains and make a substantial contribution to our conceptions of social life in the past and its possible effect on contemporary groups. In order to understand the theoretical framework for the bioarchaeological assessment and interpretation of the 20 individuals from Holtun I review the archaeology of personhood, the bioarchaeology of health and markers of stress, and osteobiography.

The study of identity within archaeology has been a popular focus, where scholars examine the intersectionality of identity and the sociocultural activities of past populations. Because bioarchaeology focuses on an individual's skeletal remains, it is critical to understand how the body is theorized in anthropology through agency, embodiment, and personhood. Broadly, agency or agentive practice, is the capacity of individuals to act independently and make choices, it is a quality of action, not action itself (Dobres and Robb 2000; Ortner 1984). This definition prompted archaeologists to emphasize the agency of individuals in the past and how their bodily choices correspond to societal transformations and intersectional identities

(Joyce 2000, 2005). To connect agency to archaeology some scholars have drawn from Merleau-Ponty's (2014) idea that bodies are the product of lived experience, or embodied.

Through this concept Meskell (1998:159) has argued that the “embodied body represents, and is, a lived experience where the interplay of irreducible natural, social, cultural, and psychical phenomena are brought to fruition through each individual’s resolution of external structures, embodied experience, and choice.” This concept allows bioarchaeologists to engage with personhood because it extends the body beyond just its material remains (Joyce and Meskell 2014; Meskell 1998). In Fowler (2004), the author emphasizes that a person can be anything that can experience an ongoing “attainment of personhood” and could include souls lacking physical bodies. In order to engage with all of these and not just the physical remains of the body Rosemary Joyce argues that we use embodied personhood to explore "[how] human beings in the past may have experienced their world through the body and experienced their bodies through their specific cultural positions" (2007:107). This concept is especially pertinent for the ancient Maya where conceptions of personhood and identity extend beyond biological death and social life, ancestral veneration, memory work, and tomb reentry all imparted social capital to the deceased and was capitalized upon by the living interacting with them or their memory (Fowler 2010; Gillespie 2010; Gonlin and Lohse 2007; Joyce 2007; Weiss-Krejci and Sachse 2006).

In order to engage with this theoretical discussion bioarchaeologists use skeletal indicators to explore the health and disease of past populations and interpret social identity (Boutin 2012). To study health and disease, bioarchaeologists usually employ paleopathological and osteological analysis (Buzon 2011). From the evaluation of dietary patterns, the presence of endemic disease and skeletal lesions, skeletal indicators of stress, and specific skeletal traits, scholars can enhance our understanding of the life-histories of an individual within a given

society (Agarwal 2016). However, some of these characteristics (such as stress) cannot directly be measured within skeletal remains and must be inferred from a suite of observable changes to the body (Armelagos and Cohen 1984). The reactions that a body produces to episodes of stress recorded as anomalies in the bone are the ones that bioarchaeologists can use to understand patterns of activity and health affecting a burial population.

Additionally, understanding the health profiles of skeletal populations through lesions and skeletal markers of biological stress may not alone depict a populations health status, instead Wood and colleagues (1992) call for the use of multiple indicators (such as non-specific inflammation, or dental pathology) in the creation of biological profiles of a past population. The osteological paradox, as Wood and colleagues' (1992) thesis came to be known, also stressed the importance of large samples when understanding these population-level demographics. However, in the Maya area, bioarchaeologists contend with poor preservation, limited funding, and small skeletal samples which, to a degree, limit bioarchaeological activity like that of ancient paleodemography and biodistance analysis (Scherer 2019). Despite these limiting factors, bioarchaeologists in the Maya area regularly study health, diet, disease, mobility, body modification, violence, and ritual practice using smaller skeletal samples with poor preservation much like our burial population from Holtun e.g., (Duncan 2011; Inomata et al. 2017; Scherer et al. 2014; Schnell 2017; Sosa et al. 2014; Tiesler 2011; Wright 2004; Wright and White 1996; Wrobel 2014)

Some scholars have dealt with small skeletal samples by asking questions of individual variation, through the approach of osteobiography (Appleby 2019; Cormier 2018; Hosek and Robb 2019; Mayes and Barber 2008; Robb 2002, 2019; Stojanowski and Duncan 2017; Tiesler, Cucina, Stanton, et al. 2017). Saul and Saul (1989) coined the term 'osteobiography' as an

analytical approach that incorporated as many skeletal features as possible to understand the life history of an individual. The approach incorporates detailed analyses of individual skeletons identifying features such as sex, age, pathology, cultural modification, and physiological stress, and are discussed in greater detail within Chapter 3. In essence, this approach explores the life history of an individual to infer how social organization such as social status, administrative roles, class, or divisions of labor may have affected their biology (Robb et al. 2001). Once these are constructed, each individual will be examined collectively in an attempt to identify patterns within the data that will be highlighted with select key individuals.

The benefit of this approach is that it can draw on as many variables as necessary and can be tailored by the researcher to their interests. The first osteobiography was reported by Saul (1972:56) where he described how scholars had previously ignored "the people who made the pottery and built the structures." Saul (1972) catalogued skeletal and pathological data to ask novel questions related to nutritional stress, biological health status, and population demographics as they related to the Maya collapse. During the 21st century, scholars have synthesized osteobiography with mortuary, architectural, paleo-climatological, ethnographic, and iconographic sources to understand how ancient lives may have been affected by environmental, political, and sociocultural processes (Beach et al. 2015; Freiwald 2020; Scherer et al. 2015; Tiesler and Scherer 2018). In one study, Robb (2001) deploys the osteobiographic approach in concert with mortuary data from remains at Pontecagnano, Italy and argues that when indexed mortuary features and skeletal markers of stress and activity are used in unison the resulting analysis is a deeper interpretation of the community than could be obtained from each data set separately. More recently, Cormier (2018) applied this approach to 52 individuals from the

Holmul region between 800 B.C. – A.D. 900. Her analysis focused on how economic, political, and social organization of the ancient Maya affected the identities of the inhabitants at Holmul.

The documented life of a single individual can provide a starting point to explore the variation in lived experience during a specific chronological period of history, or temporal region. However, it is not devoid of limitations, the principal of which is its heavy reliance on preservation (Geller 2019). A detailed analysis of osteological markers of stress and biological health depends on being able to identify the morphological changes on the remains of an individual. In some cases, particularly within the Maya region, the preservation of a burial population may not allow this rich analysis. Additionally, because the focus of this approach is to qualify the characteristics of each individual within a sample it does not traditionally contribute population-level analyses in the same way that biodistance analysis might. However, for the sample at Holtun, an osteobiographic approach is the most effective choice of approach because of the small sample and its ability to extrapolate site wide patterns from a small sample of individuals without sacrificing the rich details that could be identified from each skeleton in the series.

In addition to these individual biographic sketches, in an attempt to compare individuals from within Holtun to each other, a comparative osteobiographic approach will employed to gain a better understanding of individual variation in relationship to others at the site and within each individual time period of occupation at Holtun. Though traditional osteobiographies typically involve reconstructing individual lives in as much detail as possible (Saul and Saul 1989), this novel approach to osteobiography attempts to move beyond just one individual, situating them in relation to each other, to examine how individual lives compare when aggregated (Robb 2019).

This is an experimental extension to the osteobiographic approach propsed by the work of Robb (2019). To compare the individuals in this sample to each other two requirements must be met:

1) That all data must remain within its original context, which means that samples chosen for comparison must be seen as relative to all others. This means that we retain a general or "relative" pattern but ask how the samples within its study relate to it.
2) The events that occur within each life must be arranged in temporal order. Normally, with historical biographies, the use of written records makes this simple. However, bioarchaeologically this is far harder to do. To do this with skeletal data, bucket categories will need to be used such as childhood and adulthood.

For this study, four categories were chosen to categorize life and death events: 1) childhood and growth, 2) adult life, 3) death and 4) treatment at death. Each of these representative stages will serve as general categories into which data from mortuary and bioarchaeological contexts was sorted to. For example, for the category of treatment at death—the collected data were the mortuary context and burial goods associated to each individual in the sample. The concluding analysis attempts to correlate each individual interred at Holtun and produced a visual graph similar to those created in Pezo–Lanfranco (2020). In their 2020 study, Pezo–Lanfranco and colleagues depict childhood development, physiological stress, and survival expectancy, all within one visual representation to examine variation in individuals collectively. While the approach produced by Robb (2019) will be considered, the visual representations from Pezo–Lanfranco will be adapted to visualize the collective data generated from mortuary and osteological data collection.

Ultimatley, osteobiographies will allow me to examine the biological health status of individuals from Holtun and will provide evidence for inferred social status and specific

biological characteristics affecting these individuals. Effectively, this synthesis suggests that with caution, small-contextualized samples like the one at Holtun can successfully contribute to the exploration of broader social experience in the ancient Maya region.

Chapter Summary

This chapter introduced the ancient Maya, Holtun, Maya social organization, mortuary archaeology and the bioarchaeology of personhood. From this chapter it is clear that the ancient Maya maintained a complex system of social organization that can be inferred through an analysis of mortuary and skeletal data. While much is known about elite and royal mortuary practices, remains found within ceremonial and residential structures such as those from Holtun, can help researchers identify broader patterns of mortuary behavior throughout a site. Inferring patterns and properties of this social organization at Holtun, was done by constructing individual osteobiographies that contextualize mortuary and biological features to shed light on the individual and collective identities from the remains recovered during excavation. The following chapter will detail the methods used to construct and interpret these osteobiographies.

CHAPTER THREE: MATERIALS AND METHODS

This chapter will introduce the sample material examined and the mortuary and skeletal methodology used for data collection and recording. The chapter will first discuss the archaeological sample, mortuary methods, skeletal methods, and lastly statistical procedures used to analyze the data.

Archaeological Sample

The archaeological materials and skeletal remains for this investigation were excavated between 2010 and 2017 at the site of Holtun in the Central Lake's Yaxha-Labna area of Guatemala (Figure 3). I examined the mortuary and individual skeletal variation among this sample using an analysis of mortuary characteristics, burial good classification, and skeletal data.

Burials at Holtun span the length of occupation for the site, ranging from as early as the Middle Pre-Classic (B.C. 800 – 300), Late Classic (A.D. 500 – 800), and Terminal Classic periods (A.D. 800 – 900). Due to the nature of excavation strategy, most human burials found were within residences or in plaza contexts throughout the site. Seven individuals were recovered from the Middle Preclassic period, two from the Late Preclassic period, and 11 from the Late Classic period. The preservation of these remains is variable, ranging from highly fragmentary to moderately well-preserved skeletons. Individuals were also recovered with variable rates of representativeness including nearly completely represented individuals. In one instance, Individual 17 (HTN.26.2/2a.7) is represented by only the cranium and several disarticulated teeth. The nature of preservation limited the resolution of data observed from each case in the sample. However, for each individual a full inventory of all skeletal materials recovered was compiled. Archaeological recovery of these remains occurred over a period of eight field

seasons. In one instance, due to exposure to a humid matrix after recovery, Individual 19 (HTN.26.3.4.5) developed mold.

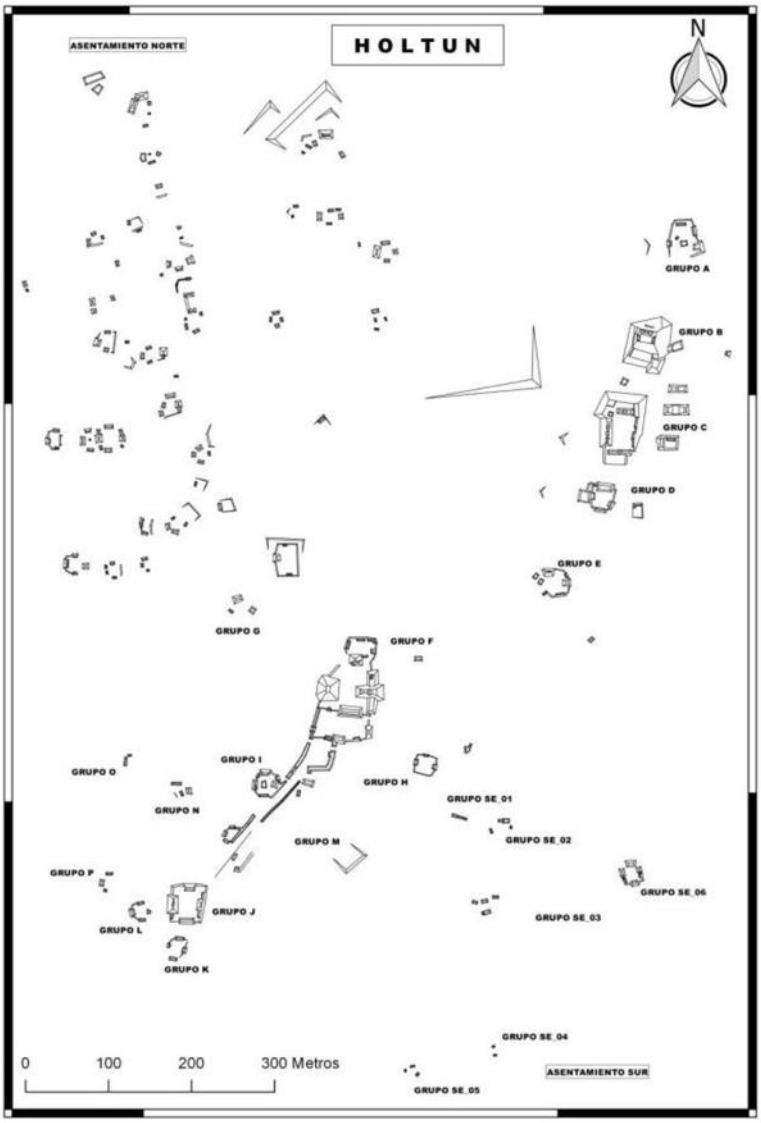

Figure 3 Map of Holtun Guatemala including major groups and residential areas (Courtesy of R. Guzman 2017).

Mortuary Analysis

Mortuary data were collected for the 18 burials. This section details what data were precisely collected and what they each mean. I start by discussing general terms pertinent to this study, including burial, grave, individual, primary burial, secondary burial, multiple burial, and minimum number of individuals (MNI). I then proceed to discuss burial location, grave construction, body orientation, grave good analysis, and ceramic analysis.

Burial – This term refers to all features of an entire burial. This would include its location within a site, the construction of the grave, the physical remains of the individual, and all associated burial goods and ecofacts if any (Welsh 1988).

Grave – This term refers to the physical space and construction features of a burial. The space and place in which an individual is interred (Scherer 2020).

Individual(s) – This term references the physical person who was interred within a grave. In this thesis, the term individual is used when in reference to a single person or multiple persons interred within a burial feature.

Primary burial – This term refers to the initial context in which an individual was interred. These burials are undisturbed until unearthed by modern archaeologists (Weiss-Krejci 2011a). Depending on environmental conditions and grave–type, skeletal remains may be complete or fragmentary and are fully articulated upon discovery, which indicates that all elements of an individual would be present within the burial. A primary burial will also display evidence for the original interment of the skeleton in anatomical position despite effects of the burial environment.

Secondary burial – Secondary burials constitute remains unearthed from disturbed contexts or from a second context where the remains may have been relocated after the initial

interment event. Unlike primary burials, secondary burials can vary greatly, and their identification can come from several different features. Secondary burials may be a grouping of isolated remains that clearly do not constitute a complete individual and where there is no evidence of the original anatomical position of the individual, despite taphonomic changes to the burial environment. They may also be evidenced by the disarticulated remains of one or several individuals, the interment of specific skeletal elements in a separate context from the rest of the individual, the isolation of skeletal elements that clearly do not constitute an entire skeleton, the visitation of an existing primary burial to remove skeletal remains or burial goods for the purposes of ancestor veneration, or looting (Duday et al. 2009).

Multiple burial – A multiple burial refers to more than one individual, deposited within the same burial context. Primary and secondary burials are recorded as single burials unless several skeletons within a context share the same space of interment in which case a note was made of such occurrence.

MNI – Minimum number of individuals; This term references the minimum number of individuals unearthed within a given context (Buikstra and Ubelaker 1994). There are three accepted methods for establishing MNI, the traditional method, the zonation method, and the landmark method (Lambacher et al. 2016). However, for this thesis the traditional method established by White (1953) was used. The method segregates the skeletal elements by left and right side, then counts the most abundant number of elements from one side to determine the final count of individuals in a sample. If the element does not have a side, it is counted as one individual unless it is duplicated. For example, if four occipitals are recovered from a single interment then the MNI of that interment is four.

Burial Location

Burial locations are classified into five primary types: house mounds or platforms, elite residences, palaces, ceremonial buildings, and plazas (Welsh 1988). Though this type of classificatory scheme is helpful in discerning where we can find burials within Maya sites often times due to poor preservation or documentation this may be difficult to do and as a result some of these categories may not all be available for analysis. For this thesis, all burials were considered either platforms (unearthed within a residential structure), plazas (unearthed in a shared non-residential space at the site), or ceremonial buildings.

Grave Construction Typologies

Grave construction classifications will follow and Welsh (1988) who produced the first extensive Maya burial typology that related individual site series into one cohesive pan-Maya classification. Geller (2004) and Saul et al. (2007) were used to support these classification characteristics. Burial patterns across space and time are made identifiable from construction typologies because a systematic classification could compare burials from numerous sites in the search for patterns.

The evaluation of grave–types allows a researcher to consider the physical construction of the grave as it relates to mortuary and interment practices. Previously, Maya mortuary practices have been presented by several scholars each of which have defined a series of grave–types for the ancient Maya (Geller 2004; Saul et al. 2007; Welsh 1988). Though these are generally accepted as potential types, they are not always agreed upon or consistent between different researchers or publications causing issues with inter-site comparisons. Additionally, not every excavator working within a site is a mortuary specialist, which means in some cases

burials may not have a grave-type assigned to them during excavation. In these cases, grave-types must be assigned from reports and will naturally maintain a degree of arbitration. Each type will be discussed below.

Simple interment – This grave–type is the simplest type of formal interment defined as "an unlined hole or pit in the ground or structural fill, or inclusion of a body in fill construction is apparent" (Welsh 1988). Additionally, Geller (2004) adds that these graves are indiscernible from the surrounding context and are regularly found within architectural constructions like a floor or wall.

Chultun – This grave-type is defined as large chambers originally dug out of the soil or bedrock for purposes other than mortuary use with or without a shaft (Welsh 1988). This definition requires evidence that the *chultun* to be something other than a mortuary feature and that it be artificially constructed. Geller (2004) offers a more inclusive interpretation of *chultunes*, which can be both artificially constructed chambers or natural cave-like chambers that occur naturally in the Maya region. This interpretation allows for burials to be classified as *chultunes* that are either naturally or artificially regardless of if the primary use for this feature was not as a grave repository.

Cist – This grave-type is defined as having and outlined grave consisting of stone lining on at least one of its sidewalls, cap or floor, but rarely, if ever, being completely lined with stone; or intentional placing of stone, frequently haphazard, directly on or around skeleton as a means of separation and protection from other graves (Saul et al. 2007; Welsh 1988). According to Geller (2004) cist's may be both undefined or capped.

Crypt – This grave-type is defined as interments with partially or completely stone-lined walls and always having a stone capped ceiling. Geller (2004), Saul et al. (2007), and Welsh

(1988) all agree that crypts are well-defined cists, but not as complex as tombs. This is important because the definition of both cists and crypts is largely arbitrary and are often considered as the same grave-type in analysis. This is because the substantial difference is usually a physical cap and the level of elaboration for the burial.

Tomb – Tombs are an elaborate underground stone-lined or rock-cut chamber of considerable dimensions, far exceeding those of the corpse. Usually, tombs contain a shaft leading down to the chamber, with an occasional antechamber and are found within royal or ceremonial structures (Saul et al. 2007; Welsh 1988). This type of grave is traditionally sealed at the time of interment and due to the labor and investment involved in making them are typically reserved for individuals of elite or noble status (Cucina and Tiesler 2006; Geller 2004; Tiesler et al. 2004).

Cache/Vessel – This grave-type is not traditionally described by Welsh (1988) but was introduced by Geller (2004) to describe deposition of remains within a ceramic vessel. Saul et al. (2007) described this type of burial as occurring within a ceramic vessel or, any otherwise perishable material and usually secondary in nature.

Unknown – This grave-type is defined as those without sufficient evidence or archaeological information to determine morphology that would classify them into one of the above types.

For this variable, data were collected by examining the mortuary context identified at time of excavation and recording the grave–type following this classification within an Excel® spread sheet.

Body Positioning

There are several body positions in which the ancient Maya were interred. Geller (2004) and Welsh (1988) define below the general criteria for determining the position of an individual within a burial.

Disarticulated – This body position is defined by individual remains that are out of natural anatomical position and connections at articulations. This type of position usually means that the burial was disturbed from its original and there is evidence for intentional or perhaps accidental disturbance due to cultural activities. This disassociation may be due to construction around the grave, secondary re-entry of the grave for ritual purposes, or other purposes the absence of a complete body from the burial defines a disarticulated individual (Geller 2004; Tiesler 2007; Weiss-Krejci 2011a; Welsh 1988).

Flexed – This body position is defined by the placement of the body in a flexed body position where the elbows and knees of the individual are bent towards the torso though the location and manner of bending may differ, individuals may be flexed on their back, on their side, or in a seated position with limbs (Geller 2004; Welsh 1988).

Bundled – It is widely recognized that the ancient Maya practiced bundling as a transformation to secondary burials where remains were tightly wrapped and transferred into a secondary context (Fitzsimmons 2011; Geller 2004; Scherer 2015). In this instance, the upper and lower limbs would be tightly associated with the thorax of the body.

Extended – This body position is defined by the placement of the body without flexing any post-cranial elements. The arms of an individual would be extended next to, or potentially crossed in front or behind the thorax, the legs of the individual would be unflexed from the pelvis (Geller 2004; Welsh 1988).

Prone – Though this is not a specific position within the body placement scheme, it refers to the anatomical orientation of the body face-down ventrally within the burial. Remains interred in a prone position can have both extended or flexed post-cranial elements and would be recovered from a burial face down (Welsh 1988).

Supine – This body orientation refers to individuals placed within the burial face-up on their back. Remains interred in a supine (or dorsal) position can have both extended or flexed post-cranial elements and would be recovered from a burial with their anterior aspect facing the open plane of excavation (Welsh 1988).

Body orientation – This is not a category of placement but rather a cartographic descriptor of the placement of the body and refers to the cardinal directions associated with the burial. In this thesis, two versions of this descriptor are used. The first is the position of the body which references the location of body relative to the cardinal directions. Here burials would be described as laid in a north/south or east/west orientation. The second is orientation of the head relative to the feet and would be described as head to the north, south, east, or west.

Grave Goods Analysis

Grave goods are usually evaluated in respect to their type, quantity, and positioning within a burial unit. Welsh (1988) divided goods into 16 categories each of which would be documented to try and identify if they served a particular function, reflected socio-political status of the interred individual, or ritual and religious symbolism. These categories could include: pottery, polychrome or stuccoed pottery, jade beads or ear flares, jade figurines, shell beads or ear flares, shells, flint and obsidian, ground stones, animal bone or teeth, clay objects, pearls, coral, or mica, textiles, furs, wood, stingray spines, codices, mosaic masks, and copal. For this thesis, these categories were condensed into four broad categories – lithics, bone, shell, and

ceramics. Observation of lithic, bone, and shell evidence was recorded as either present or absent.

Ceramics are a crucial component of research for this area due to their potential to chronologically place burial contexts with the different periods throughout the site of Holtun, and more broadly the Petén. At Holtun, Callaghan and colleagues (Callaghan and Caravantes 2018; Callaghan and Castillo 2012; Méndez–Lee 2017) have classified ceramics using the type: variety-mode system (Callaghan and Caravantes 2016; Gifford 1976; Kosakowsky 1987) and correlated them to complexes first identified by Smith (1955) at the site of Uaxactun, Guatemala and later designated spheres by Willey and colleagues (1967). Ceramic data were observed as present or absent within burials unless vessels were identified within the grave and in which case where possible they are described following identification by the Holtun Archaeological Project. Additionally, rare grave goods were described only if identified within a specific burial context. The associated burial goods of an individual help contextualize the body within a burial unit and more broadly to the site in question

Table 1 includes the mortuary variables examined and how each were coded. Mortuary variables were observed from the archaeological context of each burial and recorded in an Excel® table following this classification.

Table 1 List of the mortuary variables examined, and the observable codes used.

Variable	Coded Observation
Internment	Primary/Secondary
Burial Location	Platform/Plaza/Ceremonial Building
Burial Construction	Simple/Chultun/Cist/Crypt/Tomb/Cache/Unknown
Body Position	Extended/Flexed/Bundled/Supine/Prone
Body Orientation	East-West/North-South/Unknown
Head Orientation	North/South/East/West/Unknown
Lithics	Present/Absent
Bone	Present/Absent
Ceramics	Present/Absent
Shell	Present/Absent

Osteological Analysis

A skeletal assessment was performed on each individual to create an osteological profile. The demographic and osteological information was compiled following the established methods in Buikstra and Ubelaker (1994), White, Black, and Folkens (2012), and Ubelaker (1999) as baseline reference sources. Inventory, preservation analysis, and photo documentation were completed for each individual by Victoria Izzo, supervised by J. Marla Toyne at the Holtun Archaeological Project Lab. Each individual was evaluated for estimated age-at-death, biological sex, osteometric and odontometric data collection, as well as evidence of body modification, pathology, trauma, and dental pathology. The variables recorded in this project are defined below, including those recorded during data collection but not used in formal analysis such as stature, robusticity indices, activity markers of stress, and cranial indices. The results of the inventory assessment were recorded on datasheets and tabulated in Excel® spreadsheets.

Inventory

The first step to any osteological analysis is to perform an inventory of presence and completeness of skeletal elements and to determine the preservation of those elements. Each skeletal element was catalogued in inventory sheets following the guidelines following accepted standards in Buikstra and Ubelaker (1994). Each skeletal category was sided by "right" and "left". For fragmentary remains, the portion of the element is generally given, and the overall preservation of each element is included. Preservation can be fragmentary (<25%), partial (25-50%), nearly complete (50%-75%), and complete (>75%), or include just the cranium. For this portion of the recording Buikstra and Ubelaker (1994) use an abbreviated three part preservation code that includes fragmentary partial and complete, however, I have adapted that to include a 'nearly complete' code to divide the large percentage gap originally found in the 'partial' range.

Age-at-Death Estimation for Adults and Juveniles

Age-at-death estimation was assessed macroscopically. For adults, the pubic symphyses were observed where possible following the Suchey-Brooks method of scoring. This method uses a six-phase system based on the cumulative degeneration of the pubic symphysis (Brooks and Suchey 1990). The auricular surface was analyzed following Osborne and colleagues (2004) using a modified six phase system based on surface morphology of the auricular. Additionally, the sternal rib end was examined using a nine phase system based on age-related rib morphological changes (Işcan et al. 1984; İşcan 1985). Where primary methods for estimation of age-at-death were not possible, an assessment of cranial suture closure was employed following Buikstra and Ubelaker (1994) adapted from Meindl and Lovejoy (1985). The sutures were scored from 0-3, with 0 being open and 3 being completely obliterated, these scores were them combined into composite values that each have mean age ranges.

For juvenile remains, epiphyseal surfaces were observed following (White et al. 2012) based on the degree of epiphyseal ossification and union of long bones. Additionally, the ages for bone epiphyseal ossification and union are highly variable and increases with sex, age, ancestry, intra and inter-observer error, radiographic evaluation, and compatibility with the reference sample used (all-white children from the 1930's-1960's) (Scheuer and Black 2000). Dental development was observed through the mineralization of the crowns and roots, following Ubelaker (1999) based on 21 comparative developmental charts of tooth formation. Each chart provides an estimated range of mineralization and eruption of deciduous and permanent dentition up to 35 years of age, but are especially useful for estimating age-at-death for juveniles in concert with epiphyseal unions (Ubelaker 1999). Due to the patterned and sequential formation of teeth and genetic control, dental age is considered more reliable and precise than skeletal age (Scheuer and Black 2000; Ubelaker 1999; White et al. 2012). The combination of each of these methods determined by what skeletal materials are available, details of the source data, and a potential reference population allow the researcher to critically assess age-at-death for an individual. The age estimates were recorded as age cohorts: Child (0-5 years), Juvenile (6-15 years), Young Adult (20-35 years), Middle-aged Adult (35-50 years), and Older Adult (>50 years) (Buikstra and Ubelaker 1994). Long bone metrics were attempted where possible, but due to the fragmentary nature of the remains were not used in the estimation of age. Juvenile age was determined primarily through dental eruption patterns and if possible, through a combination with epiphyseal ossification.

Biological Sex Estimation

Biological sex estimation was assessed only for adults given the inappropriateness and lack of consistent results for sex estimation for juvenile remains (Scheuer and Black 2000). The

dimorphic features of the os coxae, such as the pubic bone shape and the preauricular surface, are considered to be the most reliable evidence for estimation of sex (Buikstra and Ubelaker 1994; Phenice 1969). Additionally, cranial morphology following Buikstra and Ubelaker (1994) was assessed for sex estimation. In some cases, due to the fragility of the ox coxae only cranial morphology was available to estimate sex.

To estimate sex from the os coxae the subpubic region, the preauricular sulcus, and the greater sciatic notch must each be observed and scored for morphological dimorphism (Buikstra and Ubelaker 1994; Phenice 1969). The Phenice technique uses the ventral arc, the subpubic concavity, and the ischiopubic ramus and a three-phase scoring system to determine sex from these traits. Though these three traits are taken in tandem with each other the ischiopubic ramus is the most likely to present ambiguous results and the ventral arc is the most reliable indicator of the three traits (Phenice 1969).

Compared to the os coxae the cranium is a far less accurate estimator of sex (Ubelaker 1999). Typically, males tend to have larger, more robust, and defined skulls than females. However, this observable quality cannot on its own estimate sex due to population, genetic, and taphonomic transformations common within a given population. The robusticity of the nuchal crest, the definition of the supraorbital margin, and the size of the mastoid process are all considered in this analysis. The traits were scored and then combined into a sex estimate. (Buikstra and Ubelaker 1994). For each skeleton, sex was classified as male, possible male, possible female, female, or indeterminate.

Metric and Non-Metric Analysis

Skeletal metrics and non-metric traits were recovered where possible for both cranial and post-cranial elements following Buikstra and Ubelaker (1994). Measurements of cranial and

post-cranial elements were recorded in millimeters using digital calipers, measuring tape, and an osteometric board where necessary. Given the preservation of the remains, robusticity indices for analysis of skeletal markers of stress and activity were not possible. Non-metric cranial and post-cranial traits were observed and recorded as present or absent, only skeletal anomalies were recorded

Paleopathological Evaluation

Osteological pathology were assessed through macroscopic description and evaluation of each observed skeletal lesion (Grauer 2007). Each individual in this sample was examined for presence of pathological conditions that would leave evidence on the skeletal system. If any identifiable bone modifications were found, they would be described following Buikstra and Ubelaker (1994). The evaluation of pathological conditions is a significant contribution to osteobiographic and bioarchaeological research because it can deepen our interpretations of the lives of the individuals at a site.

Subsequently, it is critical to understand the morphological and physiological processes of specific diseases that represent periods of health and stress during growth and development and which may be observed on through skeletal analysis. Buikstra and Ubelaker (1994) describe nine potential categories to use in this assessment: shape abnormalities, size abnormalities, bone loss, abnormal bone formation, fractures and dislocations, porotic hyperostosis/cribra orbitalia, vertebral pathology, arthritis, and miscellaneous conditions. This thesis identified skeletal evidence for porotic hyperostosis/cribra orbitalia, vertebral pathologies, osteoarthritis/degenerative joint disease, trauma, and infectious disease.

Porotic hyperostosis present on the cranial vault and cribra orbitalia of the superior aspect of the orbital bones have been commonly used as indicators of the health status in juveniles

(White et al. 2012). In general, a bioarchaeologist will observe whether or not the cortical surface of bone has evidence of thinning and porosity, and if the inner trabecular matrix has become exposed due to abnormal physiological stress (Goodman et al. 1984). However, what we observe on the skeleton are pathological lesions that may generally reflect the level of nutritional and environmental stress during growth and development (Goodman and Armelagos 1985). The lesions are generally thought to be caused by anemia, parasitic infections, or non-specific stress, and are commonly associated to childhood biological health status because they usually display evidence for remodeling once an individual has reached adolescence or adulthood (White et al. 2012). These conditions were noted as either present or absent within the skeleton and the degree or severity of their expression was coded as either mild (minimal porosity of the cranial vault), moderate (porosity was visible but not extensive), or severe (evidence of porosity with foramina formation, the thickening of the cranial vault, and remodeling indicative of a healing response to the lesion).

Each individual vertebra was observed for the presence of Schmorl's nodes, osteophytic growth, osteoarthritic growth and changes to the vertebral morphology (Buikstra and Ubelaker 1994). Each of these abnormalities are generally associated to conditions developed through strenuous activity or advanced age. Schmorl's nodes on vertebrae are protrusions of the spinal disk soft tissue into the bony body of a neighboring vertebrae causing a depression on the vertebral body and are the most obvious example because they are usually the end result of heavy labor, stress, trauma, or other spinal condition that has placed pressure on the intervertebral disks of the vertebral column (Buikstra and Ubelaker 1994). Osteophytes are skeletal proliferations of bone on the body of a vertebrae that are also associated to activity or age-related episodes of stress typically caused by the disintegration of intervertebral disks.

Lastly, the vertebrae were also examined for osteoarthritis including changes to the porosity of the vertebrae, marginal lipping at the articulating surfaces, and joint eburnation wherever possible given the recovered remains. In addition to present/absent identification, the degree of expression for osteophytes and osteoarthritis was also recorded and identified as minor, moderate, or pronounced where possible.

Degenerative joint disease or osteoarthritis is primarily caused by repetitive activity related stress to joints and joint surfaces that cause them to wear down and potentially produce morphological anomalies (White et al. 2012). Evidence of degenerative joint disease can include marginal lipping at the articulating surfaces, porosity, and joint eburnation. The presence, degree, and location of these pathology were recorded as either minor, moderate, or severe.

Traumatic injury can affect the human system in numerous ways: a break either complete or partial, nerve or blood supply disruption, and the dislocation of joints (Ortner 2003; White et al. 2012). Depending on several factors including, sex, age, gender, the specific bone involved, the specific processes that caused trauma and its resulting effects – observable changes to the bone may vary (Ortner 2011b; Waldron 2020).

The most common of the three broad impacts that trauma may have on archaeological remains is fracturing. Generally, a fracture is a discontinuity of bone or cartilage (Lovell 1997; Ortner 2011b). The severity of a fracture is assessed as either simple or complete (where no bone actually fully broke), comminuted (where the result of the fracture is more than two bone segments), or incomplete (where there is not complete breakage of the bone) (Ortner 2003; Waldron 2020). These fracture types are the result of a combination of stressors (forces) placed on the bone, which resulted in the overexertion of the bone causing it to crack. To describe fractures, the impact site, severity, and degree of healing were catalogued. Along with these

descriptors, if possible, a description of the most likely causal stressor and potential conditions that may have enabled its occurrence also took place.

Specific infectious disease identification within bioarchaeological analysis is usually difficult to accomplish macroscopically since often the morphological changes we observe do not correlate with a precise etiology, but rather can be the result of numerous diseases (Brickley et al. 2020). Most diseases that have the ability to affect the skeletal systems often kill an individual before the boney changes may develop (Wood et al. 1992). However, non-specific osseous changes to bone including periostitis, osteitis, and osteomyelitis are observed within archaeological contexts because they may have played a major part in the overall health of an individual or population (Goodman et al 1984). These macroscopic identifications were recorded if observed, their location, severity, changes to bones were all noted if possible.

Dental pathology

Dental pathology are often associated with the consumption of nutritional resources, infectious processes, genetic anomaly, developmental malformations, or cultural practices, and were assessed following Buikstra and Ubelaker (1994). Dental pathology includes developmental defects like dental enamel hypoplasia (DEH), evidence of disease such as dental calculus build-up, carious lesions, periodontal disease, abscesses, and alveolar resorption and were noted where possible through macroscopic inspection. In addition to this, tooth development, enamel formation, and degenerative dental wear were scored and catalogued on an ordinal scale for each observed individual. Dental non-metric traits like the presence of shovel shaped incisors, or an interruption groove were scored ordinally or simply marked present or absent, and where a ranked scale was not possible, only anomalies were recorded.

Dental enamel hypoplasia (DEH) is the product of developmental disturbances in the formation of enamel usually the result of disease processes or inadequate nutrition during a specific period of growth (Goodman and Armelagos 1985; Roberts and Manchester 2007; Skinner and Goodman 1992). Though the disruption is non-specific bioarchaeologists interpret their occurrence as evidence for early life trauma caused by physiological, genetic, or environmental variables (Goodman et al. 1984). Visually DEH is identified by the presence of pits or grooves, collectively known as Linear Enamel Hypoplasia (LEH). Though more advanced analysis is possible with these data the scope of this project included the macroscopic recording of enamel hypoplasia by tooth and their severity on an ordinal scale (Mays 2021). If identified, the results will be summarized by individual.

Periodontal disease is essentially the inflammation of the soft tissues due to gingival bacteria that if untreated may spread to alveolar bone surrounding a tooth (Ortner 2003). Periodontal disease may also cause soft tissue apertures of puss that contribute to the disintegration of the alveolar bone supporting teeth. For this burial population, periodontal disease was recorded as slight, moderate, or severe where observed.

Alveolar resorption is usually the result of periodontal disease and causes the bone along the alveolus to recede resulting the loss of teeth before death (Ortner 2011a). To confirm antemortem tooth loss due to age or poor oral health there must be evidence of bone remodeling (e.g., healed alveolar bone where once there may have been a tooth socket) in contrast to no remodeling, which would suggest postmortem tooth loss. Where remodeling of the alveolus was observed the location of the lost tooth and the degree of remodeling was recorded as either none, partial, or complete.

Abscesses generally indicate inflammation of the pulp chamber in a tooth following the development and proliferation of dental caries (Buikstra and Ubelaker 1994). If visible, this feature was scored on an ordinal scale of 1-5 and its location was noted.

Caries are the result of gradual demineralization of enamel, and eventual disintegration of tooth dentin and cementum (Hillson 1996). Most caries are formed due to acetic fermentation of carbohydrates consumed as a part of the diet, suggesting that there exists a relationship between carious lesions and diets high in sugar (Cucina et al. 2011; Hillson 2001). This project specifically scored caries on an ordinal scale and catalogued them according to their location on each individual. There are two different types of carious lesions, defined primarily through their occurrence on teeth: Coronal lesions, which occur on the enamel of a crown, and root surface lesions, which occur at the cemental-enamel junction (CEJ) or at root surfaces typically exposed due to advanced periodontal disease (Cucina et al. 2019; Hillson 2005).

When dental plaque, the natural buildup of organic material (biofilm) around the cementum line occurs, it mineralizes and becomes dental calculus which is visible upon macroscopic analysis of teeth (Hillson 1996). This dental calculus is composed of microscopic residues of food and organic material that contributes to our reconstruction of ancient health and diet and was scored on an ordinal scale (Table 2) for this thesis based on relative amount adhering to the tooth crowns (Brothwell 1981; Cucina et al. 2019).

Dental wear is the degenerative attrition of the occlusal surface of a tooth and can be associated to age as well as dietary resources. Over time, a tooth will lose its chewing surface due to normal use or individual practices such as night grinding, and coarse foods may also cause substantive wear to the teeth. This project recorded the degree of degradation on an ordinal scale (Table 2) as outlined in Buikstra and Ubelaker (1994).

Cultural modification of the body

In addition to skeletal modifications caused by accident, violence, or pathological processes, cultural practices and surgical interventions may be visible archaeologically (Tiesler 2014). For the purposes of this project, cultural modification was defined as the cultural practices whose product is the intentional modification of the body or the byproduct of habitual activities, such as dental filing or inlays, tool use modifications, and cranial head-shaping (Buikstra and Ubelaker 1994; Dembo and Imbelloni 1938; Tiesler 2014). Following Buikstra and Ubelaker (1994) an in-depth description of the modification, including images and the materials introduced to the body as a consequence of modification were recorded to allow sorting into categories that may help describe the intentionality behind modification.

Dental modification as a result of cultural beliefs or habitual activity is common throughout the ancient Maya region (Tiesler 2014). This practice could include the use of filing or inlays as potential alterations to dentition or pipe smoking or making string as unintentional modifiers (though I argue that these too are intentional). This study will use the typology created by Romero–Molina (1970) and the categories developed by Buikstra and Ubelaker (1994) to classify dental modification. Romero–Molina (1970) categorized over 1000 teeth into 59 different types present in the prehistoric Americas that were used as bucket categories for the dental modification in this project following the five broad categories proposed by Buikstra and Ubelaker (1994): surface modification with filing, surface modification with drilling (with or without inlays), dental repairs, dental wear associated with artifact use or labor, and tooth ablation. Dental modifications were recorded as present or absent for each individual by tooth type, and were classified using the Romero's (1952) differential classification for filing and inlays. In cases where modification was present, the type of modification was identified a

detailed description of the modification including measurements, and photographs were also included.

Intentional modification of a developing cranium is likely the result of cultural values and is nearly ubiquitous throughout prehistory dating as far back as 45,000 years (Aufderheide et al. 1998; Trinkaus 1982). The last two centuries of research have produced an overwhelming amount of literature regarding the classificatory systems used for describing crania and their modification (Tiesler 2014). Cranial modification is conducted primarily during first infancy (Birth – 3 years) where the malleable nature of this growth stage is what allows for the head to alter its shape and form the majority of cranial modification years in juveniles. Usually, this modification is done through the use of a cradle board that flattens the posterior portion of the cranium or through constricting bands (discussed below). As growth progresses and the brain increases in volume, the bones that encapsulate it accommodate its growth by expanding proportionately.

The classification by Dembo and Imbelloni (1938) is the most predominantly used to date in Mesoamerica (though there have been modifications) and it identifies three main classes of modifications, Tabular: oblique, Tabular: erect, and annular (Boston 2012; Dembo and Imbelloni 1938; Tiesler 2014; White 1996). Annular modifications are carried out by using bands or constricting ligaments throughout the circumference of the cranium that compress and redirect growth angularly away from the face (Tiesler 2014). Tabular modifications are subdivided into two categories, oblique shapes are accomplished by the use of head splints that produce backwards incline and parallel compression vectors, and erect modifications are usually produced through cradle boards or "body kits" that produce a flattened occiput. However, tabular forms may be created through the concurrent use of multiple devices. Individuals were observed

for cranial modification and were recorded as being present or absent. Additionally, detailed descriptions, measurements, photographs, and suggestions (where possible) about the type of modification and force vectors that may have been used in shaping the crania were also included. Table 2 includes of all osteological variables examined and how each were coded for this thesis.

Table 2. List of the osteological variables examined and the observable codes used.

Variable	**Coded Observation**
Preservation	Fragmentary (<25%), Partial (25-50%), Nearly Complete (50%-75%), and Complete (>75%)
Biological Sex	Male/|Likely Male/Likely Female/ Female/ Indeterminate
Age	Child (0-5 years), Juvenile (6-15 years), Young Adult (20-35 years), Middle-aged Adult (35-50 years), and Older Adult (>50 years)
Metrics	Measured only where possible (mm)
Non-Metrics	Present/Absent only anomalies recorded
Porotic Hyperostosis	Presence/Degree/Severity
Cribra Orbitalia	Presence/Degree/Severity
Vertebral Arthritis	Presence/Degree/Severity
Osteoarthritis	Presence/Degree/Severity
Trauma	Present/Absent/Description of Trauma
Dental Hypoplasia	Ordinal Scale Scoring (1-5)
Periodontal Disease	Present/Absent/Location observed
Alveolar Resorption	Present/Absent/Location observed
Abscess	Ordinal Scale Scoring (1-5)
Dental Plaque	Ordinal Scale Scoring (1-5)
Caries	Ordinal Scale Scoring (1-5)
Dental Wear	Ordinal Scale Scoring (1-5)

Statistical Analysis

This project produced categorical, ordinal, and numeric variables that were organized through Excel® sheets and produced 20 osteobiographic narratives for the sample from Holtun, as well as charts and graphs that describe and detail the information from each individual. The analysis of the materials uses visual charts and images, and both descriptive and inferential statistical methods using R 4.0.2 statistical programming software. Descriptive statistics were

used to tabulate data that will highlight the variation within this sample. Where possible chi-square statistics were performed to highlight the relationship between categorical variables (VanPool and Leonard 2011). All data were created and analyzed through R statistical computing environment– the analytical strategy of this project was performed with base R and the package DescTools (R Core Team 2020; Signorell et al. 2018). The graphics for this project were created in Microsoft Excel® and Word Processor®.

The data collected by the mortuary analysis were nominal data, which restricts the type of analytical strategies that we may employ to quantify mortuary trends in data. Likewise, the research questions asked also restrict how the data were indexed and analyzed. To understand intrasite trends, the data were those categorized into burials in plaza contexts and burials in non-plaza contexts.

To understand the central tendency of these data, I employed the use of statistical Mode within the mortuary data set of the thesis. The mode of a data set is a helpful measure of central tendency when examining nominal data, such as grave–types or bodily orientation, for which it is impossible to calculate a mathematical median value based on ordering or hierarchical thresholds. Due to the nature and structure of the data, this is the only measure of central tendency that is appropriate given that the data collected are unranked and non-continuous mortuary variables, eliminating both median and mean from formal analysis.

Beyond central tendency, the structure and type of data permits analysis through proportions. To perform an analysis of proportions first these data needed extensive indexing. To do this, data had to be sorted in a way that related each mortuary variable examined to the site and burial location of each individual within the sample. Ultimately, this created numerous contingency tables from which values could be extracted for analysis. Specifically, nominal data

such as this is well suited for analysis of proportions that assess whether an overall proportion of a variable is significantly different from that variable's observed true value (VanPool and Leonard, 2011). This is the principal statistical test that was used to identify significance between plaza and non-plaza burials at Holtun. Significance for this project is set at a probability (p) value of 0.05 or less, which will indicate that the variables analyzed in the proportions test have a five percent chance (or less) of occurring randomly and are therefore considered significant (Smith 2020).

For the intrasite analysis, several proportions tests were employed. A test for equality of proportions was carried out for both plaza and residential burials for each mortuary variable selected for analysis. This test specifically compared if certain mortuary variable subcategories in burials within plazas and non-plazas diverge from the expected proportion of burials at the site. This test produced a Pearson's X^2 test statistic and significance value due to its use of the test for equality of proportions. If any of these proportions tests identify a significant relationship, then for each of those significant tests a pairwise proportions test was employed to attempt and identify which pair-wise comparison(s) of proportions was responsible for the significant result. Given the sample proportions test used upon the data for intrasite analysis a Cramer's V coefficient of effect size was calculated to accommodate for the larger degree of potentially observable categories of variables. In addition to this burial location specific test, a 2-sample pairwise proportion test was run on all mortuary variables between plaza and non-plaza burials to identify if there is a relationship between the two or not. This test shows whether any trends observed within either location are actually significant trends related to that location or not. If significance was identified, then a Phi's coefficient of effect size was calculated on the proportions given that they would be within a traditional 2x2 contingency table.

Research Questions and Hypotheses

For the research question outlined in Chapter one a series of hypotheses based on starting similarities for the thesis were constructed from the region, site, and sample of the project:

Hypothesis One: The sample will exhibit similar mortuary features, such as grave construction, location, and complexity, that would signal similar mortuary practices for the site (Scherer 2020).

- The burials from this sample will all include similar ceramic quantities and types, which could signal a uniform burial practice. I expect to find common vessel types complete and fragmentary and similar ceramic offerings that would suggest a similar mortuary ritual throughout the sample.
- Additional grave offerings such as chert, worked bone, and obsidian will be similar and suggest the uniform placement of mortuary goods during ritual interment.

Hypothesis Two: The individuals in this sample represent a similar/consistent pattern of osteological indicators of age/sex and skeletal features (Tiesler 2020).

- There will be an equal distribution of all demographic classes of individuals across age and sex categories suggesting that Maya mortuary rituals were not selective in who was buried and where.
- The individuals from Holtun will exhibit similar distribution and range of paleopathological characteristics. I expect there should be few indicators of skeletal indicators of stress, such as Linear Enamel Hypoplasia (LEH), evidence of healed trauma, and presentation of pathological conditions, consistent with limited access to corrective dentistry or medical care.

- I expect that there will be consistent patterns and distribution of dental and cranial modification in the sample. Though the sampling strategy for this project was to examine households primarily, in the Maya region, body modification was not a socially stratified practice and, therefore, could be found throughout the site of Holtun (Tiesler 2014).

Hypothesis Three: Through a comparative osteobiographic analysis of burials at Holtun, that individuals were similar in comparison to others at the site (Robb 2019).

- The mortuary and skeletal variation expressed at Holtun, Guatemala, will be similar throughout and that Holtun shared in common social experiences throughout the occupational history of the site.

Chapter Summary

This chapter presented the methodological techniques used to collect data and interpret the individuals from Holtun. The goal was to introduce methods and variables collected from these remains that would permit an examination of mortuary and biological characteristics. Additionally, this chapter introduced the three hypotheses for this study, which were crafted from the original research question in chapter one. Each of these hypotheses will be addressed by the data collected from these individuals and presented in Chapter 4.

CHAPTER FOUR: RESULTS

This chapter presents the results obtained from the mortuary, osteological, and comparative analyses of burials from Holtun. The latter part of this chapter will present the results from proportions statistical tests from mortuary contexts within this sample.

Mortuary Analysis

The Minimum Number of Individuals for this sample was determined to be 20. This included one individual represented by one right third mandibular molar and a fetus recovered from the context of Ind. 3 (HTN.7.9.6) (Figure 4). Additionally, individuals corresponded to four distinct time periods in Maya history, the Middle Preclassic (35%, n=7), the Late Preclassic (10%, n=2), and the Late Classic period divided into the Early–Late Classic (20%, n=4) and the Late–Terminal Classic (35%, n=7).

Individuals were identified in three different types of locations. Two individuals (10%, n=2) were uncovered within ceremonial buildings, eight individuals from residential platforms (40%, n=8), and ten from plaza contexts (45%, n=10).

The results of the mortuary analysis are reported in this section for the 20 burials. Of the burials identified at Holtun the majority were recovered from primary contexts (85%, n=17) (Figure 4). Secondary burials comprised (15%, n=3) of the sample. Of the 20 burials within this sample (60%, n=12) were individual interments and (40%, n=8) were identified as multiple interments. Figure 4 represents Ind. 3 (HTN.7.9.6) and Ind. 3b (HTN.7.9.6) found within the same burial context.

Figure 4 Image of Ind. 3 (HTN.7.9.6) within their primary burial context (Crawford 2017).

The majority of graves recorded at Holtun were either simple (45%, n=9) or cist graves (45%, n=9). The remaining two burials within the sample were identified as a *chultun* (5%, n=1) and a crypt (5%, n=1). It is important to note that no tombs, cache/vessel, or unknown burials were identified within the sample.

Figure 5 Image of Ind. 15 (HTN.23.4.4C.7) within their cist grave (Crawford 2017).

For body position, nearly half of individuals were identified within a supine position (45%, n=9), one individual was identified in a prone position (5%, n=1) and two individuals were identified in a (possible) flexed (seated) position (10%, n=2) (Figure 6). A significant amount of individuals could not be observed for body position given the poor preservation of the remains within this sample (40%, n=8) (Figure 7). The majority of the identified arms were placed in an extended position (50%, n=10), four individual's arms were identified in a flexed position (20%, n=4), and four individuals could not be observed due to the degradation of the remains within the burial environment (20%, n=4).

The majority of the identified legs were placed in an extended position (55%, n=11), three individual's legs were identified in a flexed position (15%, n=3) and six individuals could not be observed due to the degradation of the remains within the burial environment (30%, n=6).

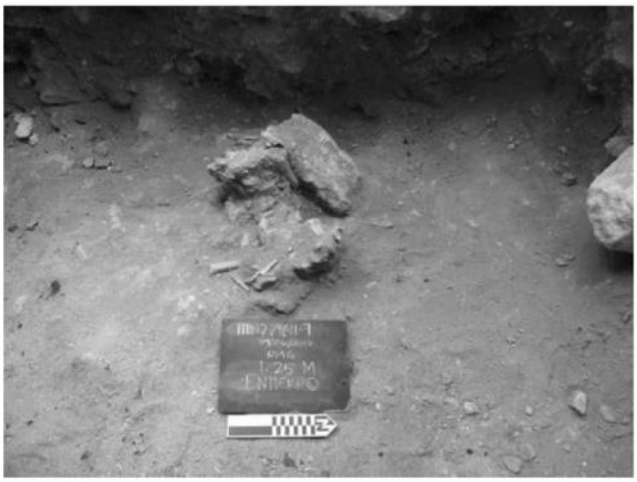

Figure 6 Image of Ind. 16 (HTN.2.29C.11.7) within a flexed position (Gill 2017).

Figure 7 Image of Ind. 7a (HTN.1.6.19.Ind1) within poorly preserved context obscuring analysis of orientations (courtesy of Holtun Archaeological Project).

A total of eight individuals, totaling (40%, n=8) of the sample, were interred in a north-south orientation (Figure 8). Five individuals, (25%, n=5) of the sample, were interred in an east-west orientation, and seven individuals (35%, n=7) could not be observed due to their preservation in the burial environment.

Figure 8 Image of Ind. 4 (HTN.2.39) oriented East–West (courtesy of Holtun Archaeological Project).

A total of seven individuals (45%, n=7) were placed with their heads to the north, three individuals (15%, n=3) with their heads to the east, one individual (5%, n=1) to the west, and nine individuals (50%, n=9) unknown. Unknown individuals were either recovered in contexts where the orientation was unclear or where too few fragments remained to determine *in situ* orientation.

Grave good type and distribution included lithics, ceramics, bone, and shell. It should be noted that in addition to presence and absence data, in some cases, specific grave goods could be identified from each burial (such as specific vessel forms, zoomorphic figurines, jade, etc.) and

are reported within the narrative of each osteobiography where possible (see Appendix A). Three notable exceptions to include in this section are the remnants of a shell artifact (possibly a belt) with burr holes recovered within the context of Ind 16 (HTN.2.29C.11.7) (Figure 8), a partial zoomorphic figurine recovered within the context of Ind 4 (HTN.2.39) (Figure 9), and a worked bone with a mat incised pattern recovered within the context of Ind 2 (Figure 10).

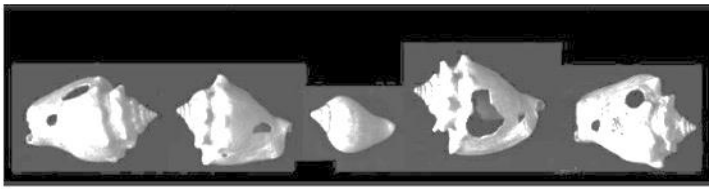

Figure 9 Shell artifacts recovered from context of Ind. 16 (HTN.2.29C.11.7) (courtesy of Holtun Archaeological Project).

Figure 10 Partial zoomorphic artifact recovered from context of Ind. 4 (HTN.2.39) (courtesy of Holtun Archaeological Project).

Figure 11 Bone artifact recovered from context of Ind. 2 (HTN.7.1.3) (courtesy of Holtun Archaeological Project).

From this sample, ceramics were observed in the majority of the sample (94%, n=17), lithics were observed as part of the mortuary assemblage for a significant portion of individuals

(72%, n=13), bone was observed in only three burials (17%, n=3), and shell was observed in eight burials (44%, n=8).

The results from the statistical mode analysis of each of these variables is reported in Table 3. One of the variables, the construction of the grave, actually resulted in a bimodal result where both simple and cist graves are equally represented. The implications of this result are discussed in Chapter Five.

Table 3 Mode results for observed mortuary variables.

Variable	**Mode**
Time Period	Late Classic
Location	Plaza
Internment	Primary
Burial Location	Platform
Burial Construction	Simple and Cist (Bimodal)
Body Position	Extended
Body Orientation	North-South
Head Orientation	North
Lithics	Present
Bone	Absent
Ceramics	Present
Shell	Absent

The data WERE also sorted by time period and sex in attempt to identify temporal shifts in mortuary behavior. The results for burial location are presented below in Table 4. From this table we can see that burials within ceremonial buildings were only identified during the Middle Preclassic and are both male individuals within the burials. Additionally, platform burials were only identified for the Late Preclassic and Early–Late Classic periods. Plaza burials were only identified for the Middle Preclassic, Early–Late Classic and Late–Terminal Classic.

Table 4 Burial location by time period and sex.

Time period	Sex	Ceremonial Building	Plaza	Platform
Middle Preclassic (n=7)	Male	2	1	0
	Female	0	2	0
	Unknown	0	2	0
Late Preclassic (n=2)	Male	0	0	1
	Female	0	0	1
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	0	1	0
	Female	0	0	3
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	1	0
	Female	0	2	0
	Unknown	0	4	0

The results for burial type are presented below in Table 5. The table demonstrates that simple graves seem to be more frequent during the Middle and Late Preclassic periods whereas during the Late Classic period cist graves seem to be more prevalent. Both males and females seem to replicate this pattern though there seems to be some diversity where one individual from each the Preclassic and Late Classic was found in a cist and a simple grave respectively.

Table 5 Grave–type data by time period and sex.

Time period	Sex	Simple	Cist	Chultun	Crypt	Tomb	Cache	Unknown
Middle Preclassic (n=7)	Male	3	0	0	0	0	0	0
	Female	1	1	0	0	0	0	0
	Unknown	2	0	0	0	0	0	0
Late Preclassic (n=2)	Male	1	0	0	0	0	0	0
	Female	1	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0
Early–Late Classic (n=4)	Male	0	1	0	0	0	0	0
	Female	0	3	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0
Late–Terminal Classic (n=7)	Male	0	0	1	0	0	0	0
	Female	0	2	0	0	0	0	0
	Unknown	1	2	0	1	0	0	0

The results for body position are presented below in Table 6. This table shows that most of the represented burials within this sample were identified in a supine position. Interestingly both of the flexed individuals identified are of male sex, and the prone burial was a female individual. Additionally, for the Middle Preclassic, it should be noted that the majority (n=5) of individuals could not be observed for position of the legs.

Table 6 Body position data by time period and sex.

Time period	Sex	Supine	Prone	Flexed (Seated)	Unknown
Middle Preclassic (n=7)	Male	0	0	1	2
	Female	1	0	0	1
	Unknown	0	0	0	2
Late Preclassic (n=2)	Male	0	0	0	1
	Female	0	1	0	0
	Unknown	0	0	0	0
Early–Late Classic (n=4)	Male	1	0	0	0
	Female	3	0	0	0
	Unknown	0	0	0	0
Late–Terminal Classic (n=7)	Male	0	0	1	0
	Female	2	0	0	0
	Unknown	3	0	0	1

The results for position of the arms are presented below in Table 7. This table shows that the majority of observed arms were identified in an extended position however, during all four time periods individuals with flexed arms are male. Additionally, for the Middle Preclassic, it should be noted that the majority (n=4) of individuals could not be observed for position of the arms.

Table 7 Position of the arms by time period and sex.

Time period	Sex	Extended	Flexed	Unknown
Middle Preclassic (n=7)	Male	1	1	1
	Female	1	0	1
	Unknown	0	0	2

Late Preclassic (n=2)	Male	0	1	0
	Female	1	0	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	0	1	0
	Female	3	0	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	1	0
	Female	2	0	0
	Unknown	2	0	2

The results for position of the legs are presented below in Table 8. This table shows that the majority of observed legs were identified in an extended position. However, during the Middle Preclassic, Early–Late Classic, and Late–Terminal Classic all males are flexed. Additionally, for the Middle Preclassic, it should be noted that the majority (n=4) of individuals could not be observed for position of the legs.

Table 8 Position of the legs by time period and sex.

Time period	**Sex**	**Extended**	**Flexed**	**Unknown**
Middle Preclassic (n=7)	Male	1	1	1
	Female	1	0	1
	Unknown	0	0	2
Late Preclassic (n=2)	Male	0	1	0
	Female	1	0	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	1	0	0
	Female	3	0	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	1	0
	Female	2	0	0
	Unknown	2	0	2

The results for orientation of the body are presented below in Table 9. This table shows that during the Middle and Late Preclassic burials are oriented East–West, and during the Early–Late and Late–Terminal Classic burials are oriented North–South. Additionally, for the Middle

Preclassic and Late–Terminal Classic, it should be noted that the majority (n=4) of individuals could not be observed for orientation of the body.

Table 9 The results for orientation of the body by time period and sex.

Time period	Sex	North/South	East/West	Unknown
Middle Preclassic (n=7)	Male	0	2	1
	Female	0	1	1
	Unknown	0	0	2
Late Preclassic (n=2)	Male	0	1	0
	Female	0	1	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	1	0	0
	Female	3	0	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	0	1
	Female	2	0	0
	Unknown	2	0	2

The results for orientation of the head are presented below in Table 10. This table shows that during the Middle and Late Preclassic period the orientation of the head occurs either to the east or west and during the Early–Late and Late-Terminal Classic periods orientation of the head was identified exclusively in either the north or south. However, for the Middle Preclassic and the Late–Terminal Classic period, it should be noted that the majority (n=4) of individuals could not be observed for position of the legs.

Table 10 The results for orientation of the head sorted by time period and sex.

Time period	Sex	North	South	East	West	Unknown
Middle Preclassic (n=7)	Male	0	0	1	1	1
	Female	0	0	1	0	1
	Unknown	0	0	0	0	2
Late Preclassic (n=2)	Male	0	0	0	0	1
	Female	0	0	1	0	0
	Unknown	0	0	0	0	0
Early–Late Classic (n=4)	Male	1	0	0	0	0
	Female	3	0	0	0	0
	Unknown	0	0	0	0	0
Late–Terminal Classic (n=7)	Male	0	0	0	0	1
	Female	2	0	0	0	0
	Unknown	1	0	0	0	3

The results for presence of ceramics are presented below in Table 11. Ceramics were identified in nearly every burial from all four time periods and for both sexes.

Table 11 The result for presence of ceramics by time period and sex.

Time period	Sex	Present	Absent	Unknown
Middle Preclassic (n=7)	Male	3	0	0
	Female	2	0	0
	Unknown	2	0	0
Late Preclassic (n=2)	Male	1	0	0
	Female	1	0	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	1	0	0
	Female	2	1	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	1	0	0
	Female	2	0	0
	Unknown	4	0	0

The results for presence of lithic are presented below in Table 12. Lithics were identified from burials of each period. However, interestingly, no females during the Early–Late Classic period were observed to have any lithics.

Table 12 The result for presence of lithics by time period and sex.

Time period	Sex	Present	Absent	Unknown
Middle Preclassic (n=7)	Male	3	0	0
	Female	2	0	0
	Unknown	2	0	0
Late Preclassic (n=2)	Male	0	1	0
	Female	1	0	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	1	0	0
	Female	0	3	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	1	0	0
	Female	2	0	0
	Unknown	3	1	0

The results for presence of bone are presented below in Table 13. This table shows that bone was present for burials during the Middle and Late Preclassic periods, but largely absent from the Early–Late and Late–Terminal Classic periods.

Table 13 The result for presence of bone by time period and sex.

Time period	Sex	Present	Absent	Unknown
Middle Preclassic (n=7)	Male	0	3	0
	Female	1	1	0
	Unknown	2	0	0
Late Preclassic (n=2)	Male	1	0	0
	Female	0	1	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	0	1	0
	Female	0	3	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	1	0
	Female	0	2	0
	Unknown	0	4	0

The results for presence of shell are presented below in Table 14. Interestingly, shell seems to be present (n=10) and absent (n=10) equally throughout the sample. However, during the Early–Late Classic, all females recovered seem to lack this grave artifact within their context.

Table 14 The result for presence of shell by time period and sex.

Time period	Sex	Present	Absent	Unknown
Middle Preclassic (n=7)	Male	1	2	0
	Female	1	1	0
	Unknown	2	0	0
Late Preclassic (n=2)	Male	1	0	0
	Female	0	1	0
	Unknown	0	0	0
Early–Late Classic (n=4)	Male	0	1	0
	Female	0	3	0
	Unknown	0	0	0
Late–Terminal Classic (n=7)	Male	0	1	0
	Female	2	0	0
	Unknown	3	1	0

Additionally, one question of interest is understanding intrasite trends within burials in plaza contexts and burials in non-plaza contexts, which meant that the data had to be segmented into those two categories. These two categories were chosen to make the sample size for each category larger and more tolerant to errors that could occur throughout the statistical treatment of the variables. Since there are three different locations of burial, platform and ceremonial building burials were collapsed into the category of "non-plaza" burials for this analysis. The resulting analysis consisted of nine plaza burials and nine non-plaza burials. Each category of burial was treated with a proportions test for each of the examined variables within the mortuary analysis section. These results suggest that in relationship to the expected proportions for each of these variables, non-plaza burials were statistically significant for having a divergent association to feature type, disposal, individuality, orientation, and ceramics. Plaza burials were only statistically deviated from expected proportions for the inclusion of ceramics within the sample. N/A's in these two tables represent analyses that could not be run due to sample size or analyses not performed because results used in the analysis were above the predetermined threshold for significance and so analysis did not proceed to consider and include effect size. Overall, these results show that there is significance between 5 of these variables and non-plaza burials. However, upon pair-wise comparison of each burial location and variable there was no significant relationship found within any of the variables (Tables 17, 18, 19, and 20). This suggests that the results may have been affected by type I error within this test as may frequently occur in samples of extremely low sample size, essentially creating falsely significant results. This is further corroborated by the results of Cramer's V analysis of effect size which finds that for all significant variables in these tables', values range from 0.02 – 0.37 suggesting a very weak relationship between these variables and burial location. Ultimately, this analysis affirms

that there is no statistically significant relationship between any of the mortuary variables examined and the location of the burials at the site of Holtun.

Table 15 Results of proportions tests for burial location and mortuary variables. (* signifies a statistically significant result).

Burial Location	**Test**	**Result**	**Feature Type**	**Orientation**	**Disposal**	**Individuality**
Plaza	Proportions Test	χ^2 Stat	8.75	2.60	1.80	0.20
		P-value	0.06	0.27	0.17	0.65
	Cramer's V	Value	N/A	N/A	N/A	N/A
Non-Plaza	Proportions Test	χ^2 Stat	10.31	6.00	6.25	6.25
		P-value	0.03*	0.04*	0.01*	0.01*
	Cramer's V	Value	0.37	0.33	0.36	.36

Table 16 Results of Proportions tests for burial location and presence of grave goods. (* signifies a statistically significant result).

Burial Location	**Test**	**Result**	**Ceramics**	**Lithics**	**Bone**	**Shell**
Plaza	Proportions Test	χ^2 Stat	4.90	2.50	2.50	1.38
		P-Value	0.02*	0.11	0.11	0.23
	Cramer's V	Value	0.02	NA	NA	NA
Non-Plaza	Proportions Test	χ^2 Stat	6.12	0.00	3.12	1.12
		P-Value	0.01*	0.28	0.07	0.28
	Cramer's V	Value	0.02	NA	NA	NA

Table 17 Results of proportions test between burial locations and grave type.

Burial Location	Test	Result	Chultun Grave	Cist Grave	In Fill Grave	Crypt Grave	Pit Grave
Plaza V. Non-Plaza	Proportions Test	χ^2 Stat	0.01	0.00	0.00	0.00	0.00
		P-Value	0.91	1.00	1.00	1.00	1.00
	Phi's V	Value	NA	NA	NA	NA	NA

Table 18 Results of proportions tests between burial location and orientation.

Burial Location	Test	Result	North/South Orientation	In Fill Orientation	East/West Orientation
Plaza V. Non-Plaza	Proportions Test	χ^2 Stat	0.00	0.00	0.70
		P-Value	1.00	1.00	0.40
	Phi's V	Value	NA	NA	NA

Table 19 Results of proportions test between burial locations and internment characteristics.

Burial Location	Test	Result	Primary Interment	Secondary Interment	Single Interment	Multiple Interment
Plaza V. Non-Plaza	Proportions Test	χ^2 Stat	0.10	0.10	0.58	0.58
		P-Value	0.75	0.75	0.44	0.44
	Phi's V	Value	NA	NA	NA	NA

Table 20 Results of proportions test between burial location and grave goods.

Burial Location	**Test**	**Result**	**Ceramics**	**Lithics**	**Bone**	**Shell**
Plaza V. Residential	Proportions Test	χ^2 Stat	0.00	0.00	0.00	1.01
		P-Value	1.00	1.00	1.00	0.31
	Phi's V	Value	NA	NA	NA	NA

Osteological Analysis

Preservation was estimated macroscopically for each of the 20 individuals. Eight individuals were identified in fragmentary preservation (40%, n=8), four individuals were identified in partial preservation (15%, n=3), four individuals were identified in nearly complete preservation (25%, n=5), and four individuals were identified as completely preserved (20%, n=4) (Figure 12).

Figure 12 Overhead image of Ind. 13 (HTN.6.8/11.8) displaying complete preservation (Courtesy of Holtun Archaeological Project).

Age-at-death was estimated, and Table 21 presents the distribution of sex and age categories for the sample from Holtun. The majority of individuals (90%, n=18) were adults at the time of death. Additionally, only two individuals (10%, n=2) were determined to be non-adults: Ind. 3b (HTN.7.9.6), a fetus, and Ind. 6 (HTN.6.2.4), a juvenile (6-15 years) (Figure 13). The largest percent of burials at Holtun (35%, n=7) were young adult (20-35 years) at the time of death. A smaller percentage of the burial population was identified as middle-aged adults (35-50

years) (20%, n=4), and only one individual (5%) was an older adult (>50 years). Lastly, non-specified adults, where the specific age category of the individual could not be determined comprised 25% (n=5) of the sample.

Table 21 Age distribution (in years) for the Holtun sample.

Sex	**Juvenile (0-15 years)**	**Young Adult (20-35 years)**	**Middle-aged Adult (35-50 years)**	**Older Adult (50+ years)**	**Adult (age unknown)**	**Total**
Male	0	1	0	0	0	1
Probable male	0	2	1	1	1	5
Female	0	2	0	0	0	2
Probable female	0	1	3	0	2	6
Indeterminate	2	1	0	0	3	6
Total	2	7	4	1	6	20

Figure 13 Image of deciduous and permanent dentition of Ind. 6 (Izzo 2017).

Osteological analysis of biological sex was conducted for the 18 adult individuals. Of these adults, sex could not be accurately estimated for 15% (n=3) of the sample. This is primarily due to the minimal amount of recovered material for each of these individuals. Of this burial sample, analysis suggest that 5 individuals (25%) are most likely male, and 6 individuals (30%) are most likely females. Figure 14 is an image of the pubic symphysis of Ind. 3 (HTN.7.9.6). Only three individuals could be positively described as male (5%, n=1) and female (10%, n=2). When all likely individuals are combined with definitively sexed individuals, we get a ratio of (8:6) where more females individuals were identified than males.

Figure 14 Image of the greater sciatic notch of Ind. 10 (HTN.6.12.7.Ind1) of probable female sex (Izzo 2017).

Skeletal pathological conditions were assessed for each individual, and a total of five individuals (25%, n=5) had pathological features present. The majority of the sample exhibited no post cranial pathology visible through osteological analysis (65%, n=13). Overall, this suggests that pathological conditions were found in low frequency. No individual within this

sample presented with evidence of cribra orbitalia and porotic hyperostosis (0%, n=0). Of the major pathological conditions observed by far the most common were those associated with age or degenerative physiological processes, summarized in Table 18. Vertebral arthritis was identified in two individuals (10%, n=2) (Figure 15). For the most part these lesions included marginal lipping, spicule formation, osteophytic changes to the spinal processes and bodies, as well as collapsed vertebral bodies. However, due to the preservation of the remains, exactly where on the vertebral column these changes took place was possible in only three instances for Ind. 10 (HTN.6.12.7.Ind1), where cervical vertebrae two, three, and four were all identified with vertebral arthritis.

Osteoarthritis was also present in three of the adult skeletons (15%, n=3) (Table 22) (Figure 16). Though only three individuals were identified with this condition they were found in most every joint surface recovered from excavation. One individual specifically had slight osteoarthritis of the mandible at the temporomandibular joint (TMJ) (Figure 17). Lastly, one individual (5%, n=1) had lytic proliferative lesions on the sacrum, phalanges, metacarpals, and metatarsals (Figure 18).

Table 22 A chart of the incidence of pathology in individuals.

Individual	Time Period	Age	Sex	Pathology	Locations	Degree	Number of observed pathology	Comments
7a	MPC	MA	M?	Osteoarthritis	right radial head, right radius, right lunate surface, left lunate surface	Slight	4	Evidence of lipping and spicule formation present. OA present near the center of the distal articular surface
10	ELC	MA	F?	Osteoarthritis	post cranial articulations	Slight	N/A	Evidence of lipping present.
5	LTC	YA	M?	Osteoarthritis	mandible	Moderate	1	Temporomandibular Joint
7a	MPC	MA	M?	Vertebral arthritis	unidentified fragments	Slight	N/A	N/A
10	ELC	MA	F?	Vertebral arthritis	C2, C3, C4, unidentified fragments	Moderate	4+	Spicule formation present on C3 and C4
18	ELC	YA	M	Lytic lesion	metacarpals, metatarsals, sacrum	N/A	N/A	Proliferation of lesions throughout body

Figure 15 Image of Ind. 10 (HTN.6.12.7.Ind1) with pronounced vertebral arthritis with lipping of the vertebral body (Izzo 2017).

Figure 16 Right radial head of Ind. 7a (HTN.1.6.19.Ind1) with osteoarthritis around the diameter of the head (Izzo 2017).

Figure 17 Image of osteoarthritis present on the surface of the mandible of Ind. 5 (HTN.6.CH.7.4) (Izzo 2017).

Figure 18 Lytic lesion present on the proximal and distal ends of a metatarsal from Ind. 18 (HTN.11.12/12A/12B.4) (Izzo 2017).

Trauma was assessed for each individual within the sample. Only one individual was identified with evidence of a traumatic skeletal injury (5%, n=1) (Figure 19). The individual presented with two circular puncture marks 5.4 mm in diameter 15.4 mm apart. These were determined to be post-mortem due to no evidence of remodeling or peri-mortem staining observable through visual analysis. Most of the total sample exhibited no form of traumatic injury identifiable through osteological analysis (95%, n=19).

Figure 19 Image of puncture marks on occipital fragment of Ind. 2 (HTN.7.1.3) (Izzo 2017).

Dental pathology was identified. In total, only 15 individuals out of 20 had teeth recovered with them and a total of 177 teeth were examined in this sample. Only two individuals were found to have evidence of periodontal disease (13%, n=2). This included alveolar resorption of the tooth sockets. Ind.2 (HTN.7.1.3.) had an edentulous mandible. Both of the mandibular portions recovered for Ind. 2 (HTN.7.1.3) and Ind. 10 (HTN.6.12.7.Ind1) presented with moderate gingival infection resulting in moderate alveolar resorption. Antemortem tooth loss was observed in the sample and only 3 teeth were suspected to be lost before death. Each tooth was observed for carious lesions, abscess, periodontal disease, enamel defects, dental calculus, and dental wear. In total 20 carious lesions were identified within 7 individuals (38%) and averaged 11.3% of total teeth present in the sample. All observed carious lesions were identified on adult individuals of probable female or female sex. While etiologically related to the development of caries, no abscesses were identified (Hillson 1999). This may likely be related to the fact that a majority of identified caries were considered only mild lesions (scoring a 1 or 2) and not fully developed to also include the formation of abscesses. Only three of the 20 carious lesions scored above a 3 and were identified on Ind. 10, an adult female, and Ind. 7b, a middle-aged adult female (Figure 20). Ind. 10 (HTN.6.12.7.Ind1) presented with only one enamel defect and represented the only such occurrence within the sample. Calculus deposits were identified in eight of the 14 individuals with teeth. Overall, calculus was identified on only 22 of 177 (12.5%) observed teeth and all presented in mild form, scoring either a 1 (14/22 or 63.3%) or 2 (7/22 or 31.8%) on an ordinal scale. Both males and females appeared to be affected similarly as 4 likely females, one male, and three likely males were identified with calculus, though the males comprised the majority of level 2 calculus scores.

Figure 20 Image of dentition of Ind. 10 (HTN.6.12.7.Ind1) with carious lesions displayed (Izzo 2017).

For most of the individuals from Holtun, dental wear was mild to moderate, of 177 teeth examined for dental wear, 85/177 or 48.0% scored below a level 2 ordinal score suggesting the presentation of wear was mild and 42/177 or 23.7% of them scored a level 3 or 4 suggesting more moderate presentation (Figure 21). Additionally, no individual in this sample presented with a score of 5 for severe dental wear.

Figure 21 Image on Ind. 7a (HTN.1.6.19.Ind1) displaying dental wear on the mandibular teeth (Izzo 2017).

Dental metrics were collected from this sample but were not a major focus of this thesis given the low number of individuals within the sample to produce biodistance analysis. Dental non-metric anomalies were identified in three individuals; moderate to severe shovel-shaped upper incisors and the formation of a cingulum.

Cranial and dental modifications were identified in only three individuals (16%). Of these three individuals, only Ind. 18 had evidence of both cranial modification and dental modification. Ind. 18 demonstrated most likely Fronto-Occipital cranial modification where external force vectors are applied at both the frontal bone and the occiput (Figure 22). I report this as likely Fronto-Occipital modification because the cranium was recovered in a disarticulated state and reconstruction was not attempted. However, upon analysis of the frontal bone and occipital regions this may have been the most likely type. Additionally, this individual had six teeth that had been modified; four incisors had been filed an encrusted with circular jade in-lays and two canines had been laterally filed (Figure 23). One individual, Ind. 5 (HTN.6.CH.7.4) was possibly modified cranially, though due to the context and preservation of the remains a potential taphonomic process could not be ruled out and thus a type of modification could not be strictly identified (Figure 24). Individual 4 (HTN.2.39) presented with dental modification in the form of lateral filing (Figure 25). Eighty-five percent (n=17) of the skeletal sample exhibited no form of body modification visible through osteological analysis.

Figure 22 Ind. 18 (HTN.11.12.12A.12B.4) *in situ* displaying cranial modification (Photo courtesy of Cardona 2017).

Figure 23 Image of modified teeth from Ind. 18 (HTN.11.12.12A.12B.4) (Photo courtesy of Cardona 2017).

Figure 24 Drawing of Ind. 5 (HTN.6.CH.7.4) with potential cranial modification (Photo courtesy of Sagastume 2016).

Figure 25 Image of lateral filing identified on Ind.4 (HTN.2.39) (Photo courtesy of HAP).

Skeletal metrics were collected as part of this project but could not be used in the estimation of stature or the calculation of robusticity indices given the limited number of key measurements that could be taken and the overall extensive fragmentary nature of the recovered remains. The measurements are included in the appendix of this thesis for future reference.

Skeletal non-metric traits were also collected only where anomalies were observed and are presented in Table 23. Though these anomalies are not clinically significant and may be asymptomatic (Sujitha et al. 2021). However, they could potentially point to genetic relatedness, cultural determinants, or labor-related stress markers on the remains (Buikstra and Beck 2006). Of note is Ind. 7a (HTN.1.6.19.Ind1) who presented with a squatting facet on his right talus (Figure 26).

Table 23 List of the incidence of non-metric anomalies in individuals.

Individual	**Time Period**	**Age**	**Sex**	**Non-Metric Anomalies**	**Present/Absent**	**Location**
7a	MPC	MA	M?	Squatting Facet	Present	Right
7a	MPC	MA	M?	Sternal Aperture	Absent	Sternum
10	ELC	MA	F?	Enlarged Mental Foramina	Present	Post cranial articulations
10	ELC	MA	F?	Mastoid	Absent	Left
10	ELC	MA	F?	Septal Aperture	Present	Right/Left Humerus
12	ELC	MA	F?	Parietal Microporosity	Present	Parietals
12	ELC	MA	F?	Temporal Microporosity	Present	Temporals
5	LTC	YA	M?	Septal Aperture	Absent	Right/Left Humerus
5	LTC	YA	M?	Vastus Notch	Present	Left/Right Patella
13	LPC	YA	F	Sesamoid Bone	Present	C2, C3, C4, and Unidentified Fragments
13	LPC	YA	F	Septal Aperture	Present	Sternum
13	LPC	YA	F	Third Trochanter	Present	Right/Left Femur
13	LPC	YA	F	Cortical Lipping	Present	Multiple Joint Surfaces

Figure 26 Image of talus of Ind. 7a (HTN.1.6.19.Ind1) with squatting facet (Izzo 2017).

Comparative Osteobiography

For the comparative osteobiographies I have created a table and a visual graph to represent the collected data from the previous analyses in one format in an attempt to understand if there are broad trends in both mortuary and biological variation collectively. Table 24 depicts the first depiction of individual demographics sorted through burial location. Interestingly Plaza burials encompassed both children and adults of all age categories for this site. However, adults seem to be the only individuals represented in ceremonial buildings and platform burials.

Table 24 Summary chart of individual, estimated age, sex, and burial location.

I.D.	Lot #	Period	Group	Age Estimation	Sex Estimation	Location
8	HTN.2.29A.0.3	MPC	F	Young Adult	Prob. Male	Ceremonial Building
16	HTN.2.29C.11.7	MPC	F	Older Adult	Prob. Male	Ceremonial Building
3	HTN.7.9.6	LC	D	Young Adult	Female	Plaza
6	HTN.6.2.4	LC/TC	E	Juvenile	UI	Plaza
17	HTN.26.2.2A.7	LC/TC	33	Adult	UI	Plaza
18	HTN.11.12–12B.4	ELC	C	Young Adult	Male	Plaza
19	HTN.26.3.4.5	LC/TC	33	Adult	UI	Plaza
3b	HTN.7.9.6	LC	D	Fetus (<Birth)	UI	Plaza
7a	HTN.1.6.19.Ind1	MPC	F	Middle-aged Adult	Prob. Male	Plaza
7b	HTN.1.6.19.Ind2	MPC	F	Adult	Prob. Female	Plaza
1	HTN.1.4A.10	MPC	F	Young Adult	UI	Plaza
1b	HTN.1.4A.10	MPC	F	Young Adult	UI	Plaza
4	HTN.2.39.A.6	MPC	F	Middle-aged Adult	Prob. Female	Plaza
5	HTN.6.CH.7.4	LC/TC	E	Young Adult	Prob. Male	Platform
2	HTN.7.1.3	LPC	D	Adult	Prob. Male	Platform
10	HTN.6.12.7.Ind1	ELC	E	Middle-aged Adult	Prob. Female	Platform
11	HTN.6.12.5.	ELC	E	Young Adult	Prob. Female	Platform
12	HTN.6.12.7.Ind2	ELC	E	Middle-aged Adult	Prob. Female	Platform
13	HTN.6.8/11.8	LPC	E	Young Adult	Female	Platform
15	HTN.23.4.4C.7	LC/TC	10	Adult	Prob. Female	Platform

In addition to this table, I have also constructed Figure 26, which collectively visualizes multiple biological and mortuary variables examined previously into one synthetic image. This figure is the first of its kind for the Maya region and represents the first attempt at visualizing life trajectories through a graphic representation to identify patterns of shared social experience or variation in biological health not previously identified through tables or images. Adult life stress and risks seem to be prevalent at every time period in this sample though they seem to occur more often within the Early–Late and Late–Terminal Classic periods. This figure also shows that treatment after death was also variable within the sample. Though most individuals were interred with ceramics not everyone was interred with a diversity of goods and at present there seems to be no association between biological features of birth, childhood, adult life, and mortuary features. The only exception to this I have identified is that individuals that were interred with unique or uncommon burial goods (in this sample) also all have at least one marker of adult life or risk, though they are not the same in each case. These cases also cross-cult the four time periods within the sample. Additionally, I wish to take a moment to analyze not just the yellow squares on this graph, but also the blank space. With regard to the treatment after death, it is clear that not everyone was uniformly buried with the same assemblages and in fact it was uncommon to have all four of these variables included in each context. Lastly, the blank space in the biological features is more difficult to interpret since not every variable was observable on each individual like on the mortuary evidence but, this visual representation corroborates earlier analysis that in this sample there is limited evidence for childhood stress and mortality.

Ind	TP	Sex	Childhood Stress			Adult Life and Risks						Death	Treatment after Death						
			CM	LEH	CO	CL	TR	OA	VA	DM	UP		RS	GT	C	L	S	B	UG
1	MPC	?										YA	PZ	Si	☐	☐	☐	☐	
4	MPC	F?				☐				☐		MA	PZ	Ci	☐	☐	☐	☐	☐
8	MPC	M?										YA	CB	Si	☐	☐			
16	MPC	M?										OA	CB	Si	☐	☐	☐		
1b	MPC	?										YA	PZ	Si	☐	☐	☐	☐	
7a	MPC	M?						☐	☐		☐	MA	PZ	Si	☐	☐			
7b	MPC	F?				☐						A?	PZ	Si	☐	☐			
2	LPC	M?					☐	☐				A?	PT	Si	☐		☐	☐	☐
13	LPC	F				☐						YA	PT	Si	☐	☐			☐
5	LTC	M?	☐					☐				YA	PZ	Ch	☐	☐			☐
6	LTC	?										J	PZ	Si	☐				
15	LTC	F?				☐						A?	PT	Ci	☐	☐	☐		☐
17	LTC	?										A?	PZ	Cr	☐	☐	☐		
19	LTC	?										A?	PZ	Ci	☐	☐	☐		☐
3	LTC	F				☐						YA	PZ	Ci	☐	☐	☐		
3b	LTC	?										I	PZ	Ci	☐	☐	☐		
10	ELC	F?		☐		☐		☐	☐			MA	PT	Ci					
11	ELC	F?				☐						YA	PT	Ci	☐				☐
12	ELC	F?				☐						MA	PT	Ci	☐				
18	ELC	M	☐					☐		☐	☐	YA	PZ	Ci	☐	☐			

Figure 27 Graphic representation of comparative biography features (Created by the author, adapted from Pezo–Lanfranco et al. 2020).

Abbreviations: (TP) Time Period (RS) Residential Group (MPC) Middle Preclassic (LPC) Late Preclassic (ELC) Early-Late Classic (LTC) Late-Terminal Classic (CM) Cranial Modification (LEH) Linear Enamel Hypoplasia (CO) Cribra Orbitalia (CL) Carious Lesions (TR) Trauma (OA) Osteoarthritis (VA) Vertebral Arthritis (DM) Dental Modification (UP) Unique Pathology (RS) Residential Group (CB) Ceremonial Building (PZ) Plaza (PT) Platform (GT) Grave–type (C) Ceramics (L) Lithics (S) Shell (B) Bone (UG) Unique Burial Goods (YA) Young Adult (MA) Middle Adult (OA) Old Adult (A?) Adult of unknown age (J) Juvenile (I) Infant (Si) Simple Grave (Ci) Cist Grave (Cr) Crypt Grave (Ch) Chultun (☐) Variable is present in this individual

Chapter Summary

This chapter presented the result of mortuary, osteological, and comparative osteobiographic analyses. Overall, the results identified common features of the mortuary program at Holtun, and the overall biological health status of individuals observed through osteological analysis. Individuals were most commonly interred in simple graves or cists in an extended supine position with head oriented to the north. Additionally, very few indicators of childhood stress or systemic pathology were identified. Overall, these results suggest that

osteological features found do not pattern within either time period or burial location. Lastly, statistical analysis of mortuary features found no significant relationship between the examined mortuary variables and the location of the burial as it relates to plazas or structures.

CHAPTER FIVE: DISCUSSION

This chapter will present a discussion of the results of the analysis of mortuary and osteological data and my interpretation of these burials from Holtun, Guatemala. The goal of this thesis was to examine how Maya social organization is reflected in burial treatment and evidence of skeletal markers of stress at Holtun, Guatemala? The ensuing discussion presents an interpretation of these contextualized osteobiographies as they relate to the bioarchaeological methods and theory that intersect their formation and identities at Holtun. This level of analysis including mortuary data, osteology, comparative osteobiography, and social theory allows bioarchaeologists to present ancient humans as active populations and individuals with uniquely intersectional and social identities.

Mortuary Analysis at Holtun

Overall, the results from these mortuary analyses suggest that hypothesis one was only partially validated. This sample did present similar mortuary features. When all burials from all time periods are considered, the typical mortuary program at Holtun consisted of interment in an extended, supine position with head to the north. Burials were typically within a primary context, with only a few occurrences of secondary burials. Simple and cist graves predominated the sample and were typically found within plazas or intrusive into existing structures. Though single interments were the norm for Holtun, in several instances individuals were found within consecutive stratigraphic contexts. Although there is a degree of regularity at Holtun, there was also a significant amount of variability within the examined mortuary features. In all but one burial, fragmented ceramics were identified within the fill of the burial. However, in only a few

cases were complete vessels or larger ceramic fragments recovered from the burials. There appears to be inclusion of ceramic fragments as part of the mortuary program, but only in certain burials were whole vessels included. This pattern is largely repeated with the inclusion of chert within the fill of the burial, but only three cases was obsidian or jade included within a burial. Bone and shell were limitedly associated with the mortuary program at Holtun, bone was infrequently associated to burials with only two instances where worked bone or stingray remains were encountered. Shell was also limitedly present, with some common shell types included as part of the fill of a burial, but only two cases were fine shell artifacts associated to the burials. Lastly, there seems to be no statistically significant difference between the mortuary composition of burials within plaza contexts and non-plaza contexts. Therefore, while there is certainly mortuary homogeneity within the sample, there are also several key instances where individuals are buried with goods that are not common within the broader expression of mortuary variation at Holtun.

Though the mortuary record for the ancient Maya is undoubtedly complex, the results confirm the identification of a number of burial trends at Holtun, Guatemala. In general, a large portion of the burials were primary interments containing single individuals within simple graves or cists. Individuals were also often found in an extended body position, with bodies oriented north/south and their heads primarily placed to the north and feet to the south. However, only seven of 20 (35%) individuals within the sample actually reflect this trend. Individuals are represented in this sample with head orientations corresponding to all four cardinal directions, five of seven burial types, flexed body position, secondary interments, and three different time periods.

In an analysis of Maya burials, Welsh (1988) identified that simple burials such as those that are most common at Holtun were also the most common burial type at a number of sites including Tikal, Seibal, Altun Ha, and Barton Ramie among others. In my analysis I found that extended burials were also the most common body positioning. Welsh (1988) found that at sites including Piedras Negras, Palenque, Altar de Sacrificios, and Copan a similar result favoring extended body positions was evident. Additionally, at Holtun head position to the north seems to be the most favored practice, and this seems to also be the case at Piedras Negras, Palenque, Uaxactun, and Tikal where Welsh (1988) finds a similar trend. However, though these similarities exist, there are also numerous instances, within Welsh (1988) where other patterns that were not identified at Holtun seem to be commonplace. These similarities and differences suggest that certain cultural protocols related to burial were practiced throughout the Maya region and across temporal boundaries. At Kaminaljuyu, Obledo (2004) and Thompson (2005) has observed that 15% of individuals were oriented within a north-south position with their heads to the north which is contrast to the sample from Holtun that finds over 40% of individuals with this classification. However, individuals at Kaminaljuyu were traditionally interred in a supine and extended position as is also the case with the burials at Holtun. Elsewhere in the Belize river valley, Drake (2016) has found a significant portion of burial buried in a prone position (22%), which is in contrast to the 5% observable at Holtun. This comparison is interesting since globally, prone burials are usually associated with deviant behavior (Wiseman et al. 2021).

The comparison of results from this study and others throughout the Maya region affirm that the ancient Maya did not homogenously subscribe to a specific common burial practice, but rather employed mortuary programs that varied through time, location, social groups, and individual identities (Ashmore and Geller 2005). At Holtun, this means that an individual's

personhood and agency could be observed because there are no two identical mortuary contexts within the site. While broad similarities existed, each individual burial represents an interconnected relationship between the dead and the decisions of the living who interacted with them during life and the choices they made to commemorate them. While understanding the reasons why the Maya elected to perform these diverse mortuary practices is beyond the scope of this thesis, it is evident that individual choice of which mortuary features to include during burial seems to have played a role in the creation of mortuary assemblages at Holtun, and throughout the region. This leads me to one of the biggest questions in Maya research– where and why, are certain individuals selected for burial in certain locations? Indeed, there is no clear answer to where all the individuals who inhabited a site may have been placed since there are no formal cemetery spaces. However, throughout the length of the Holtun Archaeological Project 18 burials representing 20 individuals have been identified in a variety of contexts and these form the first patterns of Maya mortuary practices observable at the site. These burials were identified throughout the excavation of Preclassic period structures rather than a systematic search for all buried individuals at Holtun. However, while they do not represent a perfect cross-section of the population of Holtun, the variation in these burials does give us a tentative and preliminary understanding of the mortuary program for the site. Additionally, the variation in these practices reflects the diverse and intersectional personhood of individuals at Holtun through both the choices made by the living during interment rites and their relationship to the deceased.

One instance within this sample that exemplifies the diversity of these choices and social identities is Individual 16 (HTN.2.29C.11.7) who was interred in building FB–2 within the Preclassic ceremonial core of Holtun composed of major architectural features including a Preclassic E–Group. The burial was located in the fill of the northern half of the eastern range

structure of the E-Group and an offering of worked seashell, four large seashells with burr holes, one medium-sized shell, and numerous small shell beads were included (Gill 2017). The body was placed in a flexed and seated position, oriented from east-west with head to the west. This is the only burial within the sample that was identified within a seated position and one of two burials identified within this ceremonial structure. This is intriguing because not only is this body position uncommon, the inclusion of worked shell as a grave good is also rare. While the categories I chose for grave goods dealt with the presence or absence of these goods instead of their intrinsic value or prestige, certain individual burials such as this one included material that were considered special or valuable within the region (Sharpe 2019). In addition to this, Ind. 3 (HTN.7.9.6) was also identified with obsidian flakes, shell beads, and an eroded bowl; Ind. 4 (HTN.2.39) was identified with a zoomorphic figurine; Ind. 2 (HTN.7.1.3) was identified with a Sierra Red bowl and a worked bone with an incised mat pattern; and Ind. 13 (HTN.6.8/11.8) was identified with a partial bowl and jade. These examples suggest that perhaps individual choice and influence played a role the way that individuals of higher status expressed their status through material goods and elaborate mortuary practices. In this way, group identities are reified through common and shared mortuary practice, but individual identities are highlighted through the instances where the mortuary program deviates from the expected standard at Holtun or includes items of high value or prestige.

However, these features also equally reflect the living and the acts of preparation taken for burying the dead and how they relate to the social and personal choices of the living. Both of these facets to the choices made during the protocols of death contribute to the expression of personhood for individuals at Holtun. For some societies, as for the Maya, the dead are active agential entities that cement and reify the relationship between ancestors and the landscapes,

rights, properties, and ideologies associated to the living (McAnany 2013). Despite the physical death of these ancestors, they nonetheless played a crucial social role within ancient Maya social organization, and this too is an extension of their identity and personhood of the deceased (McAnany 2011; Weiss-Krejci 2011b). Weiss-Krejci (2011b) specifically argues that the remains of the Maya dead could potentially be used as totems for the solidification power and identity among the descendants of these individuals. This concept of legitimation is colloquially referred to as "ancestral veneration" and is one potential explanation for the ubiquitous placement of ancient maya dead within household and living spaces. However, the term ancestor has a complicated etiology within this framework. Ancestors are not necessarily strict genealogical antecessors of the living. Maya communities were not organized through strict kinship structures and the connection between the living and the dead could also have been metaphorical or imaginary (Gillespie 2000). This is integral to understanding how burial placements, funerary decisions, and identities are consecrated because even within household burials constituted meaningful and intentional social action. Burial near the home, in both the larger scale of ancient Maya elites and the household level affirmed the relationships and rights between the living and the dead at both scales (McAnany 2013[1995]). This is particularly true at Holtun, where burial within ceremonial buildings such as those in Group F, elite residences such as those at Group D, and at the household level (Group 33) seem to be present. To me this argument asserts the fact that burials were selective at both scales and thus there must have been a number of choices influencing who and where individuals were selected for burial in a given space. However, it stands to reason that more definitive patterns at Holtun must be made before this can be said with any degree of certainty, as such the results remain a tenuous exploration of the preliminary data observed from these burials.

Overall, these results suggest that Hypothesis two was only partially validated. This sample did not present an equal representation of sex and age grades, though it does approximate one. This suggests that rather than a selective assortment of individuals, Maya mortuary rituals were not selective in who was buried within monumental architecture, platforms, and plazas in so far, as the sex and age of individuals is concerned. By this I mean that if there were selective pressures on who or where to bury someone, they did not include these demographic variables and might have included cultural, religious, administrative, or symbolic identities not related exclusively to age or sex. However, much more excavation and data would be required to corroborate this idea and at present it remains largely conjecture on the reasoning for who was selected for burial. Additionally, hypothesis two states that evidence of cranial modification should be expected since the practice was not socially stratified, and all individuals' crania would reflect this widespread practice. This was not validated because only two individuals within the sample were likely identified with cranial modification, and two individuals were identified with dental modification. Lastly, it was also hypothesized that there would be a similar distribution and range of pathological characteristics among the sample where only a few indicators of skeletal indicators of stress, evidence of healed trauma, and severe presentation of pathological conditions were present at Holtun. This hypothesis was not validated either. The sample from Holtun presented with a relatively low frequency of nutritional deficiency and pathology and by in large there is limited evidence that the majority of individuals suffered any form of childhood stressors. Skeletal pathology traditionally indicative of childhood stress are largely absent from the sample and dental evidence of childhood stress was only limitedly

identified. There was a high rate of dental wear across the burial sample, and a high frequency of dental caries among women. There were only limited examples of occupational stress markers and a very low level of traumatic injury within the sample. However, while these results might suggest that this hypothesis is validated, this cannot be said due to the major limitation of preservation and lack of completeness within the sample. For example, Ind. 2 (HTN.7.1.3) is represented almost exclusively by teeth. This means that for this individual any indicator related to childhood or adult stress visible on the postcranial skeleton could not possibly be taken into consideration because the postcranial skeleton was either obliterated by the burial environment or never included within the context in the first place. In essence, a definitive preliminary pattern for this hypothesis cannot be accurately assessed because not every variable considered was available for observation in each individual, and it might be quite possible that evidence of life stress may have been present at one point but given the condition of the remains is inaccessible through macroscopic analysis alone.

Demographically, the sample from Holtun does not represent a 50/50 distribution of sex or all age cohorts. There are no infants, no juveniles older than approximately six years, and only one individual in their old age (older than 50 years). The most frequent age category encountered were young adults (20-35 years), though this might be expected since this is the most common age at death category for individuals within pre-industrial societies other than <5 infants. With respect to sex, women were encountered more frequently than men, though it should be noted that of the individuals found within ceremonial buildings, all are male. What this suggests is that choices beyond just the biological sex of an individual were guiding who was selected for burial within the site of Holtun, and at specific locations within it. However, variation in sex and age is deceivingly difficult to interpret because the ratios are affected by time period, taphonomy, and

mortuary behavior. At Cuello, Hammond (1995) has noted that there is no correlation between either age or sex and access to the mortuary goods and burial types. Therefore, while small samples such as those at Cuello or Holtun, rarely contribute to paleodemographic assessments, they do contribute to the discussion on social organization through the differential access some individuals may have had to burial location within a site. What this result suggests is that there were diverse choices guiding who was selected for burial within the site of Holtun, and at specific locations, though the reasons for this are yet to be discerned.

Two interesting cases that illuminate these alternative choices is that of individuals 7a (HTN.1.6.19.Ind1) and 7b (HTN.1.6.19.Ind2) recovered from Group F- Plaza A, a formal auxiliary area attached to the ceremonial core of the Preclassic period E–group at Holtun. Individual 7a (HTN.1.6.19.Ind1) may have been a probable male, 18-35 years and 7b (HTN.1.6.19.Ind2) was a probable female of undetermined adult age. Both were covered in cinnabar, placed in an extended position, and oriented from North-South. Additionally, dental calculus build-up, a severe carious lesion, and linear enamel hypoplasia of the right maxillary canine were identified. The recovery of these skeletal remains and the grave offerings identified suggest, in concert with other archaeological material the possibility, that this context may have been associated with ceremonial feasting and ritual activity. The presence of cinnabar within this context is also a major source of information for inferring ancient activity. Cinnabar, hematite, or red ochre, were the most common reds used in Mesoamerica traditionally to embalm nobility, perform ritual ceremonies, heal maladies, and paint art (Ávila et al. 2014; Cervini-Silva et al. 2013; Rigon et al. 2020). The inclusion of this pigment within a funerary context is usually a sign that the individual covered represented someone of higher status (Scherer 2012). Therefore,

it stands a possibility that these two individuals were selected for burial in Group F due to their status.

Considering a general examination of the biological health status of individuals from Holtun only a limited and conservative interpretation can be made within the present analysis do to the poorly preserved small sample. Most individuals do not demonstrate skeletal pathology or stress within the sample upon macroscopic analysis and the distribution of pathology does not support a division of individuals by mortuary feature or location. One potential obscuring factor to consider is the preservation of the remains. For example, Ind. 11 (HTN.6.12.5) was only partially represented and highly fragmented. Both of these conditions work together to obscure and often obliterate the surface of bones making difficult (if not impossible) to discern the evidence of biological health visible on the skeletal system. However, there are a few key exceptions that provide insights into the pathological and stress status of certain individuals and can be discussed.

When considering episodes of childhood stress, I considered cribra orbitalia, porotic hyperostosis, and enamel defects as key indicators. The incidence of cribra orbitalia and porotic hyperostosis occur consecutively, with cribra orbitalia representing only a brief episode of stress and fully developed porotic hyperostosis representing a more prolonged episode of childhood developmental stress (Suby 2014). Enamel defects may also indicate childhood stress as the formation of this tissue occurs during growth and development. Ind. 10 (HTN.6.12.7.Ind1) was the only one identified with a childhood stress skeletal marker, an enamel defect. This is in stark contrast to other studies in the Maya region. At Cuello, Saul and Saul (1997) identified linear enamel hypoplasias in high frequencies (>40%) with females being the sex with the highest frequencies. The sample examined here only represents 20 individuals, making it difficult to

confidently identify any patterns of health and disease. Because of these limited observations indicators of developmental stress within this sample can only be used to tentatively suggest that these individuals may not have been exposed to severe environmental conditions that may have affected their development during infancy or early adolescence. However, the caveat with this piece of discussion is that while lack of exposure to stress is a possibility, it should also be noted that episodes or stress may have killed individuals before they had time to progress into a stage that affected the skeleton in addition to preservation and surface erosion, which could have obscured those results (Wood et al. 1992).

When considering trends in diet, the patterns identified at Holtun provide some interesting insights. For the most part evidence of dental wear is relatively uniform, both males and females have moderate wear consistent with the consumption of food such as maize, which generates wear on teeth due the inclusion of coarse additives (Schnell 2017). However, it should be noted that all teeth and all food consumption over time will cause teeth to wear, therefor this interpretation still requires more evidence to corroborate. When carious lesions are considered, an interesting pattern emerges where in this sample only females seem to be affected by caries. This could be explained by a number of reasons. The first of these is preservation bias, whereby the female skeletons are simply better preserved than the males and teeth were only found for female individuals. However, teeth were recovered from 14 contexts including men and woman at different stages of preservation, so it is unlikely that this factors into why only woman have carious lesions at Holtun. The most likely idea I suggest is that women at Holtun were processing foods higher in starch or sugar content or had poor dental hygiene habits and thus were afflicted by carious lesions. That being said, at present it is impossible to confidently assert these claims as related to social change or environmental stressors given that the females from

this sample come from throughout the entire occupation of Holtun and the small sample size identified for such a vast occupational period.

The data presented here allow for a relatively limited interpretation due to the small sample and the poor preservation of this skeletal series. However, studies in the Maya area on health and diet are plentiful though they typically include chemical analyses to contribute molecular evidence in addition to what can be discerned from visual analysis from the skeletal remains. Studies do show that some individuals were consuming high levels of starchy C_4 foods like Maize throughout the region. At Cahal Pech individuals from the Preclassic were found with high $\delta^{13}C$ and $\delta^{15}N$ values, which were interpreted as an increased reliance on maize and marine fish consumption at the site (Powis et al. 1999; Ebert et al. 2019). However, at Altun Ha researchers found that individuals had reduced C_4 foods and decreased marine food consumption throughout the Late Classic (White et al. 2004). While there seems to be some variation in these isotope values as they relate to time period there is also variation within a population. Tykot and coauthors (1996) found evidence for a decrease in the C_4 food items within the diet of adult males from the Preclassic period however, they attribute this to changes in the protein source rather than a decreased contribution of maize in the diet. What these studies suggest is that broad interpretations about changes in diet overtime are difficult to confidently assert and that the variation within individual communities should be explored further. At Holtun, further investigations into dietary reconstructions would need to be analyzed and interpreted to link the visual analyses conducted here to the chemical results and more broadly to the Maya region.

When considering age, all age cohorts identified seemed to have similar evidence for carious lesions suggesting that these are not the result of cumulative pathology, but more likely dependent on the structure of diet and consumption of resources. At El Zotz and Piedras Negras

Scherer (2007; 2018) has found both woman and men with carious lesions suggesting that the data at Holtun are different from other sites in the Maya region. However, there are a couple reasons for this. The first could be that male individuals within the sample did not have teeth to observe or the preservation of the teeth was such that caries lesions could not be identified. The second is that this might be a real pattern but at present we do not have an accurate representation of the population or a large enough sample size to make this claim.

Skeletal pathology also seems to occur in low frequency and a majority of those identified are degenerative, age-related conditions. However, since only five individuals in the sample are middle-aged adults or older adults, this low frequency might have been expected. The younger group of individuals within this sample may not have yet developed pathology related to repeated activity associated with advanced age or labor (Cormier 2018). At Cuello, Saul and Saul (1997) note the high frequency of osteoarthritis within their sample and particularly within middle-aged or older adults. Additionally, one individual, Ind. 5 (HTN.6.CH.7.4) was identified with a squatting facet on their right talus. While this is not necessarily a pathology so much as it is a non-metric anomaly, most squatting facets are the result of repeated stress on that talus from squatting-like movement (Smith and Wollen 2020). This anomaly may too have been the result of repeated stress, which may have developed through continual squatting activity throughout life. Though small, anomalies such as these contribute to the life history of this individual because they represent an instance where due to a habitual activity the expected morphology of the talus transformed, essentially creating a physical manifestation of identity that includes the possibility that this individual habitually squatted for some particular reason. Unfortunately, this skeletal location was not available in every individual to evaluate the prevalence of its

morphological change throughout the sample, nor does there seem to be a comparable data set for the region.

Lastly numerous proliferative lytic lesions were identified on Ind. 18 (HTN.11.12.12A.12B.4). These lesions presented at the phalangeal joint unions and the vertebral column and may likely be the result of gout (Ortner, 2000). Though I could not find a comparable data set in the Maya region, suggesting that either the data have not been reported before or this is a novel case of the disease, archaeologically the study of gout is well represented. Notably, Fornaciari and colleagues (2009) found similar lesions on several members of the Medici family. The comparison in this case paints a salient portrait of the status of this individual from Holtun and his association to the upper levels of elite society. Gout is an arthritic disease primarily cause by the build-up of uric acid in the joint surfaces from the conspicuous consumption of foods high in fats and protein. This suggests that in addition to mortuary and cultural determinants of status Ind. 18 (HTN.11.12.12A.12B.4) also displays dietary and paleopathological evidence for his elevated status. The lesions on Ind. 18 (HTN.11.12.12A.12B.4) also extended to his vertebral column, namely the coccyx. In the same study Fornaciari *et al.* (2009) also found an association between gout and diffuse idiopathic skeletal hyperostosis (DISH) another disease commonly associated to elite or noble status. The authors concluded that that the link between these two diseases could be an indicator of lifestyle and the consequence of a high caloric-diet, obesity, and type II diabetes. While the lesions on the vertebral column of Ind. 18 (HTN.11.12.12A.12B.4) are slight and cannot be associated to DISH currently, more analysis might be in order to explore the possible etiology of the vertebral lesions.

The last consideration of skeletal variation in the sample examined was body modification, specifically cranial and dental modification. Two individuals were modified, though only one of them could be definitely identified through macroscopic morphological identification. Since the cranium for this individual was not reconstructed it was impossible to provide a cranial index however, the evidence of modification provides an intriguing result. Since cranial modification required very little tools or skills to produce and was not likely a socially-stratified practice (Cerezo-Roman and Tsukamoto 2021), it could be expected to be found in high frequencies among ancient Maya burial samples. However, this is not the case at Holtun as only two individuals or 10% of the sample was encountered with cranial modification. In a regional exhaustive analysis of purposeful cranial modification, Tiesler (2014) argues that these modification practices occur along such a wide variety of contexts that head shape would have acted as a sign of beauty and emphasized a combination of group membership and their ideals of beauty, child rearing, and ideology. The concluding argument is that modification may have crosscut cultural time periods, identity, gender, sex, or temporal divisions and may have instead been used among the Maya to mark certain individuals as unique, rather than elite or noble (Tiesler 2014). At Holtun, both individuals with cranial modification are male, one buried in a plaza (Ind. 18; HTN.11.12.12A.12B.4) and the other in a *chultun* (Ind. 5; HTN.6.CH.7.4) and both buried during the Late Classic period. This potentially suggests that males may have been subject to cranial modification at Holtun although more individuals would be needed to validate this finding. Additionally, this modification speaks to the identity of this individual and the agency of the practitioners who performed the modification. Once modified the cranium represented a change in the skeletal morphology for this individual that directly interfaced with other aspects of their personhood to form their embodied experiences and the way they were

commemorated in the past. Through this, their identity is shaped not only by the modification, but also by the practitioners who exercised their own agency and embodied ideals through the procedure, and by the contemporaries of those who were modified which likely perceived the modification in both positive and negative ways during their interactions with them in life and death.

Dental modification occurred in this sample within two individuals out of 13 individuals with teeth. One individual Ind.4 (HTN.2.39) was female interred in a Middle Preclassic plaza and had evidence for lateral filing of their canines and the other individual Ind. 18 (HTN.11.12.12A.12B.4) was male and interred in a Late Classic plaza had evidence for both lateral filing of the canines as well as of filing of the incisors and jade inlays. Modifications of this type would have required a particular toolset and practitioner knowledgeable on how to actually perform these modifications and also, access to rare materials such as jade or pyrite for inclusion as inlays (Mata Amado 1993). They would not have taken place during infancy as is the case with cranial modifications, but rather during late adolescence or adulthood once permanent dentition had completely erupted. Modification in sub-adults is exceedingly rare since the practice has been associated with the development of additional embodied identities within an individual such as the charge of political office or an administrative role (Braswell and Pitcavage 2009; López Olivares 1997; Plumer 2017). Because of this, researchers have argued that dental modification served a different purpose than cranial modification and may have been a marker of elevated status and preferentially performed among elites who lived in the urban core of Maya sites (Sharer 1978; Tiesler 2014; Tiesler, Cucina and Ramírez-Salomon 2017). However, not every elite individual has dental modification, and because of so the modification may have likely been regulated by group memberships and imparted not only beauty upon select

elites, but also social or political distinction to other non-elite individuals (Geller 2009; Tiesler, Cucina and Ramírez-Salomon 2017; Williams and White 2006).

This is particularly intriguing when I consider the biography of Ind. 18 (HTN.11.12.12A.12B.4), the only individual, an adult male, with both cranial and dental modification. During infancy, this individual experienced physiological stress in the form of fronto-occipital modification, which permanently affected how he looked throughout life. In this way, Ind. 18 (HTN.11.12.12A.12B.4) embodied ideals of beauty and their caregivers' identities from a very early age. However, at some point after his adult dentition were formed, he acquired dental modification in the form of inlays and lateral filing, which likely resulted in lifelong social and health consequences. To perform the modification a practitioner likely took three or four steps, each of which involved a significant amount of pain or discomfort if the drilling and filing exposed the sensitive dentin protected by enamel (Geller 2009). The individual within this sample was subjected to modification at least six times suggesting that he was risked this pain on at least one (if all modification were done concurrently) if not multiple times throughout his life. What both of these modifications suggest about this individual is that he underwent significant changes throughout his life history which shaped his identity, first during infancy, then in adulthood largely due to cultural ideology and transforming corporate group memberships throughout his life. These two changes are physical manifestations of the fluid transformations within an individual's social identity throughout his life given the broader social or corporate groups to which he was associated to or inducted within throughout life. In comparison to other sites, this individual has similar dental modifications to an individual identified at el Peru-Waka as a powerful noble and an individual at Holmul identified as an elite male (Eppich 2017; Cormier 2018). Additionally, Cerezo–Roman and Tsukamoto (2021) argue at El Palmar that one

of the individuals they recovered was a standard bearer and also had morphological and contextual data that he was involved in administrative or elite duties but was not himself a member of the nobility. The lack of variation and patterns related to body modification at Holtun is to be expected from the small sample size of the population and the preservation of the remains which potentially obscured if or what type of modification other individuals may have had.

Comparative Osteobiography

These individuals' specific details illuminate primarily at Holtun that one of the principal patterns we can observe is the range of variation within individuals buried at the same site. However, though each person has unique traits to their context they also share a number of characteristics that will be discussed further below in light of the time periods represented (Figure 28).

Ind	TP	Sex	Childhood Stress			Adult Life and Risks						Death	Treatment after Death						
			CM	LEH	CO	CL	TR	OA	VA	DM	UP		RS	GT	C	L	S	B	UG
1	MPC	?										YA	PZ	Si	■	■	■	■	
4	MPC	F?				■				■		MA	PZ	Ci	■	■	■	■	■
8	MPC	M?										YA	CB	Si	■	■			
16	MPC	M?										OA	CB	Si	■	■	■		
1b	MPC	?										YA	PZ	Si	■	■	■	■	
7a	MPC	M?						■	■		■	MA	PZ	Si	■	■			
7b	MPC	F?				■						A?	PZ	Si	■	■			
2	LPC	M?					■	■				A?	PT	Si	■		■	■	■
13	LPC	F				■						YA	PT	Si	■	■			■
5	LTC	M?	■					■				YA	PZ	Ch	■	■			■
6	LTC	?										J	PZ	Si	■				
15	LTC	F?				■						A?	PT	Ci	■	■	■		■
17	LTC	?										A?	PZ	Cr	■	■	■		
19	LTC	?										A?	PZ	Ci	■	■	■		■
3	LTC	F				■						YA	PZ	Ci	■	■	■		
3b	LTC	?										I	PZ	Ci	■	■	■		
10	ELC	F?		■		■		■	■			MA	PT	Ci					
11	ELC	F?				■						YA	PT	Ci	■				■
12	ELC	F?				■						MA	PT	Ci	■				
18	ELC	M	■					■		■	■	YA	PZ	Ci	■	■			

Figure 28 Graphic representation of comparative biography features (Created by the author, adapted from Pezo–Lanfranco et al. 2020).

Abbreviations: (TP) Time Period (RS) Residential Group (MPC) Middle Preclassic (LPC) Late Preclassic (ELC) Early-Late Classic (LTC) Late-Terminal Classic (CM) Cranial Modification (LEH) Linear Enamel Hypoplasia (CO) Cribra Orbitalia (CL) Carious Lesions (TR) Trauma (OA) Osteoarthritis (VA) Vertebral Arthritis (DM) Dental Modification (UP) Unique Pathology (RS) Residential Group (CB) Ceremonial Building (PZ) Plaza (PT) Platform (GT) Grave–type (C) Ceramics (L) Lithics (S) Shell (B) Bone (UG) Unique Burial Goods (YA) Young Adult (MA) Middle Adult (OA) Old Adult (A?) Adult of unknown age (J) Juvenile (I) Infant (Si) Simple Grave (Ci) Cist Grave (Cr) Crypt Grave (Ch) Chultun (■) Variable is present in this individual

The Middle Preclassic Period Burials

Often due to poor preservation, analysis of Preclassic period burials is primarily supported through mortuary data and analysis. This is no exception at Holtun, since all 20 represented individuals have mortuary context associated to their remains, no matter their preservation. Of the burials, seven were associated to the Middle Preclassic period (900 B.C.E–300 B.C.E).

Individual Ind. 8 (HTN.2.29A.0.3) & Ind. 16 (HTN.2.29C.11.7) were interred in building FB–2. The skeletons of both individuals were placed, oriented from East-West. Both of these individuals were probable males of adult age. Ind. 8 (HTN.2.29A.0.3) was only partially recovered and was absent any offerings likely taken from the burial during the looting event. Ind. 16 (HTN.2.29C.11.7) was identified with several seashells that may have severed as a necklace or adornment. Individual 4 (HTN.2.39) was recovered just outside of building FB–2 underneath Plaza F–B. The skeleton of this individual was placed, oriented from North-South and would have probably been a female of 30-50 years of age. Further paleopathological identifications of Ind. 4 (HTN.2.39) revealed moderate to heavy dental wear, carious lesions causing enamel loss and cultural modification in the form of lateral filing to the left maxillary canine.

The remaining four individuals interred at Group F were recovered from Plaza A, a formal plaza attached to the ceremonial core of the Preclassic period E–group at Holtun. Ind 1 (HTN.1.4A.10) and 1b (HTN.1.4A.10) was identified after the removal of middle and late Preclassic material near the structure on the northwest corner of the plaza. The material recovered, represents two distinct individuals is comprised of no more than 30 small and largely unidentifiable fragments. However, associated artifacts include ceramics, shell, animal bone, jade, and obsidian all identified within the same matrix as the osteological material. Age at death was estimated and suggests that at least one of the individuals represented by this set of remains was a young adult between the age of 16 and 20. Individual 7a (HTN.1.6.19.Ind1) was identified with a jar offering and disarticulated, which suggests that this individual was placed in this space secondarily. Additionally, they were covered in cinnabar, placed in an extended position, and oriented from North-South. Sex and age-at-death estimation suggested that this individual may have probably been a male from 18-35 years of age. Paleopathological examination revealed

heavy dental wear including dentin exposure, dental calculus build-up, and mild-moderate porosity, lipping, and spicule osteophyte formation due to arthritis in nearly all joint surfaces. Individual 7b (HTN.1.6.19.Ind2) was identified within the context of HTN.1.6.19.and from the remains present they were likely female and of adult age. Additionally, dental calculus build-up, a severe carious lesion, and Linear Enamel Hypoplasia of the right maxillary canine were identified.

These seven individuals are interesting to consider given that they are associated to formal Preclassic architecture and suggest that plaza burials at Holtun during the Preclassic are oriented East–West.

Broadly speaking, Middle Preclassic skeletons are overwhelmingly represented by males and adults (Saul and Saul 1997; Thompson 2005). However, the presence of adults of both sexes and a young adult in this context suggests that selection criteria for interment was most likely built around genealogical or corporate group membership, rather than other specific parts of identity which may be reified through other variables in mortuary or osteological analysis (Saul and Saul 1997). Additionally, the identification of burials from Middle Preclassic ceremonial structures, and plazas suggests a community wide mortuary ritual that was replicated in formal ceremonial spheres. This is interesting to consider since most of the earliest internments in the Maya region are usually associated with residential platforms. For example, at Cuello, all burials from the Middle Preclassic come almost exclusively from houses and auxiliary structures (McAnany 1998; Saul 1972; Saul & Saul 1997). However, the burials identified at Holtun suggest that as early at the Middle Preclassic period individuals at Holtun were being buried under house floors and in nearby ceremonial structures, a practice associated with complex mortuary internments and ancestral veneration that proliferated exponentially throughout the

Late Preclassic (Garza 2001; McAnany et al.1999; Wrobel et al. 2017). However, Holtun is not the only exception to this generalization and the presence of burials interred outside of residential structures suggests that mortuary diversity was common among the earliest Maya communities and reflected individuals with ascribed identities beyond their household or local group membership (Joyce 1999).

Osteological evidence for adult life stress such as carious lesions, osteoarthritis, and vertebral arthritis were present within this time period. However, when the sample is segmented by time period it becomes increasingly difficult to discern a pattern of osteological variation beyond the descriptive results of each individual. That being said, both individuals with carious lesions are female and one individual presented with dental modification. Comparatively, for the Middle Preclassic period neither of these results are absent from the skeletal record as both Saul and Saul (1995) and Tiesler (2014) find evidence for caries and dental modification during this period, though due to preservation the evidence is limited.

The Late Preclassic Period Burials

This period in Maya history was characterized by generally more complex mortuary behavior and burial assemblages than the Middle Preclassic period (Wrobel et al. 2017). However, though complex mortuary behavior is especially evident during the Late Preclassic, some of these practices may have had long-standing histories surfacing as far back as the Early Preclassic period in ritual caves (Brady 1995). Of the burials within this thesis, 2 were associated to the Late Preclassic period (300 B.C.E–250 C.E). These individuals were identified at Group D, and E.

Ind. 2 (HTN.7.1.3) was found in group D and is composed of four different residential platforms that surround a patio near the center of the site. This individual was identified once excavators reached an unlined hole in the ground potentially underneath the earliest stucco floor. The body was placed in a flexed position, oriented from East-West, and was likely male and of adult age. The associated artifacts include Sierra Red ceramics, Mother of Pearl Shell, and a fragment of worked bone resembling a textile or mesh pattern. One cranial fragment had evidence of two puncture marks 15.4mm apart, each with a diameter of 5.4mm.

Ind. 13 (HTN.6.8/11.8) was identified in group E a residential platform near group D once excavators reached bed rock and encountered a capstone. The body was placed in an extended position, oriented from East-West, of adult age and male. The associated artifacts included ceramic sherds and two jade beads found in the matrix of the burial. characteristics. This individual also presented with evidence of easily visible Linear Enamel Hypoplasia (weaning lines), heavy dental wear and dental calculus build-up near or on the grooves themselves. Additionally, this individual presented with mild-moderate lipping in nearly all joint surfaces including larger surfaces.

These individuals though similar to Middle Preclassic remains exhibit distinct mortuary complexity in the form of burial practice and grave goods. Though there are only two individuals within this period at Holtun, Ind. 13 (HTN.6.8/11.8) was discovered with trade items (jade, greenstone, and seashell) and complex goods like the worked bone identified with Ind. 4 (HTN.2.39) which correspond to indicators of social complexity at a number of sites in the Maya region (Hammond et al. 1995). The inclusion of more sophisticated burial goods, potentially from long distance exchange or developed craft production at Holtun is consistent with the idea that there is increasing social experience within the Late Preclassic period (Chase et al. 2018).

Burial orientation patterns as related to plaza burials at Holtun during the Middle Preclassic do seem to be replicated exactly during the Late Preclassic. Ind 4 (HTN.2.39) and Ind.11 (HTN.6.12.5) are oriented east-west within a plaza as was found with the Middle Preclassic burials. Though this may likely be a consequence of small sample size and excavation strategy it could also suggest a continuation in the mortuary protocols of Holtun at the time. In tandem, several sites within the Maya region have uncovered an increase in burial wealth throughout the Late Preclassic including Ceibal, Cuello, and Santa Rita Corazol (Chase et al 2018; Hammond et al. 1995; Palomo et al. 2017).

Additionally, these individuals at Holtun also continue the early trend of burials in ceremonial areas. However, these structures were not likely commoner structures or monumental architecture given their placement in the site. This a shift (though a small one) away from the Middle Preclassic period where only large-scale constructions had evidence for mortuary behavior. One possible explanation for this is that by the Late Preclassic period there is a continuity in burial practice that favored communal and public internments to domestic or household contexts, but the start of a shift to include both communal shared group identities and more private individual identities away from main ceremonial structures (Hammond et al. 1995). Body treatment, including its placement for commemoration is a reflexive byproduct of collectively agreed upon social organization within a given site or region. For this reason, though there are a number of pan–Maya mortuary characteristics there are also a number of variable practices that occur (or do not) across specific areas in varying degrees of frequency.

One such example is the appearance of commingled and secondary internments. At Holtun, these appear as early as the Middle Preclassic period with identification of Ind 1 (HTN.1.4S.10), 1b (HTN.1.4A.10), 7a (HTN.1.6.19.Ind1), and 7b (HTN.1.6.19.Ind2). These

interments in other areas of the Maya region do not appear until the Late Preclassic at the earliest (Hammond 1995). However, the exceptions to broad generalizations demonstrate the mortuary complexity in the region and its variable commencement beginning in some places (such as Holtun) far earlier than 300 B.C.

Osteological evidence for adult life stress such as carious lesions, osteoarthritis, and vertebral arthritis were also present within this time period. While no pattern could be discerned from just two individuals, Ind. 13 (HTN.6.8/11.8) continues the trend of being female and having carious lesions. Additionally, for both individuals there does seem to be evidence of joint stress in the form of osteoarthritis and vertebral arthritis. Comparatively, for the Late Preclassic period neither of these results are absent from the skeletal record as Saul and Saul (1995) and Rodriguez (2017) document these skeletal changes during the time period.

The Early–Late and Late–Terminal Classic Period Burials

Throughout this period there is an increased development of mortuary complexity including the visibility of several levels of social stratification through mortuary assemblages and burial constructions (Weiss-Krejci & Sachse, 2006). Three Early–Late Classic burials at Holtun were identified at the plaza in group E and one at group C. Seven Late–Terminal Classic Burials were identified at Holtun, three in group E, two in group 33, one in group 10, and two in group D

Individuals 10 (HTN.6.12.7.Ind1), 11 (HTN.6.12.5), and 12 (HTN.6.12.7.Ind2), were found on the eastern side of the plaza. Excavations determined that the western portion of the plaza was a residential area and the eastern portion where the presence of an altar was identified served as an adjacent funerary space. This interpretation and the orientation of the bodies all

facing a north-south direction suggests that they might possibly be residential burials, but more importantly the increasing mortuary complexity identified at Holtun during the Early–Late Classic period. The presence of funerary altars does not appear in the Maya area before the development of Early Classic monumental spaces (Scherer 2020). Here we also see an interesting shift in communal identities when compared to earlier burials at Holtun, though ceremonial and ostentatious burials are certainly present throughout the region, at Holtun these individuals signal a concurrent interest in both Classic period monumental ceremonialism and also local and residential mortuary practices that commemorated ancestral members that may have been important to the community widely, but also reified local or individual groups and identities.

The next individual from this period I will discuss is Ind. 18 (HTN.11.12.12A.12B.4) who I have discussed at length elsewhere in this chapter but will include him in this discussion to briefly say that he is the only individual within the sample that has both cranial and dental modification. While this is likely a consequence of his transition into multiple and concurrent identities during his life he also represents an individual whose status may have merited these modifications. This is important because it is the first example of this at Holtun. Comparatively, there is little evidence of individuals with both cranial and dental modification within a similar context such as Ind. 18 (HTN.11.12.12A.12B.4). Though further research must be done to find a comparative individual, most researchers usually focus on the cranial or dental modifications and even Tiesler's (2014) work on the subject does not treat dental modifications in the same breath as cranial modification, in part perhaps because of the differential and multifactorial etiology of these practices.

Osteological evidence of life stress was identified during this time period as well. As in both the Middle Preclassic and Late Preclassic periods woman have carious lesions. Only two individuals here suffered from joint stress in the form of osteoarthritis and one individual had both cranial and dental modification.

Additionally, burials from the Late-Terminal Classic period are this first burials identified at Holtun, that extend beyond the central core of the site. Individuals were identified at groups 10 and 33 each of which is a periphery residential group of Holtun further removed from the ceremonial core of the site. This trend was only made visible by undergoing this temporal comparison and suggests that the sites mortuary program expended through this time period to the periphery of the group where previously only burials within the immediate core of Holtun had been recovered. This is in part due to the fact that the Holtun, had not extended this far during the Middle Preclassic period and thus we see along with the movement of people the continuity of mortuary ritual even to these areas.

Osteologically, in this period the pattern of carious lesions in females does seem to be replicated. However, this time period had the least available osteological evidence within it given the limited preservation of the remains. Only one person out of seven was observed to have osteoarthritis. No osteological pattern could be observed since the absence of these variables diminishes the ability to make definitive conclusions from this sub-set of the sample.

From the Late–Terminal Classic period Ind. 3 (HTN.7.9.6) and 3b (HTN.7.9.6) present a case study where Ind. 3 (HTN.7.9.6) was found with a fetal element within her burial context (Ind. 3b; HTN.7.9.6). This individual is uniquely positioned to examine how a personhood approach may illuminate interesting interpretations about social experience and identity. The first of which is that this person may have been of elevated status given the richness of the burial

assemblage, including shell beads that may have been jewelry and obsidian flakes, both of these being prestige goods at Holtun. The second of which is that this person may have potentially been a mother, given the identification of a human fetal ischium. However, if anything this interpretation is only one of several that consider how the inclusion of unique elements such as these may contribute to the intersectional and embodied identities of an individual. In this instance whose agency is performed, that of the mother, or that of the infant? Additionally, does the identification of this delicate bone within the burial serve as an indicator of status, identity of the decedent, or perhaps something more intimate about the relationship between the mother and infant, or the community that buried her? However, these questions are obscured by the preservation of the remains, and thus it also stands to reason that this could have been an individual bone tossed into the burial for purposes not yet known or the only remaining piece of a poorly preserved complete fetus. Like in other instances throughout this thesis, this interpretation is a tenuous exploration of the evidence within this individual and numerous factors obscure the detailed analysis of her context. However, cases like the one I just described serve to provide intriguing considerations for the bioarchaeology of personhood and agency in archaeology. Comparatively, the literature on archaeological fetal burials is rare in Mesoamerica, but notably in Tipu, Belize Danforth and colleagues (1997) found no evidence for mothers with fetuses, only neonates. One potential complicating factor is the idea that we may not know exactly where neonates and infants were buried in the ancient Maya world. This is a topic that needs further exploration in the region given that in other parts of the word the inclusion of fetuses and neonates within formal mortuary assemblages is well documented (Tocheri et al. 2005). However, demographics like age do not seem to be a limiting factor when considering selection for burial so how exactly to undergo a study of fetal remains in the region

might need to be considered more carefully. This comparison is interesting because it suggests that burial with fetal elements is rare, but whether that is a cultural phenomenon or a byproduct of the preservation in the region which would degrade fragile and delicate fetal elements is up for debate.

Chapter Summary

In this chapter I presented the discussion of mortuary and biological features identified in chapter 4 and a theoretical discussion of the implications for these results as they illuminate patterns of social organization, mortuary complexity, and embodied personhood within the sample at Holtun. Additionally, I presented a temporal comparison of burials through a comparative osteobiographic approach to discuss the trends and results of each individual within the context of their time period. The final chapter will build upon this discussion and include a theoretical consideration of this work within the larger narrative of Maya bioarchaeology and beyond.

CHAPTER SIX: CONCLUSIONS

This thesis presented the mortuary and osteological examination of individuals from Holtun, to investigate how social organization could be reflected within these data. As the first burials from Holtun, this analysis has produced a number of important results for Maya bioarchaeology to consider. First is the development of mortuary complexity at Holtun from the Middle Preclassic period forward. The most common mortuary configuration was one single interred individual interred within a simple grave with body oriented north to south and head oriented to the north. This thesis also contributes to the growing corpus of Preclassic burials (n=9) in the region available for collective analysis. Additionally, the identification of a preliminary pattern where only females within the sample had evidence for carious lesions was also uncovered. Lastly, preliminary patterns for the mortuary program and skeletal variation for the site both overall and by time period were identified.

Moreover, this project contributes the identities of 20 individuals at Holtun, and their contribution to our understanding of ancient Maya social organization produced through and osteobiographic approach. In every case discussed throughout this thesis, each instance of variation which deviates from the patterns described may likely represent the diversity and embodied personhoods that were embedded within ancient Maya social organization, and the practices and traditions that reified an inconstant landscape of intersectional identities resulting in a variety of archaeological interpretations. Lastly, another key contribution of this thesis is the attempt to integrate a comparative osteobiographic approach within the Maya region. This work represents the first attempt at applying this novel model to the Maya region and the first

extension of the approach to a complex mortuary assemblage including burial features and grave goods.

The examination of these identities is exactly what the osteobiographic approach excels at producing because in addition to the development of patterns, it allows analysts to treat variation (or what would otherwise be a lack of patterns or trends) as the pattern itself, where individual variation is highlighted beyond a population approach. This brings me to final thoughts on the contribution of the comparative osteobiographic approach to research in the Maya area and the nature of small samples. The approach first proposed by Robb in 2019 to treat osteobiographies through a comparative lens holds significant promise in identifying how mortuary and biological variables intersect and highlight the nuance in individual lives beyond there analyses when considered separately. However, the biographies I created for Holtun, look very different from the ones of Neolithic Italy produced by Robb (2019), or the trajectories highlighted by Pezo–Lanfranco (2020). This is, of course, a consequence of preservation, and is something that any researcher is going to have to contend with in the Maya world. Additionally, to an extent, I am sure that some patterns are obscured throughout my visual analysis because not all variables were observable on each individual. The visual representations I created which are adapted from Pezo–Lanfranco (2020) serve to highlight how individual variation may not always be as individual as once thought and in fact commonalities exist even within small and temporally diverse samples. Its strength in creating a visual representation of how similar or dissimilar some components are– such as the inclusion of ceramics in burials or body modification, while at the same time capturing the trajectories of each life is its benefit. Because of this I argue that the bioarchaeology of personhood has the potential to contribute the greatest interpretive framework for bioarchaeological data that also encompasses the complexity of the

past within a humanistic lens (Boutin 2016). This process facilitates our interpretation of small samples and breathes new life into decades of archaeological reporting that has relegated unideal skeletal series into appendices and technical reports.

This approach is deeply grounded in the perspective that each individual matters in our research beyond the statistic that they may or may not represent. Attune to the post-processual critique in anthropology, this approach contributes a humanist model to the past grounded in the observable variables and archaeological context of the data that we examine. In some ways, beyond the cultural revelations of the past that we can gain, this research also affects the way archaeologists engage with modern indigenous communities whose relationship to ancestorhood and indigeneity are fraught with political and colonial entanglements (McAnany, 2016). Osteobiographies represent but one approach (of many) that humanize, and place individuals front and center in the conversations of the past and how individual identities and persons actually lived and contributed in the past (Boutin 2019). Through this argument I imagine here, as McAnany (2020) posits, a Maya archaeology that is deeply invested in the interrogation of the past in conversation with the present call for equitable and humanistic approaches to scholarship on the ancient past.

Limitations

Broadly, research on the development of Maya social organization is dampened by numerous impediments to bioarchaeological analysis all stemming from small skeletal samples, limited geographic and temporal representation, and lastly, poor preservation (Scherer 2018). One major limitation of this study is sample size. Holtun has only 20 individuals represented, and of these nine represent the Preclassic period. Though this number is high (for Preclassic

burials) it is still the byproduct of the difficulty in reaching the stratigraphic and cultural levels where these burials are located likely having been obliterated by time or a later settlement.

Another limitation is the temporal resolution of burial dates. Usually, burials are relatively dated through ceramic type variety-mode sequencing. However, these ceramic complexes initially conceptualized as sequential actually frequently co-occur within the same stratigraphic level and often even within individual burials, which suggests that there is going to be a degree of temporal overlap between remains. However, despite these limitations each individual contributes to our first understanding of the biological and mortuary variation for this site and a valuable source of information from exploring unique patterns of identity within a site.

Preservation was also a major limitation of this study. Osteobiographies benefit from well-preserved individuals since their skeletons (due to the amount of material available for analysis) will have more variation and individual characteristics to assess (Robb 2019). The poor state of preservation regularly encountered in the Maya region severely limits our ability to make paleodemographic and paleopathological assessments either because the skeletal features have obliterated, or because the representative sample of recovered remains is not large enough to make these assessments. However, though quantitative assessments are not possible it does allow us to examine the variation within the sample. In essence the patterns we can observe stem from the variation present within the sample.

Lastly, skeletal data used for this project came from a secondary source, the written data collection sheets produced by Victoria Izzo and the Holtun Archaeological Project reports from 2011–2017. However, this allowed for the inclusion of mortuary and archaeological analysis that contributed the archaeological data for individuals at Holtun, beyond just skeletal differences into a contextualized synthesis of data.

Implications and Future Directions

This thesis contributes to the growing literature on how differences in mortuary and skeletal variation can help provide the first preliminary identification of broader shared social experiences and organization through bioarchaeological pattern identification in the Maya region. Additionally, evidence for the mortuary and bioarchaeological diversity of burials across time and burial location at Holtun, Guatemala as the first ever identified patterns at this site contributes new knowledge and evidence for Maya bioarchaeology.

To better understand the bioarchaeological patterns at Holtun, a larger sample size would be needed. For this to occur, more excavations would be necessary. In addition, it would be beneficial if the sample was more representative of each time period. For example, though Middle Preclassic burials are usually male, this is hardly representative of the general populations they are recovered from. Additionally, because of the poor preservation making macroscopic identifications difficult, the inclusion of biogeochemical and molecular approaches like light stable isotopes and trace elements analysis might illuminate more thoroughly the diet, mobility, and health patterns of these individuals (Freiwald 2020). Lastly, the inclusion of zooarchaeological analysis, as it relates to burials and special deposits, might illuminate instances of ceremonial commemoration or animal sacrifice that could contribute to the examination of who these individuals were and what their status may have been in the context of Ancient Holtun.

This project's goal was to examine how Maya social organization is reflected in burial treatment and evidence of skeletal markers of stress. I interpreted the results from data collection to explore the variation and possible social experience of individuals at the site as they relate to each other in an osteobiographic approach. In particular, this study examined if individuals from

Holtun, regardless of mortuary and bioarchaeological variation, represent patterned burial practice and diverse social experiences. The results of this study suggest that at Holtun, individuals articulated with broader Maya mortuary practices and embodied diverse social experiences. Unfortunately, it is impossible to currently make definitive and quantifiable assessments about the true nature of biological and mortuary variability due in large part to the limited number of individuals recovered and their poor preservation. However, this analysis exemplifies the strength of an osteobiographic approach to contextualize small samples within broader narratives of ancient Maya mortuary practice and social organization. As this skeletal series (and others in the region) increase in size, social theory driven bioarchaeology will be readily able to critically examine the development of Maya social organization through a research agenda that places the individual at the forefront of analysis and extrapolates diverse interpretations of social experiences through a thorough assessment of daily life and embodied personhood at sites throughout the region.

APPENDIX A: OSTEOBIOGRAPHIES OF HOLTUN

Introduction to Appendix A

Appendix A lists all of the osteobiographies generated for the 20 individuals within the sample. Each biography has both a table that directs the reader to additional context (within the Holtun Archaeological Project Reports) as well as highlights some key points and features from each individual. In addition to this, each individual was treated with an in-depth descriptive narrative of the variables assessed throughout the analysis of this thesis as well as the incorporated mortuary context and any excavator notes present throughout the original field discovery of human remains. This section is largely a contribution of descriptions for each individual that goes beyond the brief description presented in the discussion. Lastly, for each individual (where possible and available) overhead images, line drawings, and *in situ* field images of both the remains and the archaeological context were included for reference.

Individual 1

Table 25 Profile of Individual 1 (HTN.1.4A.10).

Individual/HAP ID #:	Ind.1; HTN.1.4A.10
Burial ID #:	HTN.1.4A.10
Site:	Holtun, Guatemala
Year Excavated:	2011
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.2, Temporada 2011 (p.92-94;237)
Associated Period/Date:	Middle Preclassic
Burial Location:	Group F– Plaza A
Feature Type and Orientation:	Simple Grave In Fill
Internment Type/Body Position:	Secondary Commingled
Associated Artifacts:	Ceramics, Chert, Bone, Shell, Obsidian
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Indeterminate
Skeletal/Dental Pathology:	None Observed
Observations:	Stingray Spine in context

Individual HTN.1.4A.10 is classified as a multiple, secondary commingled interment in an elite residential plaza F–A (Table 25; Fig. 28). The grave was identified after the removal of middle and late Preclassic material underneath the wall of substructure near the structure on the north west corner of the plaza. Once identified, excavators cut into the matrix below and discovered that HTN.1.4A.10 had actually been disturbed from remains at a lower level and were actually associated to this individual. The material recovered, representing two distinct individuals is comprised of no more than 30 small and largely unidentifiable fragments. The cranium and appendicular skeleton were not represented. Several distal rib fragments were identified as well as distal phalanges and metatarsal fragments (Fig. 29). Three teeth were identified, one maxillary right canine and two right mandibular molars, the presence of which indicates this was a commingled context. The associated artifacts include ceramics, shell, animal

bone, jade, and obsidian all identified within the same matrix as the osteological material. The recovery of this material in concert with other archaeological material introduced the possibility that this context may have been associated to ceremonial feasting activity but cannot exclude the possibility that taphonomy may have played a role in the degradation of these individual's remains. Due to the absence of any skeletal remains used for sex estimation this commingled assemblage could not be assigned sex. Age at death, however, was estimated using Iscan and colleagues sternal rib end methodology (1984; 1985). The distal end of the rib was shallow with negligible erosion and irregular billowing on the articular surface. Each of the identified rib ends were scored as 1.5 and 2 which together suggest that at least one of the individuals represented by this set of remains was a young adult between the age of 16 and 20 years.

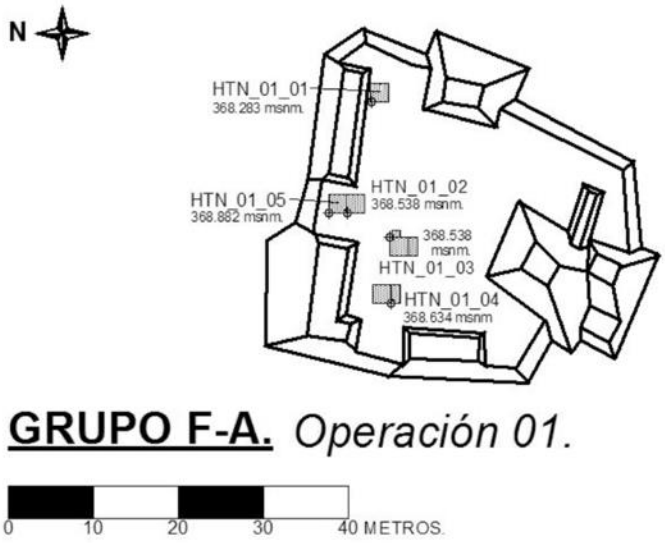

Figure 29 Drawing of Plaza F–A and surrounding structures depicting unit HTN.1.4 where HTN.1.4A.10 was found (Guzman 2016).

Figure 30 Image of HTN.1.4A.10 (Izzo 2017).

Individual 1b

Table 26 Profile of Individual 1b (HTN.1.4A.10).

Individual/HAP ID #:	Ind.1b; HTN.1.4A.10
Burial ID #:	HTN.1.4A.10
Site:	Holtun, Guatemala
Year Excavated:	2011
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.2, Temporada 2011 (p.92-94;237)
Associated Period/Date:	Middle Preclassic
Burial Location:	Group F– Plaza A
Feature Type and Orientation:	Simple Grave In Fill
Internment Type/Body Position:	Secondary Commingled
Associated Artifacts:	Ceramics, Chert, Bone, Shell, Obsidian
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Indeterminate
Skeletal/Dental Pathology:	None Observed
Observations:	

Individual 1b HTN.1.4A.10 is classified as a multiple, secondary commingled interment in an elite residential plaza F–A (Table 26; Fig. 29). This individual was encountered throughout the excavation of HTN.1.4A.10 which also produced Individual one. This individual is represented by a single tooth, a right third mandibular molar and is their only remaining skeletal element. It was determined that this molar was not within the same archaeological context (though it was found nearby) of individual one and so it was considered its own separate person (see Scherer 2011: 237). Though very little can be concluded from just one molar we can determine the individual was of at least young adult age.

Individual 2

Table 27 Profile of Individual 2 (HTN.7.1.3).

Individual/Burial ID #:	Ind.2; HTN.7.1.3
Burial ID #:	HTN.7.1.3
Site:	Holtun
Year Excavated:	2011
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.2, Temporada 2011 (p.41-45;238)
Associated Period/Date:	Late Preclassic
Burial Location:	Group D
Feature Type and Orientation:	Simple Pit Grave; E/W
Internment Type/Body Position:	Primary; Flexed
Associated Artifacts:	Ceramics (including a Sierra Red bowl with outcurving sides everted rim, and flat base – partial), Bone, Shell
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Adult
Biological Sex Estimation:	Probable Male
Skeletal/Dental Pathology:	Mandibular resorption potential infection of right alveolar portion
Observations:	Edentulous

HTN.7.1.3 is classified as a single, primary interment in a residential plaza. The grave was constructed as a simple pit using an unlined hole in the ground potentially underneath the stucco floor identified in HTN 7.1.2 (Table 27). The body was placed in a flexed position, with body oriented from East-West (Fig. 30). The associated artifacts include a Sierra Red bowl and other ceramics, Mother of Pearl Shell, and a fragment of worked bone resembling a textile or mat pattern. HTN.7.1.3 was recovered in poor fragmentary preservation where only approximately 25% of the individual was present at the time of excavation, likely due to taphonomic processes (Tiesler et al. 2010). The cranium was primarily represented by occipital and petrous portion fragments (Fig. 31). One of these fragments has evidence of two puncture marks 15.4mm apart, each with a diameter of 5.4mm. These cranial elements are usually some of the last to degrade

due to the density of the bone in these areas. No teeth were found in this burial and the mandibular fragment identified had evidence of healed alveolar resorption, suggesting the individual may have been an adult at death (White et al. 2011).

In addition to the cranial remains, several clavicular, scapular, femoral, and tibial fragments were also identified. A portion of the femur presented evidence of cracking and potential rodent gnawing. Using secondary sex characteristics, this individual was identified as a probable male (Scherer 2011). The robusticity of cranial and mandibular fragments along with the femoral fragment support this estimation (Buikstra and Ubelaker 1994). However, based on the extremely fragmentary presentation of HTN.7.1.3, it is not possible to accurately estimate the biological sex or age-at-death of this individual. It is most likely that the individual was an adult due to the alveolar resorption in the right portion of the mandible and a male due to the overall structure of the bone. Other than the alveolar resorption, there is no observable skeletal or dental pathology on the cranial and post-cranial remains.

Figure 31 Drawing of HTN.7.1.3. (Callaghan and Rivera Castillo 2011).

Figure 32 Image of HTN.7.1.3 remains (Izzo 2017).

Individual 3

Table 28 Profile of Individual 3 (HTN.7.9.6).

Individual/HAP ID #:	Ind.3; HTN.7.9.6
Burial ID #:	HTN.7.9.6
Site:	Holtun
Year Excavated:	2013
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.4, Temporada 2014 (p.21-34)
Associated Period/Date:	Late Classic
Burial Location:	Plaza D–Patio
Feature Type and Orientation:	Haphazard Cist Grave; N/S
Internment Type/Body Position:	Multiple Primary; Extended
Associated Artifacts:	Ceramics (including an eroded bowl outcurving sides, flat base, nubbin supports, and red slip – complete), Chert, Shell
Preservation:	Complete (>75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Female
Skeletal/Dental Pathology:	None Observed
Observations:	Moderate Dental Wear; Ischium of fetus present

HTN.7.9.6 is classified as a single, primary interment in a residential plaza. The grave was constructed as a haphazard cist using partially lined stone pit with several large stones placed above the remains (Table 28; Fig. 32). The body was placed in an extended position, oriented from North-South (Fig. 32). The associated artifacts include a partially complete vessel potentially from the Late Classic period, chert, and shell beads, the remains of which may have been for a necklace or similar object. The ceramic vessel was placed on the lower limbs of the individual and samples of its contents were collected. HTN.7.9.6 was recovered in near complete preservation where approximately 75% or more of the individual was present at the time of excavation. Though the individual is nearly complete, due to taphonomic processes their remains

are extremely fragmentary. The cranium was primarily represented by temporal, parietal, and zygomatic fragments. Also discovered was a left body fragment of the mandible with several mandibular teeth still present, both left premolars were present and were the only teeth that presented with significant wear (scored as 4). Only two maxillary teeth were identified.

The axial body was highly fragmented with most vertebrae represented by fragments of the body and spinous processes. Included within the axial body the ischium of a fetus was identified. Though this is evidence of another individual within this interment the presence of just this element warranted inclusion within this osteobiography. The appendicular body was relatively well preserved, including numerous long bones where only the epiphyses were missing from the individual and several pieces of the os coxae which allowed for an estimate of age at death and biological sex (Fig. 33). Both ilia were present but fragmentary, however, the greater sciatic notches were well persevered and each were given a score of 2 (indicating broad notches) suggesting female sex. Additionally, the presence of the mental eminence and gonial flaring allowed for secondary cranial traits to be considered in sex estimation. The gonial flaring was scored as 1 suggesting very gracile flaring, and the minimal evidence of a mental eminence are both characteristic of female sex. Lastly, the auricular surface was preserved and was examined through the Ousborne and colleague's method (2004) and given a phase of 1b suggesting this individual was a young adult from about 18-25 years of age at death.

A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results. The extensive fragmentary and postmortem destruction of this individual hindered the evaluation of pathologies. One of the maxillary molars had evidence of bacterial infection due to evidence of inflamed roots.

Figure 33 Image of HTN.7.9.6 in situ (Crawford 2014).

Figure 34 Image of HTN.7.9.6 (Izzo 2017).

Individual 3b

Table 29 Profile of Individual 3b (HTN.7.9.6).

Individual/HAP ID #:	Ind.3; HTN.7.9.6
Burial ID #:	HTN.7.9.6
Site:	Holtun
Year Excavated:	2013
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.4, Temporada 2014 (p.21-34)
Associated Period/Date:	Late Classic
Burial Location:	Plaza D–Patio
Feature Type and Orientation:	N/A
Internment Type/Body Position:	Multiple Primary
Associated Artifacts:	N/A
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Juvenile (Infant)
Biological Sex Estimation:	Female
Skeletal/Dental Pathology:	None Observed
Observations:	Moderate Dental Wear; Ischium of fetus present

Individual 3b was found within the context of individual three in a residential plaza. The grave was constructed as a haphazard cist using partially lined stone pit with several large stones placed above the remains (Table 29; Fig. 33). Within the burial context of individual three the remains of a fetus were identified. Individual three was described as a young adult female and these remains were found in the same context. The individual is represented by one sole skeletal element a fetal ischium and though very little might be discerned osteologically from this find, it is nonetheless an individual and a biography was included.

Individual 4

Table 30 Profile of Individual 4 (HTN.2.39.A.6).

Individual/HAP ID #:	Ind.4; HTN.2.39.A.6
Burial ID #:	HTN.2.39.A.6
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.264-284)
Associated Period/Date:	Middle Preclassic
Burial Location:	Structure F–Plaza F/B
Feature Type and Orientation:	Cist Grave; E/W
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics, Chert, Bone, Shell
Preservation:	Partial (25–75%)
Age-at-Death Estimation:	Middle Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Dental Caries
Observations:	Ceramic Zoomorphic Figurine in context; Dental Filing on Left Maxillary Canine

Individual HTN.2.39.A.6 is classified as a single, primary interment in plaza F–B (Table 30; Fig. 34). The grave was identified after the removal of Late Preclassic material underneath a plaza floor. Three stones were identified surrounding the cist, haphazardly placed around the individual (Fig. 35). HTN.2.39.A.6 was identified with ceramics, chert, bone, and shell throughout their context. Excavators also recovered a partially preserved zoomorphic figurine with four appendages. The body was placed in an extended position, oriented from East-West and approximately 75% of HTN.2.39.A.6 was recovered however, preservation was largely fragmentary (Fig. 36). The cranium is primarily represented by cranial vault fragments, loose dentition, and several mandibular fragments. The axial skeleton was poorly represented with only a few vertebral fragments identified and both os coxae present but highly fragmented. The appendicular skeleton of this individual presented several large fragments of long bone shafts

including a near complete right radius and ulna. Sex estimation was attempted through secondary cranial characteristics. The glabella, mastoid process, and external occipital protuberance were used in this determination. Of the traits examined, the glabella scored a 1, the mastoid process and external occipital protuberance each scored a 2, all suggesting that this individual may have probably been a female. There were no primary traits to estimate age, however, all cranial fragments broke along open cranial vault sutures which suggests that there was minimal sutural obliteration. Additionally, given the fully developed dentition present with moderate wear this individual may possibly have been a adult 30-50 years of age.

This individual also presented with evidence of moderate to heavy dental wear including dentin exposure of the anterior teeth. Carious lesions were identified in five teeth all of which affected the cementoenamel junction, causing abscesses and enamel loss. The mandibular left first premolar has a short root and an additional occlusal surface, a consequence of a developmental defect or stunted growth due to crowding. Lastly, the maxillary left canine had lateral filing present. A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results.

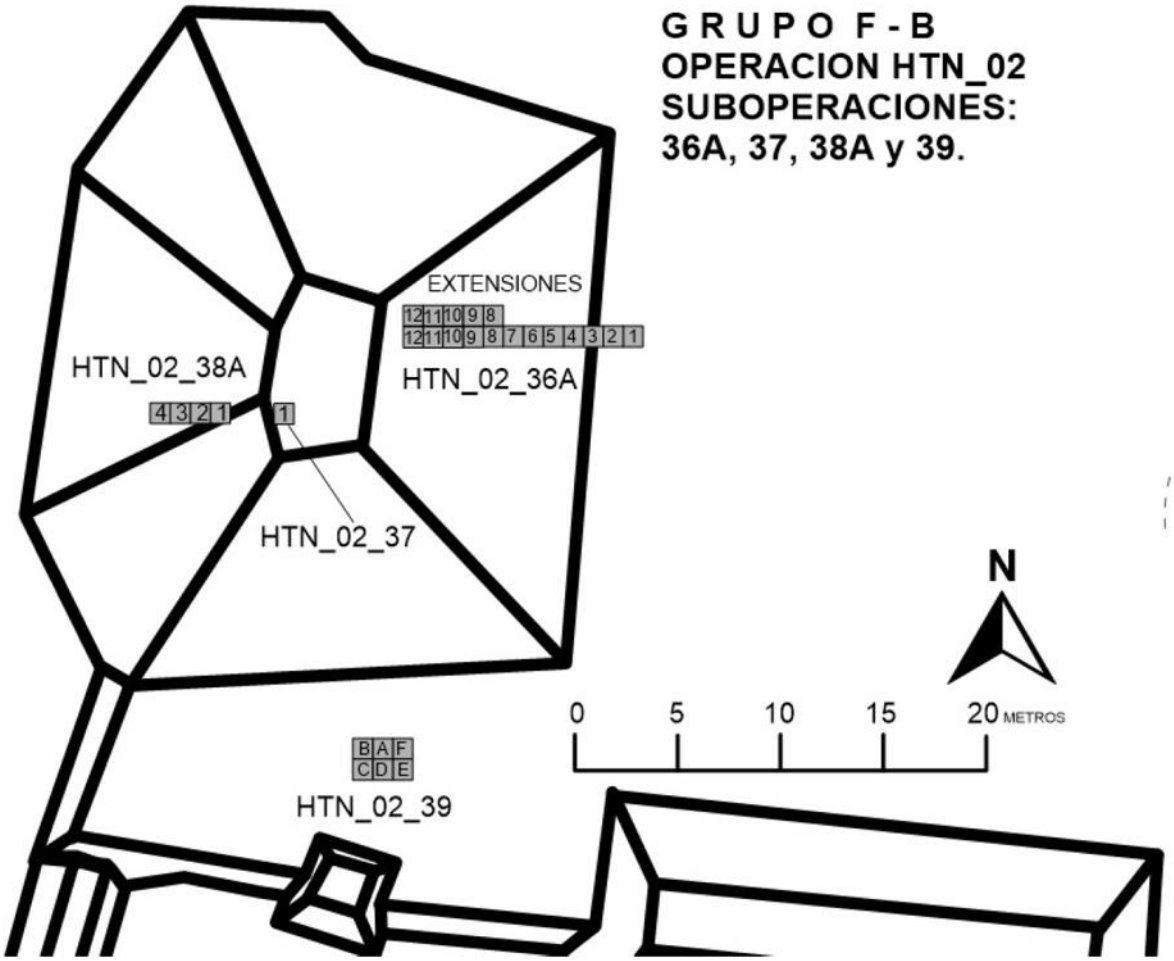

Figure 35 Drawing of site plan for Group F–B indicating units of excavation (Guzman 2016).

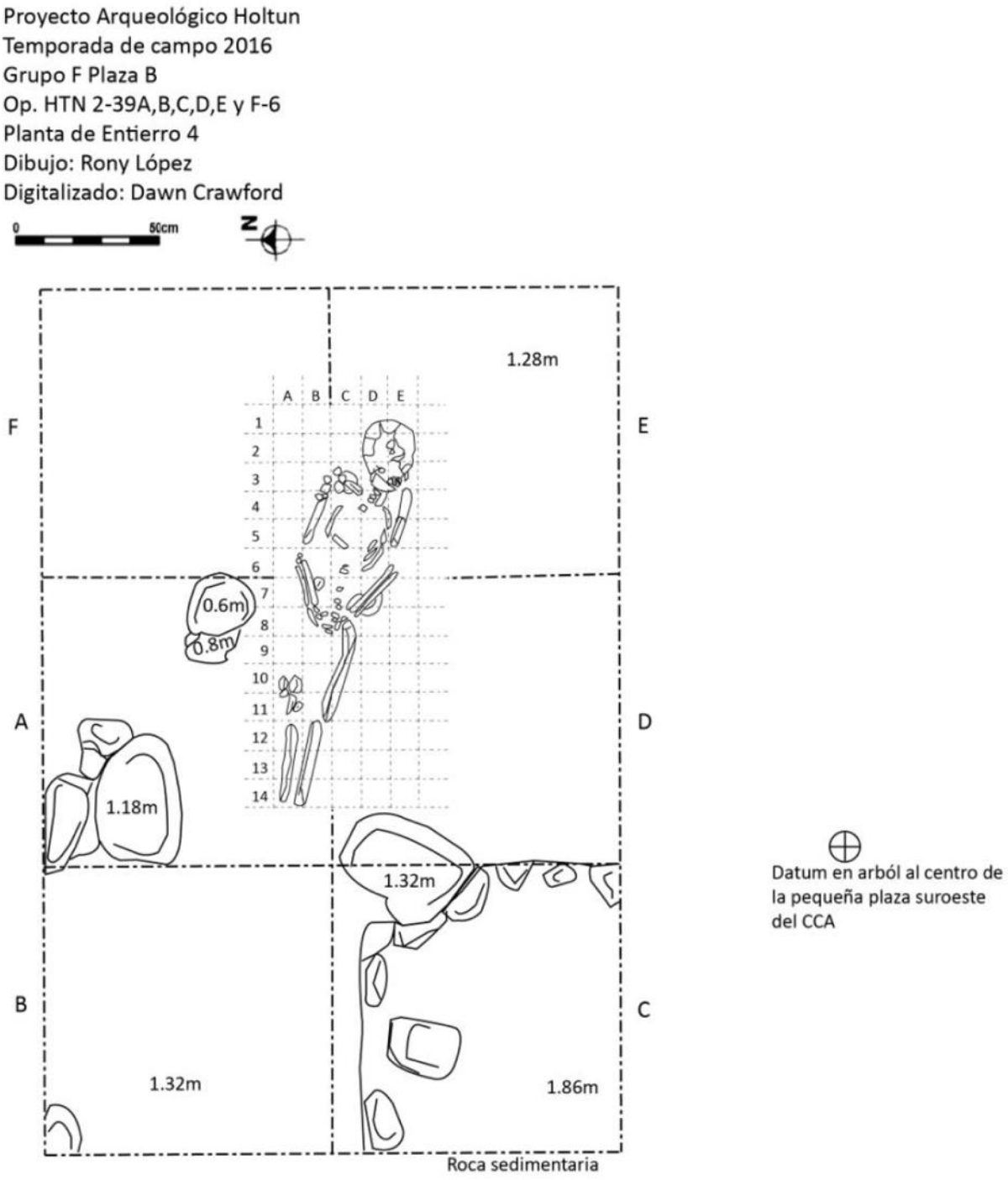

Figure 36 Drawing of HTN.2.39.A–F.6 (Lopez 2016).

Figure 37 Image of HTN.2.39.A.6 (Izzo 2017).

Individual 5

Table 31 Profile of Individual 5 (HTN.6.CH.7.4).

Individual/HAP ID #:	Ind.5; HTN.6.CH.7.4
Burial ID #:	HTN.6.CH.7.4
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.112-114)
Associated Period/Date:	Late to Terminal Classic
Burial Location:	Group E–Building E (Building Exterior)
Feature Type and Orientation:	Chultun; N/A
Internment Type/Body Position:	Secondary Disturbed; Seated
Associated Artifacts:	Ceramic sherds and Chert
Preservation:	Partial (25–75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Probable Male
Skeletal/Dental Pathology:	Porosity and Lipping at Temporomandibular Joint (TMJ); Shovel Shaped Maxillary Incisors; Dental Calculus Present
Observations:	Chert Arrow in context; Possible Cranial Modification; Vastus Notch present

HTN.6.CH.7.4 is classified as a single, secondary interment in a residential plaza. The burial was within a chultun laid on bedrock (Table 31; Fig. 37). The body was placed in a seated position (Fig. 37). The associated artifacts included ceramic sherds and a chert arrow projectile. Approximately 40% of HTN.6.CH.7.4 was recovered and preservation was fragmentary. The individual was represented mostly by the axial skeleton. One arm was present both most other long bones were missing from this context. This could be due taphonomic processes or transforming body processing methods. As a secondary burial, either of these processes or a combination of them both could be factors to consider. The cranium was primarily represented by temporal, parietal, and occipital fragments. Also discovered was a left body fragment of the

mandible with several mandibular teeth still present. This individual seems to be differentially preserved potentially due to water damage throughout burial. In areas where water may have been a factor there are several degraded and absent fragments. In places where water did not affect the remains there is excellent preservation, including a nearly complete set of hands and feet. Most of the dentition is loose and both maxillary and mandibular first and second incisors presented pronounced shoveling. In addition to this, wear was identified in all teeth present and dental calculus was found on all four maxillary incisors.

The axial body was highly fragmented with most vertebrae represented by fragments of the body and spinous processes, no pelvic fragments were identified. The size and robusticity of these fragments indicate that this individual was of very large size (Fig. 38). Though this makes our analysis of sex only probable, there were sufficient secondary cranial traits to make an estimate. The right mastoid process, gonial angle, and ascending ramus each were examined. The mastoid process and gonial angle were each scored as 4's and the ascending ramus was broad each of which suggesting that this would have been a male. Additionally, given the auricular surface and sternal rib ends of this individual it is estimated that they were between 20-30 years of age.

A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results. In addition to these measurements, the patella was observed to have a vastus notch. The left temporomandibular joint (TMJ) had slight porosity and lipping. Though the fragments recovered cannot be reconstructed, the evidence of temporomandibular osteoarthritis in a young adult could be associated with cranial modification throughout childhood (Tiesler 2014). Lastly some remains were identified as possibly pertaining to a different individual given that they do not fall within the range of variation for this

individual. Though this could be the product of the differential preservation, the remains are different enough to suggest that they do not belong to this individual.

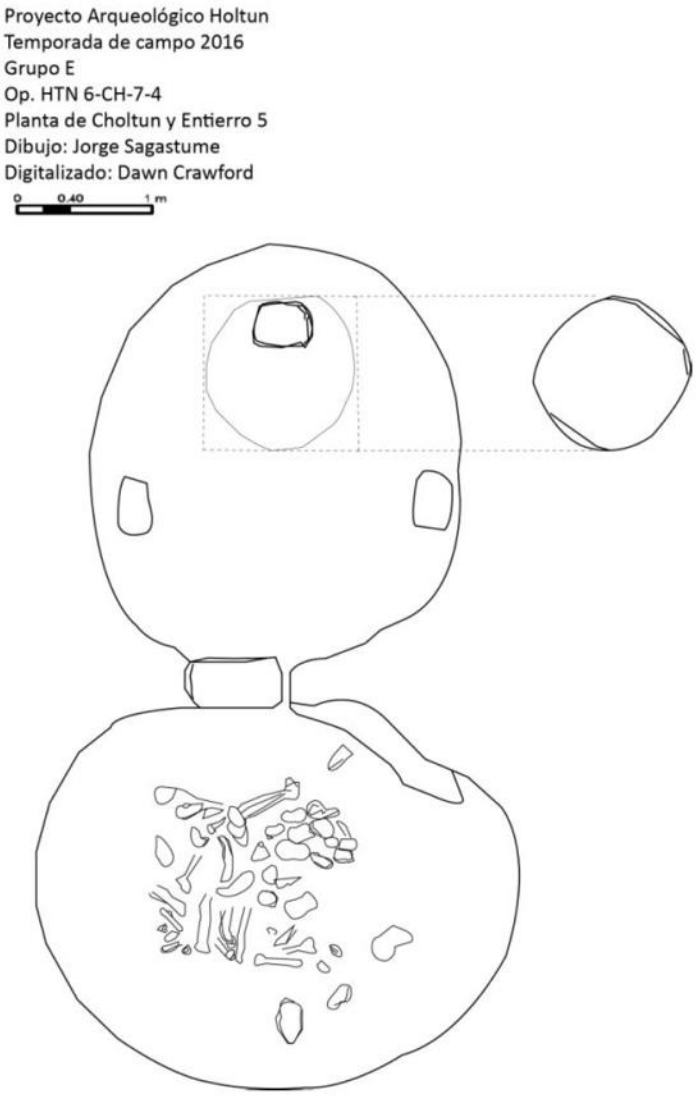

Figure 38 Drawing of Chultun and HTN.6.CH.7.4 (Sagastume 2016).

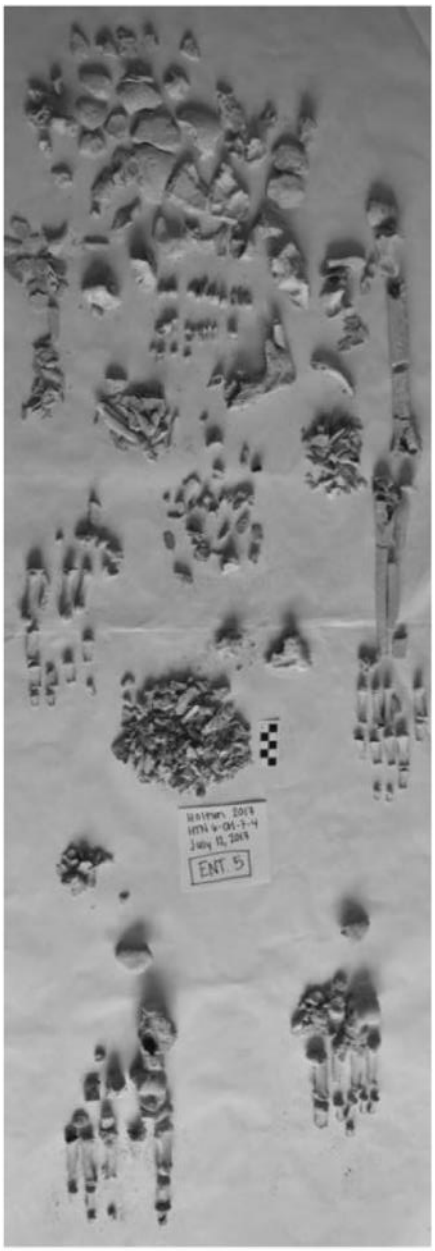

Figure 39 Image of HTN.6.CH.7.4 (Izzo 2017).

Individual 6

Table 32 Profile of Individual 6 (HTN.6.2.4).

Individual/HAP ID #:	Ind.6; HTN–6–2–4
Burial ID #:	HTN–6–2–4
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.72)
Associated Period/Date:	Late to Terminal Classic
Burial Location:	Group E–Plaza
Feature Type and Orientation:	Simple Grave
Internment Type/Body Position:	Primary
Associated Artifacts:	Ceramics
Preservation:	Skull Fragments
Age-at-Death Estimation:	Juvenile
Biological Sex Estimation:	Indeterminate
Skeletal/Dental Pathology:	None Observed
Observations:	Interred near and altar

HTN.6.2.4 is classified as a single, primary interment in an elite residential plaza. The burial was within a simple pit grave within fill near and altar in Group E (Table 32; Fig. 39). Ceramics were associated with this interment and have been identified as Late to Terminal Classic period sherds. Approximately 10% of HTN.6.2.4 was recovered, and preservation was fragmentary including both adult and deciduous teeth (Fig. 40). This lack of recovered remains could be the product taphonomic processes or transforming body processing methods that selectively used only certain skeletal elements. The cranium was primarily represented by temporal and parietal fragments. Examining the dentition present revealed that this individual was likely between 5-7 years of age. Due to the morphological diversity of long bones and cranial elements during childhood and adolescence juveniles are excluded from sex estimation.

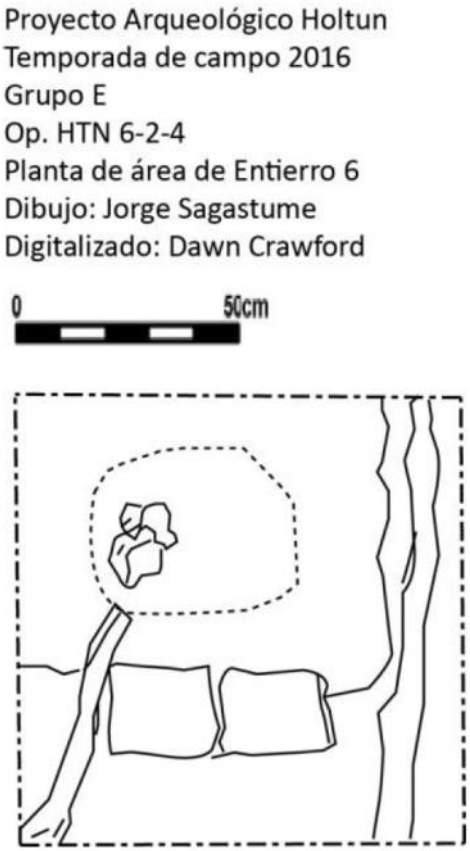

Figure 40 Drawing of HTN.6.2.4 (Sagastume 2016).

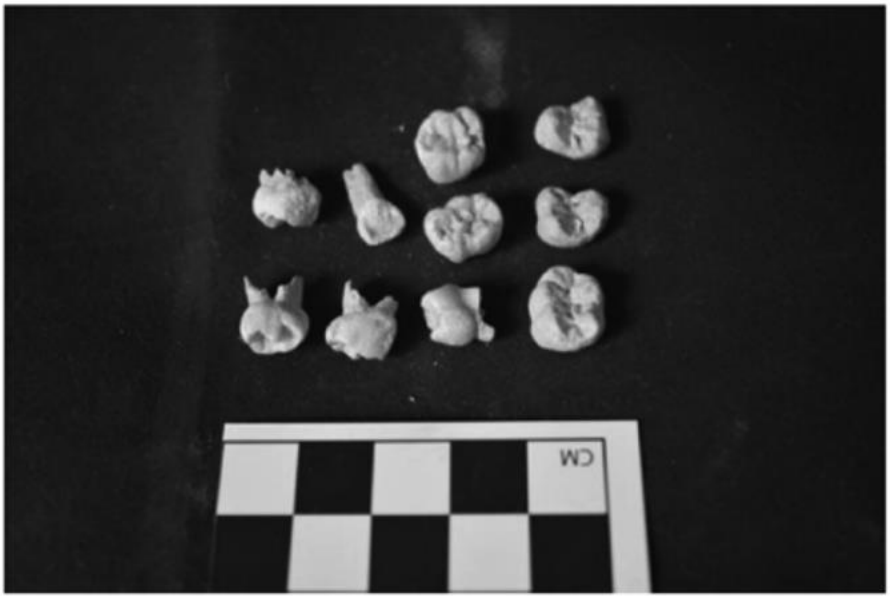

Figure 41 Image of dentition of HTN.6.2.4. (Izzo 2017).

Individual 7a

Table 33 Profile of Individual 7a (HTN.1.6.19.Ind1).

Individual/HAP ID #:	Ind.7a; HTN.1.6.19.Ind1
Burial ID #:	HTN.1.6.19
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.161-162)
Associated Period/Date:	Middle Preclassic
Burial Location:	Group F-A–Plaza
Feature Type and Orientation:	Simple Grave
Internment Type/Body Position:	Secondary
Associated Artifacts:	Ceramics (including an Achiotes Unslipped jar, see also Mendez-Lee 207:610) and Chert
Preservation:	Partial (25–75%)
Age-at-Death Estimation:	Middle Adult
Biological Sex Estimation:	Probable Male
Skeletal/Dental Pathology:	Osteoarthritis at Radius, Pelvis, and Vertebral bodies; Dental calculus present
Observations:	Cinnabar present in context; Dental wear in lower molars; Squatting Facet Present

Individual HTN.1.6.19.Ind1 is classified as a multiple, secondary interment in residential plaza F–A (Table 33; Fig. 41). The grave was identified in the fill beneath a Middle Preclassic stucco floor in the plaza of F-A. HTN.1.6.19.Ind1 was identified with an offering of a an Achiotes Unslipped jar with handles on it (see Mendez-Lee 2017:610) over top of the thoracic cavity though they appeared in relative anatomical position the remains were discovered disarticulated which suggests this individual is within a secondary context. Additionally, this individual was covered in cinnabar. The body was placed in an extended position, oriented from North-South and approximately 75% of HTN.1.6.19.Ind1 was recovered however, preservation was largely fragmentary (Fig. 42). The cranium is present but no diagnostic features were

observed that could aid in sex estimation. The axial skeleton was poorly represented with only a few vertebral fragments identified, two sternal rib ends, and both os coxae present but highly fragmented. The appendicular skeleton of this individual presented several large fragments of long bones. The preservation of this individual is unexpected, though fragmentary many fragile elements remained while other more robust elements like the femurs had degraded (Fig. 43). Sex estimation was attempted through primary pelvic and secondary cranial characteristics. The ascending ramus, mandibular shape, and ventral arch were used in this determination. Of the traits examined, the ascending ramus scored a 1, the mandible was "U" shaped and the ventral arch was scored as a 5, all suggesting that this individual may have probably been a male. The pubic symphysis, auricular surface, and sternal rib ends were used to estimate age. Of these characteristics, the pubic symphysis, auricular surface each scored within phase 2, and the sternal rib end scored a 3 suggesting that this individual was an adult of age 18-35.

This individual also presented with evidence of moderate to heavy dental wear including dentin exposure of the molars. Additionally, dental calculus build-up was present on the lingual surface of their maxillary dentition and the cementoenamel junction of their molars. This individual also presented with mild-moderate porosity, lipping, and spicule osteophyte formation due to arthritis in nearly all joint surfaces including larger surfaces, ribs, and vertebral bodies. A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results. Lastly some remains were identified as possibly pertaining to a different individual given that they do not fall within the range of variation for this individual, all of which were later associate to HTN.1.6.19.Ind2.

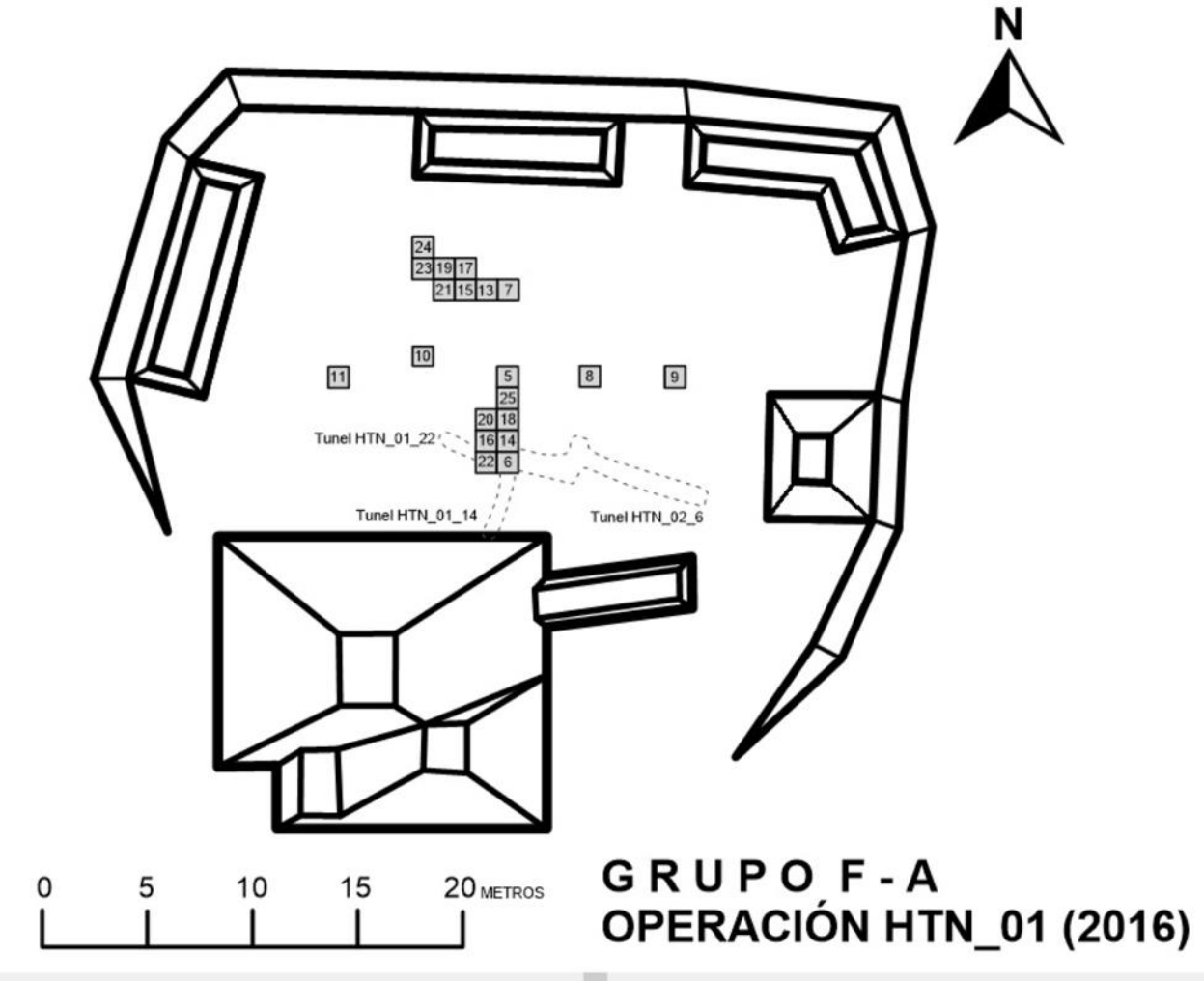

Figure 42 Image depicting HTN.1.6 where both HTN.1.6.19.Ind1 and HTN.1.6.19.Ind2 were discovered (Guzman 2016).

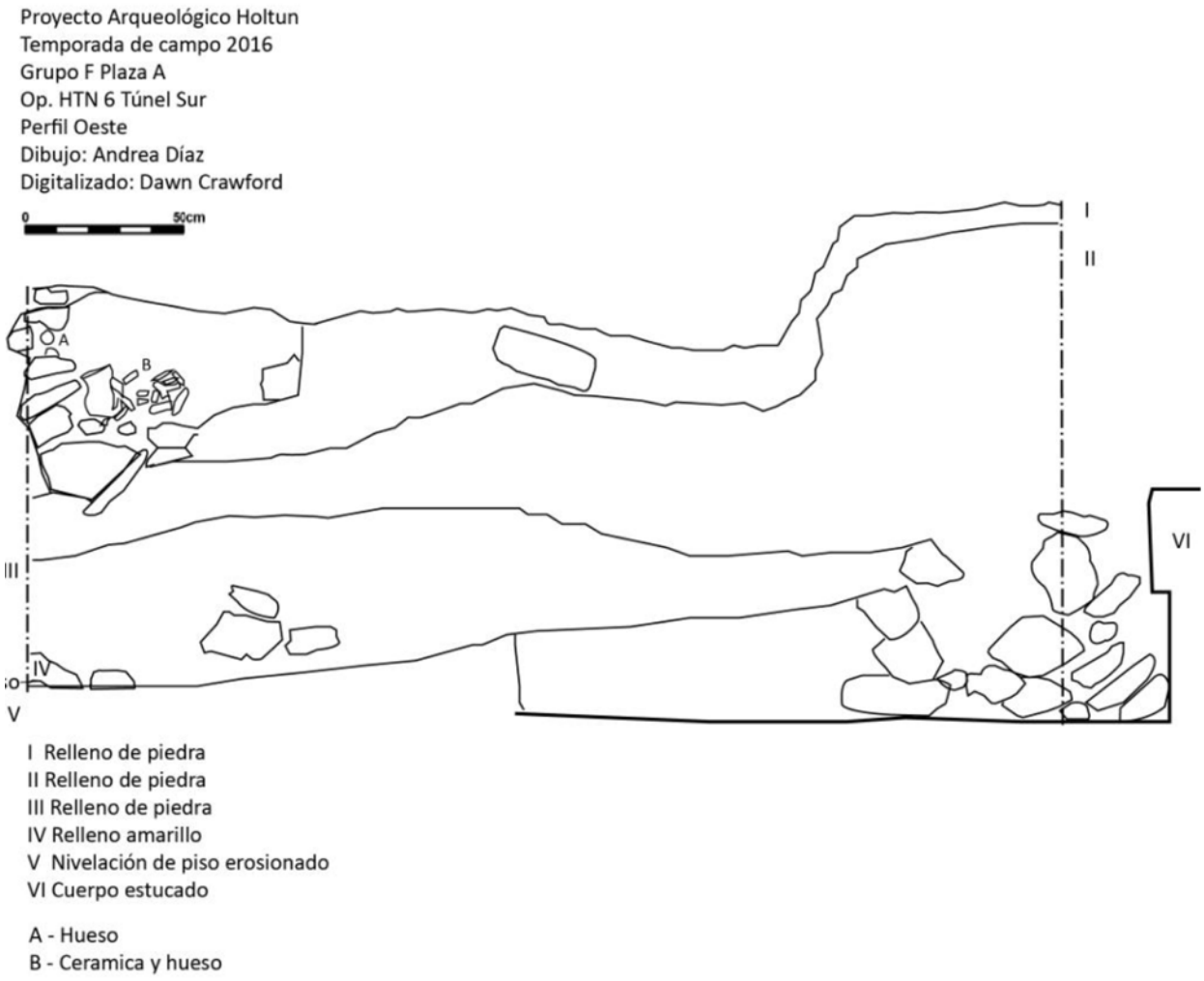

Figure 43 Drawing of context for HTN.1.6.19.Ind1(B on the drawing) and HTN.1.6.19.Ind2(A on the drawing) (Diaz 2016).

Figure 44 Image of HTN.1.6.19.Ind1 (Izzo 2017).

Individual 7b

Table 34 Profile of Individual 7b (HTN.1.6.19.Ind2).

Individual/HAP ID #:	Ind.7b; HTN.1.6.19.Ind.2
Burial ID #:	HTN.1.6.19
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.161-162)
Associated Period/Date:	Middle Preclassic
Burial Location:	Group F-A–Plaza
Feature Type and Orientation:	Simple Grave
Internment Type/Body Position:	Secondary
Associated Artifacts:	Ceramics and Chert
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Dental Calculus, Caries, and Calculus Present
Observations:	

Individual HTN.1.6.19.Ind2 is classified as a multiple, secondary interment in an elite residential plaza F–A (Table 34). The grave was identified in the fill beneath a Middle Preclassic stucco floor. HTN.1.6.19.Ind2 was identified within the context of HTN.1.6.19.Ind1 all of them disarticulated which suggests these individual were within a secondary context. The limited remains recovered from this individual preclude and analysis of grave–type and positionality beyond the assessment performed for HTN.1.6.19.Ind1 (Fig. 43). Comparatively, HTN.1.6.19.Ind2 is smaller in size than HTN.1.6.19.Ind1 and though less elements are present, they are better preserved. The cranium is present but no diagnostic features were observed that could aid in sex estimation. The dentition present was fully developed and presented little to no wear (Fig. 44). Additionally, dental calculus build-up was present on the cementoenamel junction of their molars and incisors. The right mandibular first molar presented with a severe

carious lesion, and the right maxillary canine with Linear Enamel Hypoplasia. Sex estimation while inconclusive was estimated using relative size and gracility of the remains and suggested that this may have possibly been a female. A limited number of measurements were performed, even though the fragmentary nature of the remains precludes any conclusive results.

Figure 45 Image of HTN.1.6.19.Ind2 (Izzo 2017).

Individual 8

Table 35 Profile of Individual 8 (HTN.2.29A.0.3).

Individual/HAP ID #:	Ind.8; HTN.2.29A.0.3
Burial ID #:	HTN.O2.29A.0.3
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.290)
Associated Period/Date:	Middle Preclassic
Burial Location:	Building FB–2
Feature Type and Orientation:	Simple Grave; E/W
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics and Chert
Preservation:	Partial (25–75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Probable Male
Skeletal/Dental Pathology:	Dental calculus present
Observations:	Potentially looted context

Individual HTN.2.29A.0.3 is classified as a single, primary interment in building FB–2 (Table 35). The grave was located at the base of the center of the eastern range structure of the E-Group in Plaza F-B. The burial was exposed by looters and discovered in a looter's tunnel dug into the center of the building from the plaza (W) side, and possibly partially destroyed, but still in situ. In front of this building Callaghan discovered a dedicatory cruciform cache cut into bedrock, which was later covered by a Terminal Preclassic-period shrine containing painted walls and graffiti (Callaghan 2017). The body was originally articulated but became disturbed by the looting or some other modern event (Fig. 45). HTN.2.29A.0.3.6 was identified with no burial offerings and ceramic remains throughout their context suggest that it is from the Middle Preclassic period. Excavators also noted that the cranium was missing or destroyed and unidentified. The body was placed in an extended position, oriented from East-West and

approximately 50% of HTN.2.29A.0.3 was recovered however, preservation was largely fragmentary (Fig. 46, 47). The axial skeleton was poorly represented with only a few vertebral fragments identified and both os coxae present but highly fragmented, no diagnostic features were identified for sex estimation. The appendicular skeleton of this individual presented highly fragmentary and unidentifiable remains. Most of the trabecular bone was present but no cortical bone could be identified to aide in the identification of fragments. One tooth was identified, a maxillary right canine with evidence of lingual calculus and significant dental wear on the buccal and mesial planes. Sex estimation is inferred only through the overall size of the individual and the robust muscle attachments identified suggesting that this individual may have been male. There were no primary traits to estimate age, however, no unfused epiphyseal unions or dentition in development was recovered. Compounded with the overall size of this individual, it may be possible that they were of adult age.

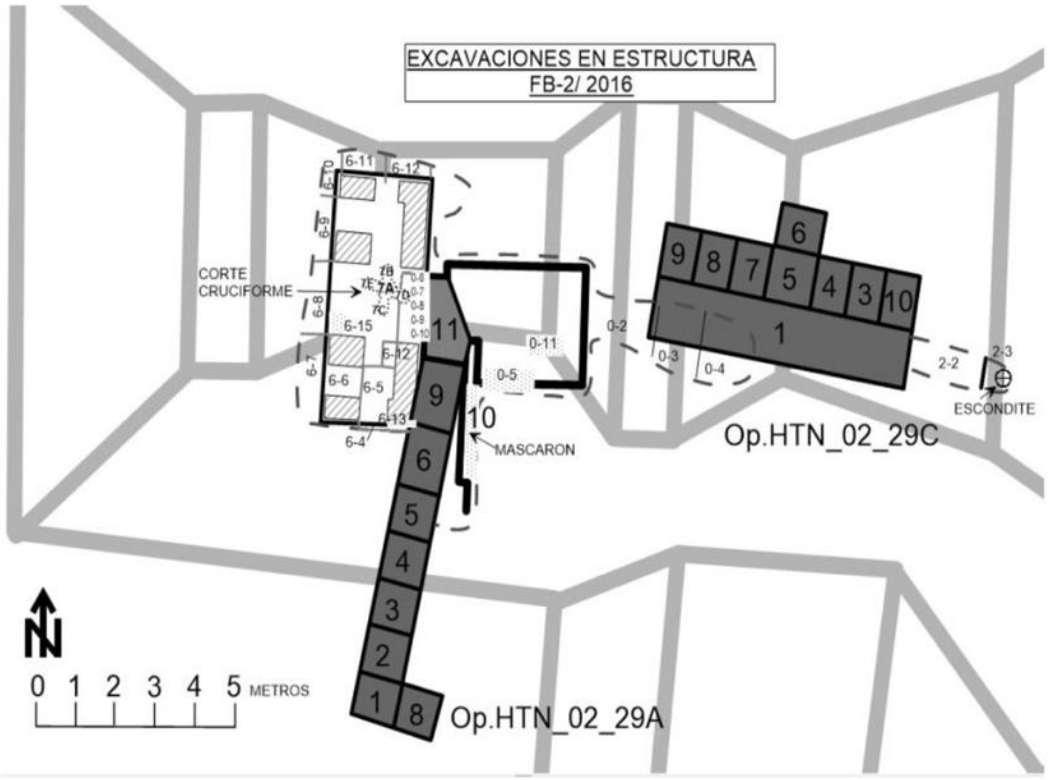

Figure 46 Image of units within structure FB–2 showing HTN.2.29A.0.3 (Guzman 2016).

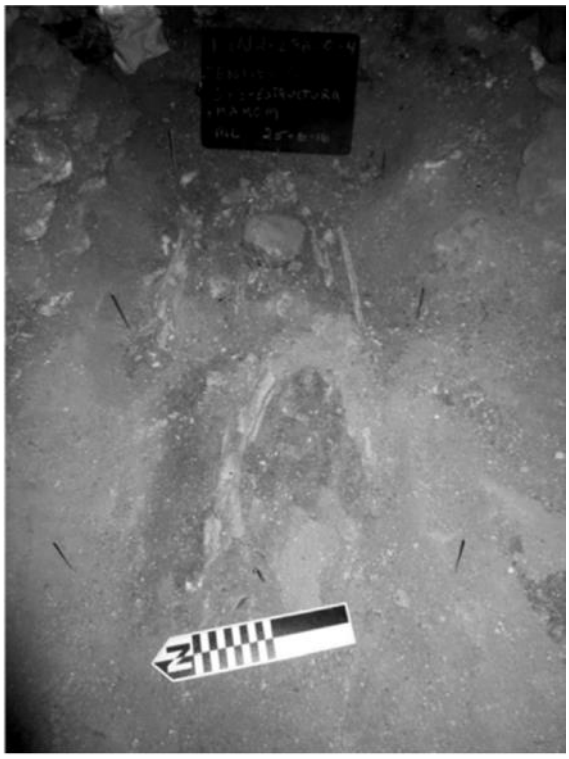

Figure 47 Image of HTN.2.29A.0.3 (Callaghan 2016).

Figure 48 Image of remains of HTN.2.29A.0.3 (Izzo 2017).

Individual 10

Table 36 Profile of Individual 10 (HTN.6.12.7.Ind1).

Individual/HAP ID #:	Ind.10/ HTN.6.12.7.Ind1
Burial ID #:	HTN.6.12.6
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.104)
Associated Period/Date:	Early Late Classic
Burial Location:	Group E
Feature Type and Orientation:	Partial Head Cist; N/S
Internment Type/Body Position:	Primary Extended
Associated Artifacts:	Ceramics
Preservation:	Complete (>75%)
Age-at-Death Estimation:	Middle Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Arthritis and spicule formation at vertebral bodies
Observations:	Volcanic stone in context

HTN.6.12.7.Ind1 is classified as a multiple, primary interment in an elite residential plaza. The grave was constructed as a partial head cist using partially lined stone pit walls surrounding the cranium and several large stones placed around the remains (Table 36). This burial is separated from HTN.6.12.5 by a soil level of 0.10m. Associated to HTN.6.12.7.Ind1 was a piece of unworked volcanic stone placed upon the thoracic cavity. The body was placed in an extended position, oriented from North-South. Approximately 75% of HTN.6.12.7.Ind1 was recovered however, preservation was largely fragmentary (Fig. 48). The individual was represented mostly by the appendicular skeleton. The cranium was nearly complete and primarily represented by temporal, parietal, and frontal fragments. Also discovered was a near complete fragment of the mandible with evidence of alveolar resorption.

The axial body was highly fragmented with most vertebrae represented by fragments of the body and spinous processes, pelvic fragments were identified but only one of the key characteristics to perform sex estimation was identified. However, the presence of the greater sciatic notch and of cranial elements is sufficient to perform a sex estimation through secondary traits. Both the right and left sciatic notches received the lowest score of 1 suggesting a wide angle to the notch consistent with female sex. The brow ridges, supraorbital margin, mastoid process, mental eminence, gonial angle, ascending ramus, and mandibular shape each were examined. The brow ridges were the only trait that resulted in an ambiguous determination having scored a 3 midway between male and female sex. The mastoid process and gonial angle were each scored as 1's, the supraorbital margin, mental eminence, and ascending ramus were scored as 2, and lastly the mandibular shape was described as "V" all suggesting that this would have probably been a female. Additionally, given the auricular surface of this individual it is estimated that they were between 40-50 years of age.

A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results. In addition to these measurements, the mandible was observed to have a large mandibular foramen on the both sides, with either opening approaching alveolar resorption. Cervical vertebrae 3 and 4 were identified as having vertebral arthritis, exhibiting both collapsed bodies and curved spicule osteophyte formation. The dens and its articulating joints also have lipping evident on them. Additionally, carious lesions were observed on the teeth in both the cementoenamel junction of molars and the interproximal surface of both incisors and canines. This individual also presented with calculus on the right lower incisor and significant dental wear on all teeth present.

Individual 11

Table 37 Profile of Individual 11 (HTN.6.12.5).

Individual/HAP ID #:	Ind.11/ HTN.6.12.5
Burial ID #:	HTN.6.12.7
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.105)
Associated Period/Date:	Early Late Classic
Burial Location:	Group E
Feature Type and Orientation:	Partial Cist; N/S
Internment Type/Body Position:	Primary Extended
Associated Artifacts:	Ceramics
Preservation:	Partial (25-75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Interruption Grooves, Dental Caries, Enamel Defect, Dental Calculus
Observations:	Two complete vases in context, Shovel Shaped Incisors, Metacone, and Enamel extensions Present

IND.6.12.5 is classified as a multiple, primary interment in an elite residential plaza. The grave was constructed as a partial head cist using partially lined stone pit walls surrounding the cranium and several large stones placed around the remains (Table 37). This burial is separated from HTN.6.12.7.Ind1 by a soil level of 0.10m. Associated to HTN.6.12.5 ceramic sherds were recovered surrounding the burial. The body was placed in an extended position, oriented from North-South. Approximately 75% of HTN.6.12.5 was recovered however, preservation was largely fragmentary (Fig. 49, 50). The cranium is present but very few diagnostic features were observed for sex estimation. Cranial sutures are visible and present suggesting limited to no obliteration due to advanced age. The third molars of this individual appear not to be fully developed and limited wear was observed on the dentition. No pelvis or feet were observed on

this individual and their hands were nearly complete. Of the potential traits for sex estimation the only ones present were the supraorbital margin and the mastoid process. The mastoid process was scored as a 2, having a relative long structure but very gracile, indicating gracile muscle attachments typically associated with probable female sex. Through cranial sutural obliteration and dental development this individual is presumed to be a young adult between 18-30 years of age. Some measurements were taken but none provided conclusive results. The fragmentary nature of the remains also hindered the analysis of potential unfused epiphyseal unions. The dentition of this individual was also marked with numerous non-metric traits including, the presence of shoveling in all four maxillary incisors and both canines, interruption grooves in upper incisors, a metacone in both maxillary first and third molars, and enamel extensions and extranumerary roots in both maxillary first molars.

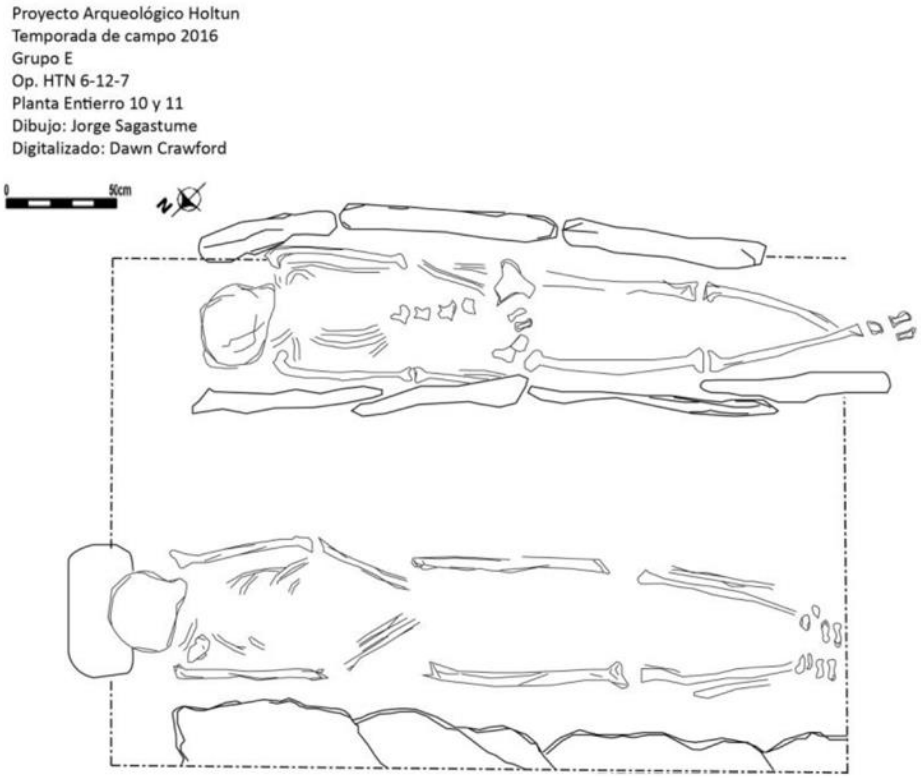

Figure 49 Drawing depicting HTN.6.12.7.Ind1 and HTN.6.12.5 (Sagastume 2016).

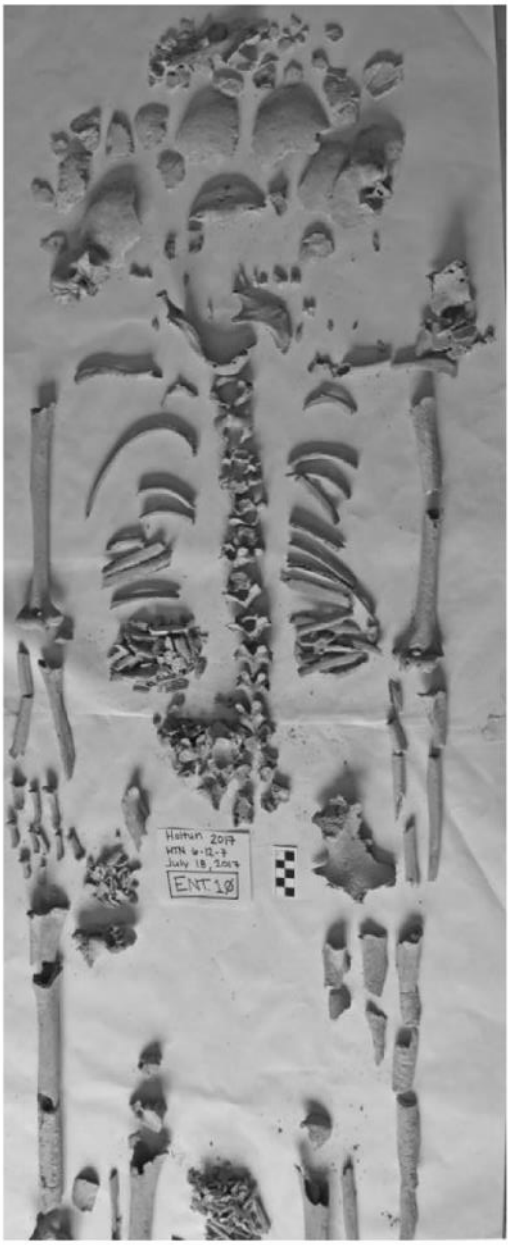

Figure 50 Image of HTN.6.12.7.Ind1 (Izzo 2017).

Figure 51 Image of HTN.6.12.5 (Izzo 2017).

Individual 12

Table 38 Profile of Individual 12 (HTN.6.12.7.Ind2).

Individual/HAP ID #:	Ind.12/ HTN.6.12.7.Ind2
Burial ID #:	HTN.6.12.7
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p.107)
Associated Period/Date:	Early Classic
Burial Location:	Group E
Feature Type and Orientation:	Partial Head Cist; N/S
Internment Type/Body Position:	Primary
Associated Artifacts:	Ceramics (including a Saxche Orange Polychrome bowl with slightly incurving sides, and an eroded composite bowl with basal flange and 3 supports, see Mendez-Lee 2017:611-612)
Preservation:	Skull Fragments
Age-at-Death Estimation:	Middle Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Dental Caries
Observations:	Dental Ware, Parietal and Temporal Microporosity

HTN.6.12.7.Ind2 is classified as a multiple, primary interment in an elite residential plaza. The grave was constructed as a partial head cist using partially lined stone pit walls surrounding the cranium and several large stones placed around the remains (Table 38). This burial is separated from HTN.6.12.7.Ind1 by a stone wall. Associated to HTN.6.12.7.Ind2 two complete offering vessels were recovered including a Saxche Orange Polychrome bowl with slightly incurving sides, and an eroded composite bowl with basal flange and 3 supports (see Mendez-Lee 2017:611-612). This cist was also capped and held considerably less skeletal material than HTN.6.12.5 or HTN.6.12.7.Ind1. The body was placed in an extended position,

oriented from North-South. Approximately 20% of HTN.6.12.7.Ind2 was recovered and preservation was largely fragmentary including cranial fragments, several cervical vertebrae, a full fifth phalanx and six teeth (Fig. 51, 52). The cranium presented an opportunity to estimate sex through secondary trait characteristics. The glabellar region, supraorbital margin, and mastoid process were observed for sex estimation. Each of these traits scored the most gracile score possible of 1 suggesting that this individual may have possibly been female. The overall presentation of muscle-skeletal markers at the mastoid process, mandibular rami, and maxillary portions are consistent with expected female sex. Cranial sutures are visible and present suggesting limited to no obliteration due to advanced age. Additionally, teeth do not show evidence of advanced age, such as degeneration, alveolar resorption, carious lesions, or significant dental wear. These characteristics combined with open cranial sutures suggest this individual was of adult age. No pelvis or appendicular skeleton was observed. Some of the cranial fragments recovered are observed to have micropitting potentially due to limited but active osteoporosis or differential taphonomic processes on cranial fragments. No lesions were observed with this characteristic though absence of lesions does not preclude osteoarthritis from being present.

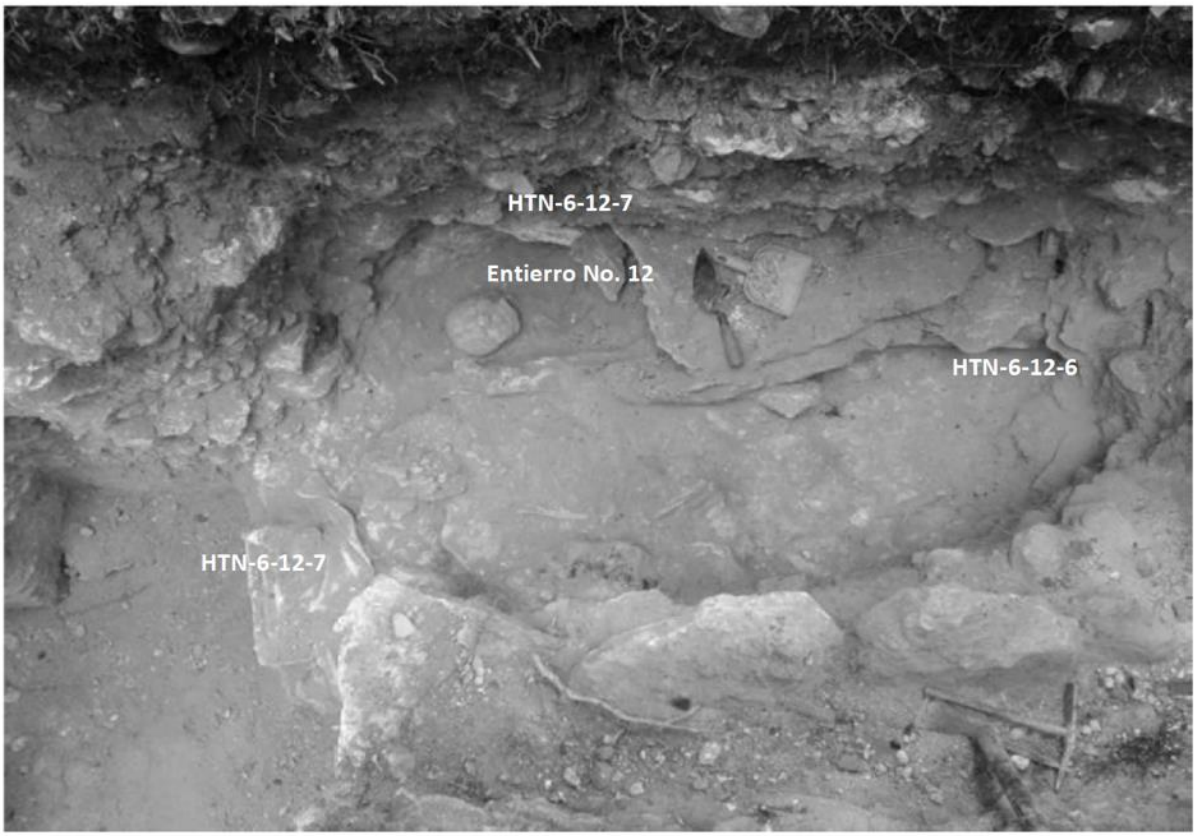

Figure 52 Image of HTN.6.12.7.Ind2 in relationship to HTN.6.12.7.Ind1 and HTN.6.12.5 (Sagastume 2016).

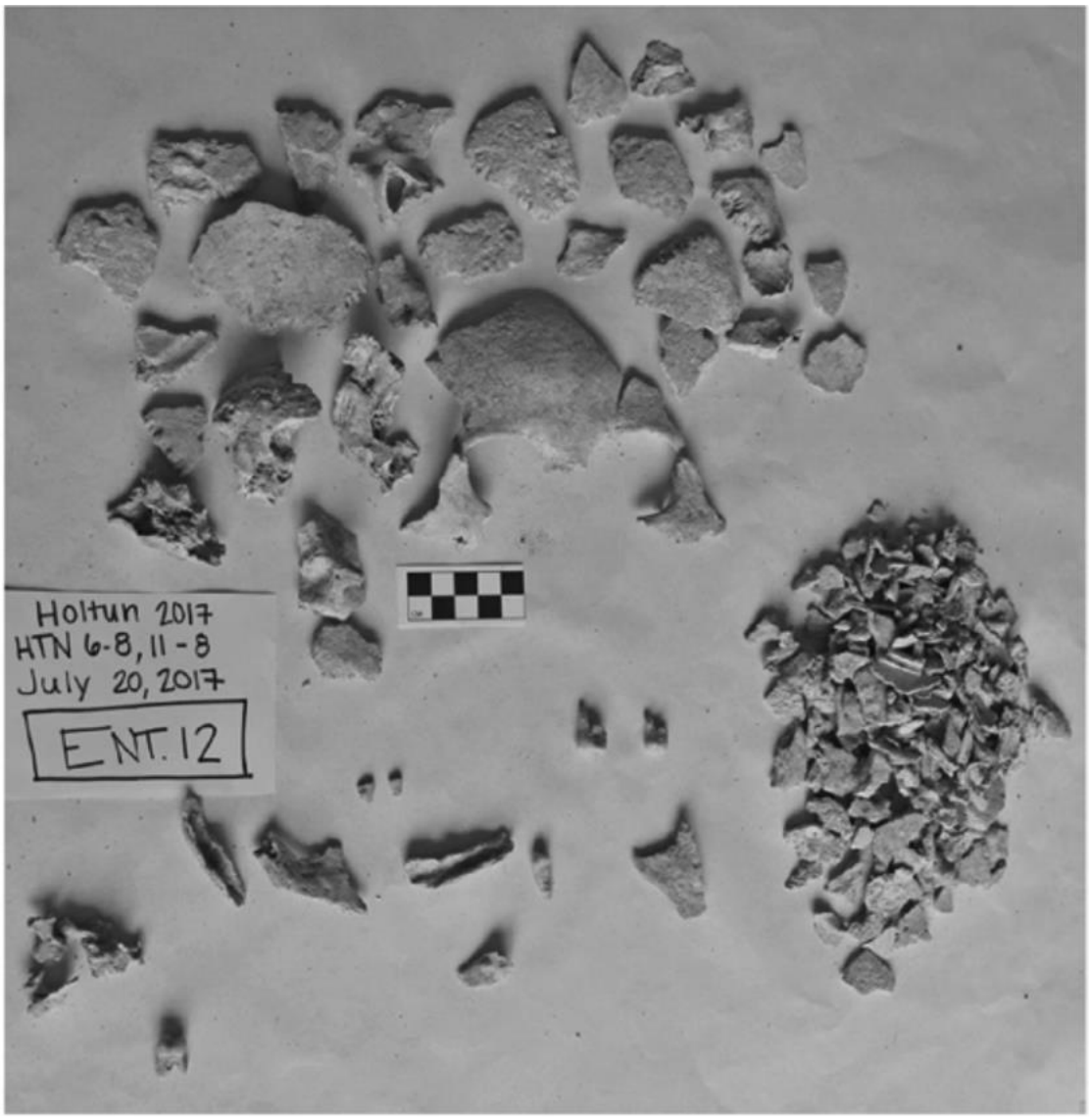

Figure 53 Image of HTN.6.12.7.Ind2 (Izzo 2017); Image ID suggests remains come from HTN 6-8;11-6 however, these remains actually correspond to HTN.6.12.7.Ind2 found near the contexts of both Ind 10 and 11.

Individual 13

Table 39 Profile of Individual 13 (HTN.6.8/11.8).

Individual/HAP ID #:	Ind.13/ HTN.6.8/11.8
Burial ID #:	HTN.6.11.8 and HTN.6.8.7
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p93,98)
Associated Period/Date:	Late Preclassic
Burial Location:	Group E
Feature Type and Orientation:	Simple Grave; E/W
Internment Type/Body Position:	Primary Extended
Associated Artifacts:	Ceramics (including an unclassified bowl form – partial), Jade
Preservation:	Complete (>75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Female
Skeletal/Dental Pathology:	Dental Caries, Dental Abscess
Observations:	Sesamoid Present, Septal Aperture, Third Trochanter, Lipping on joint surfaces

HTN.6.8/11.8 is classified as a single, primary interment in a residential plaza. The burial was within a simple grave laid upon bedrock with a capstone that divided it from earlier layers but absent formal stone walls surrounding the individual (Table 39). The body was placed in an extended position, oriented from East-West. The associated artifacts included ceramic a partial ceramic vessel (unclassified but with remnants of red slip) and two jade beads found in the matrix of the burial. HTN. 6.8/11.8 was nearly completely recovered and though much of the preservation seems to be fragmentary there are some areas were differential preservation resulted in larger better-preserved elements (Fig. 53, 54). The cranium was primarily represented by temporal and maxillo-facial remains. The mandible was fragmented, and the maxilla presented nearly complete with teeth in-situ. The axial skeleton was poorly represented with only a few

vertebral fragments identified and a nearly complete pelvis. This individual is largely represented by the appendicular skeleton including hand and feet elements. Sex estimation was attempted through both primary pelvic and secondary cranial characteristics. The preauricular sulcus, greater sciatic notch, glabella, and external occipital protuberance were used to estimate sex. Of these characteristics, the preauricular sulcus received the lowest score of, indicating a very large and elongated sulcus, indicative of female sex. The remaining three characteristics all scored 2's which corroborate the female sex of this individual. do not belong to this individual and include a left and right radius, several carpels, and a clavicle. To estimate age at death the auricular surface of this individual was used. The estimated phase of 1.5 suggests that they were between 20-30 years of age. Additionally, cranial sutures on the cranium including cranial vault and nasal bone sutures were observed. The vault sutures were all observed to be open and the nasal suture was approaching obliteration, both consistent with age beyond juvenile development but before advanced degeneration. This individual also presented with evidence of easily visible Linear Enamel Hypoplasia (weaning lines) on dentition. This defect was also compounded by the presence of moderate to heavy dental wear and dental calculus build-up near or on the grooves themselves. Additionally, this individual presented with mild-moderate lipping in nearly all joint surfaces including larger surfaces. A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results. In addition to these measurements both femurs were observed to possibly have a third trochanter. Though a third trochanter is possible, the robusticity of this individual may also suggest that this is a robust muscle attachment that has caused significant skeletal rugosity within the epiphyses of the femurs. Lastly some remains were identified as possibly pertaining to a different individual given

that they do not fall within the range of variation for this individual and several are redundant. Though this could be the product of the differential preservation, the redundant remains certainly

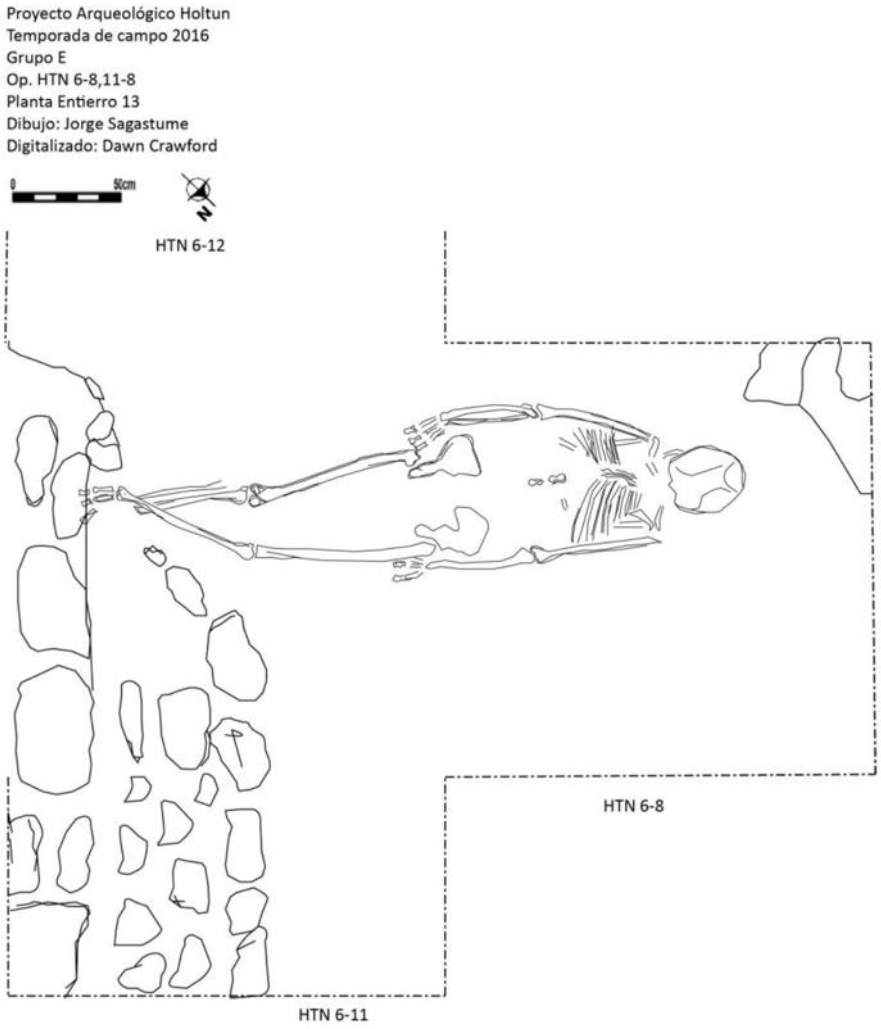

Figure 54 Drawing of HTN.6.8/11.8 (Sagastume 2016).

Figure 55 Image of HTN.6.8.11.8 (Izzo 2017).

Individual 15

Table 40 Profile of Individual 15 (HTN.23.4.4c.7).

Individual/HAP ID #:	Ind.15/ HTN.23.4.4C.7
Burial ID #:	HTN.23.4.4C.7
Site:	Holtun
Year Excavated:	2017
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.7, Temporada 2017 (p.280)
Associated Period/Date:	Late to Terminal Classic
Burial Location:	Group 10
Feature Type and Orientation:	Partial Cist; N/S
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics (including a cylinder vase vertical sides, flat base, and remnants of red slip, and an eroded plate with 3 supports) and Chert
Preservation:	Partial (25-75%)
Age-at-Death Estimation:	Adult
Biological Sex Estimation:	Probable Female
Skeletal/Dental Pathology:	Dental Caries
Observations:	Dental Calculus and Wear; Complete Red Vase; Edentulous Mandible

HTN.23.4.4c.7 is classified as a single, primary interment in a residential plaza. The grave was constructed as a partial cist carved out of the bedrock perhaps as an initial offering before the earliest structure was erected at group 10 (Table 40; Fig.55). The body was placed in an extended position, oriented from North–South. Upon recovery it was noted that this individual's left tibia and fibula was crossed over their right side, the cranium was protected by a head cist and the individual was recovered beneath a plaster floor. The associated artifacts include ceramics, shell, and two intact vessels. One tripod vessel located to the west of the individual and a cylindrical red vase located to the east of the individual's cranium. HTN.23.4.4c.7 was recovered in partial fragmentary preservation where only approximately 50%

of the individual was present at the time of excavation, likely due to taphonomic processes (Tiesler et al., 2010). The cranium was primarily represented by cranial vault fragments and the mandible (Fig. 56). The axial skeleton was poorly represented with only a few vertebral and rib fragments identified. The appendicular skeleton was better preserved and included several long bone diaphysis though the hands and feet were not identified. Due to the absence of a pelvis sex estimation was attempted through secondary cranial characteristics. The glabella, supraorbital margin, mastoid process, external occipital protuberance, mental eminence, and mandibular shape were used to estimate sex. The glabella, supraorbital margin, and mental eminence each scored a 2, the mastoid process scored a 3, the external occipital protuberance scored a 1, and the mandibular shape was "V" shaped all characteristics suggesting that this individual was probably female. Age at death was also estimated using secondary characteristics including the presence of edentulism on the mandible and the degenerative obliteration of cranial vault sutures.

This individual also presented with evidence of moderate to heavy dental wear and dental calculus build-up on the maxillary incisors. The tooth roots and portions of the enamel morphology were starting to erode due to taphonomic processes which hindered the examination of carious lesions or enamel defects. One lesion was identified on the left second maxillary molar. Additionally, this individual presented with dental filing in the right maxillary canine. Though the canine was worn and eroded the filing was still visible. A limited number of measurements were performed, even though the fragmentary nature of the long bones precludes any conclusive results.

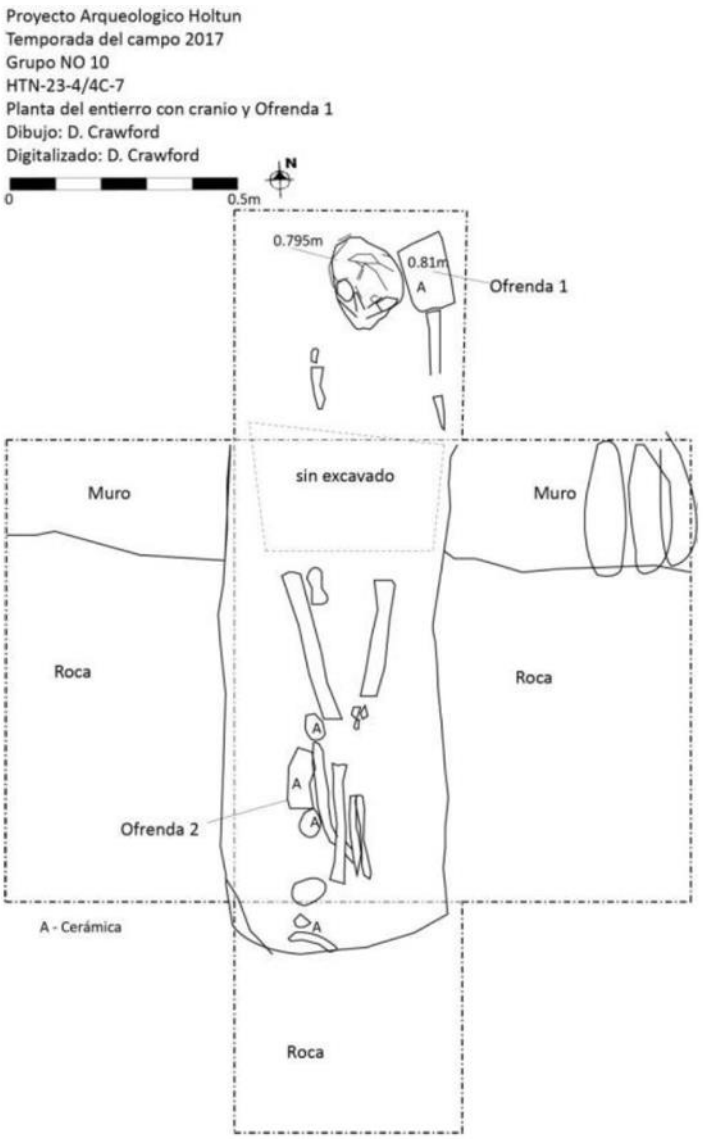

Figure 56 Drawing of HTN.23.4.4c.7 with vessel offerings (Crawford 2017).

Figure 57 Image of HTN.23.4.4c.7 (Izzo 2017).

Individual 16

Table 41 Profile of Individual 16 (HTN 2.29C.11.7).

Individual/HAP ID #:	**Ind. 16/ HTN.2.29C.11.7**
Burial ID #:	HTN.2.29C.11.7
Site:	Holtun
Year Excavated:	2016
Archaeological Reports:	*Proyecto Arqueológico Holtun. Informe No.6, Temporada 2016 (p221)*
Associated Period/Date:	Middle Preclassic
Burial Location:	Group F–Plaza B
Feature Type and Orientation:	Simple Pit Grave; E/W
Internment Type/Body Position:	Primary; Flexed
Associated Artifacts:	Ceramics, Chert, Shell
Preservation:	Complete (>75%)
Age-at-Death Estimation:	Older Adult
Biological Sex Estimation:	Probable Male
Skeletal/Dental Pathologies:	None Observed
Observations:	Body was in seated position; Minimal Dental Wear

Individual HTN.2.29C.11.7 is classified as a single, primary interment in building FB–2 (Table 41; Fig. 57). The grave was identified directly below a floor (Fig. 58). HTN.2.29C.11.7 was identified with ceramic remains throughout their context that suggest it is from the Middle Preclassic period. An offering of worked seashell was also identified with this individual and included four large seashells with burr holes, one medium sized shell, and numerous small shell beads. The body was placed in a flexed and seated position, oriented from East-West and approximately 50% of HTN. 2.29C.11.7 was recovered however, preservation was largely fragmentary (Fig. 59). The axial skeleton was poorly represented with only a few vertebral fragments identified and both os coxae represented by only the acetabulum, no diagnostic features were identified for sex estimation. The appendicular skeleton of this individual presented highly fragmentary and unidentifiable remains most of the trabecular bone was present

but no cortical bone could be identified to aide in the identification of fragments or periosteal reactions. The cranium was not present, and several loose teeth were recovered. Sex estimation was performed through secondary sex characteristics including the glabella, supraorbital margin, mastoid process, mental eminence, and mandibular shape. Of these traits, the supraorbital margin and mental eminence were scored as ambiguous, the glabella was scored as a 2, the mastoid process was scored as a 4, and the mandibular shape was identified as "U". Though these results are inconclusive, when compounded with the overall size of the individual and the robust muscle attachments identified they may have probably been male. There were no primary traits to estimate age, however, no unfused epiphyseal unions or dentition in development was recovered suggesting that the individual was an adult.

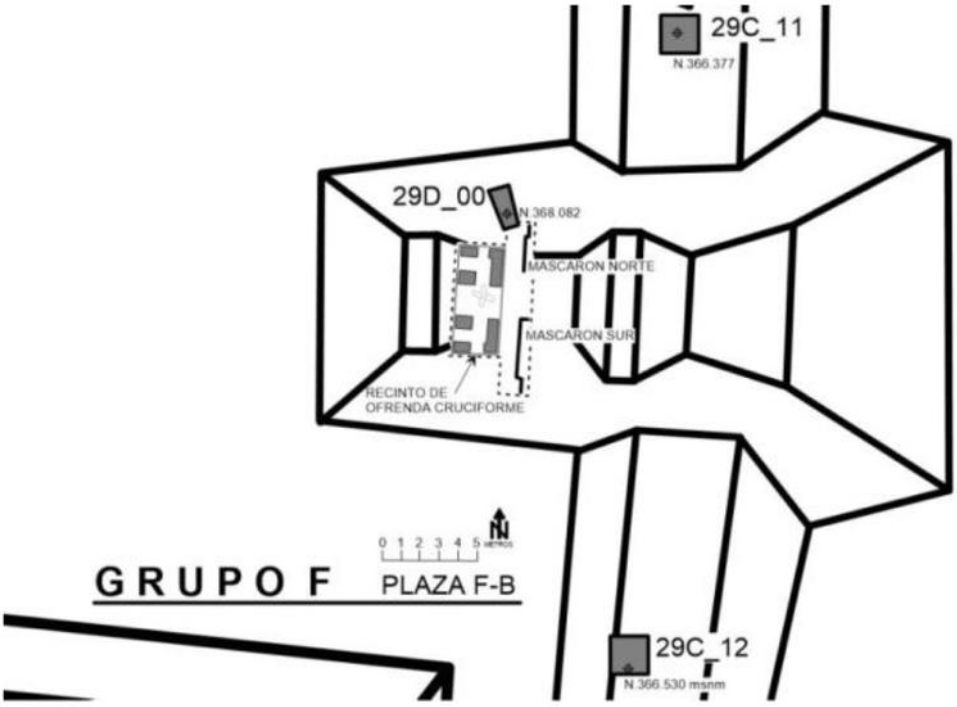

Figure 58 Drawing of Structure FB–2 and Unit HTN.29C.11 (Guzman 2017).

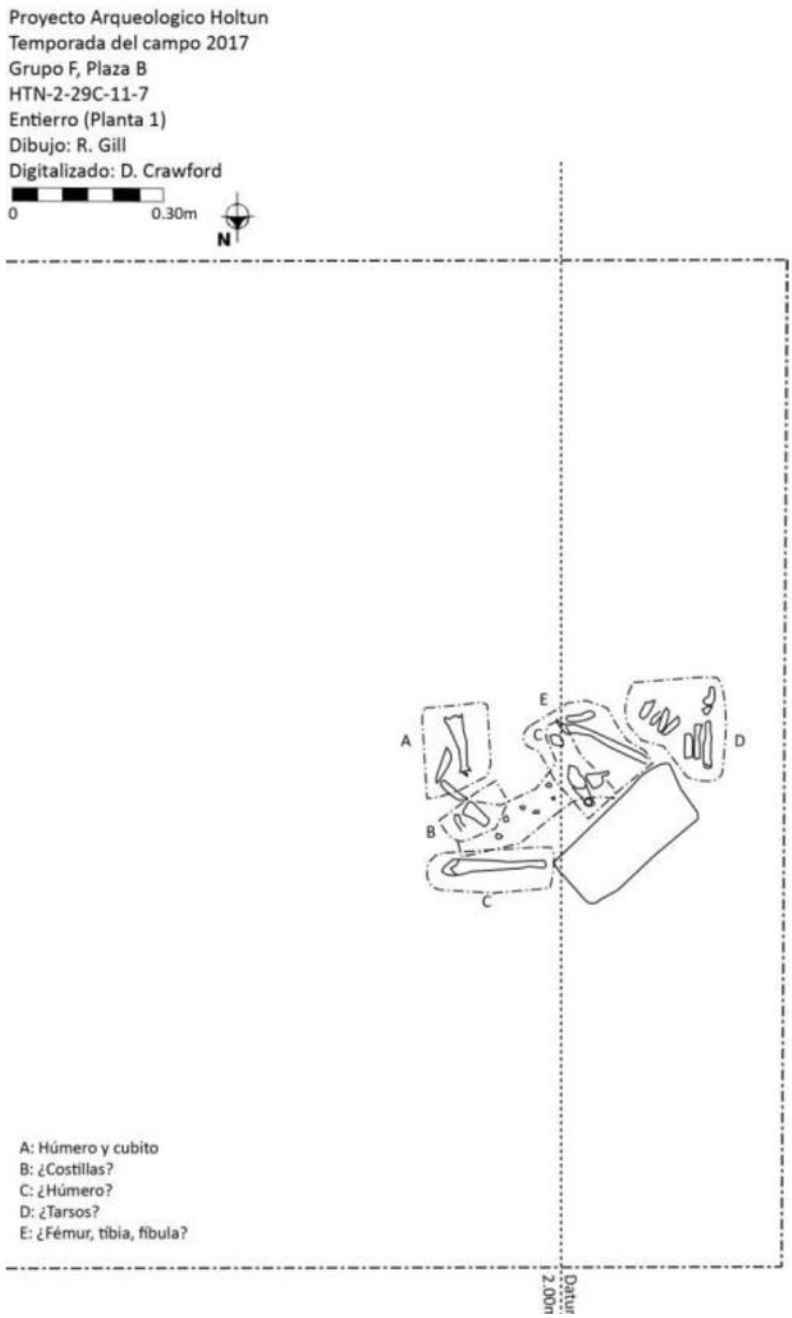

Figure 59 Drawing of plan for HTN.2.29C.11.7 in seated position (Gill 2017).

Figure 60 Image of remains from HTN.2.29C.11.7 (Izzo 2017).

Individual 17

Table 42 Profile of Individual 17 (HTN.26.2.2a.7).

Individual/HAP ID #:	Ind. 17/ HTN.26.2.2a.7
Burial ID #:	HTN–26–2/2a–7
Site:	Holtun
Year Excavated:	2017
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.7, Temporada 2017 (p304)
Associated Period/Date:	Late Classic to Terminal Classic
Burial Location:	Group 33– Plaza
Feature Type and Orientation:	Simple Crypt; N/S
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics (complete vessel), Chert, and Shell
Preservation:	Fragmentary (<25%)
Age-at-Death Estimation:	Adult
Biological Sex Estimation:	Indeterminate
Skeletal/Dental Pathology:	Carious lesions
Observations:	Burned Teeth

HTN.26.2.2a.7 is classified as a single, primary interment in a residential plaza. The grave was constructed as a simple crypt using partially lined stone walls and bedrock as the inferior construction of the crypt (Table 42; Fig. 60). The body was placed in an extended position, oriented from North-South (Fig. 60). The associated artifacts include ceramics, lithic materials, and shells. One whole vessel was recovered near the individual. HTN.26.2.2a.7 was recovered in poor fragmentary preservation where only approximately 25% of the individual was present at the time of excavation, likely due to burial practice and/or taphonomic processes (Tiesler et al. 2010). The individual is represented by a number of unknown skeletal fragments including long bone and cranial fragments. Twelve teeth were also identified for this individual, all of which displayed evidence of burning given their dark coloration (Fig. 61). The roots of

most of the recovered teeth were not present. Given the presence of third molars this individual was classified an adult. Lastly, carious lesions on the teeth were present.

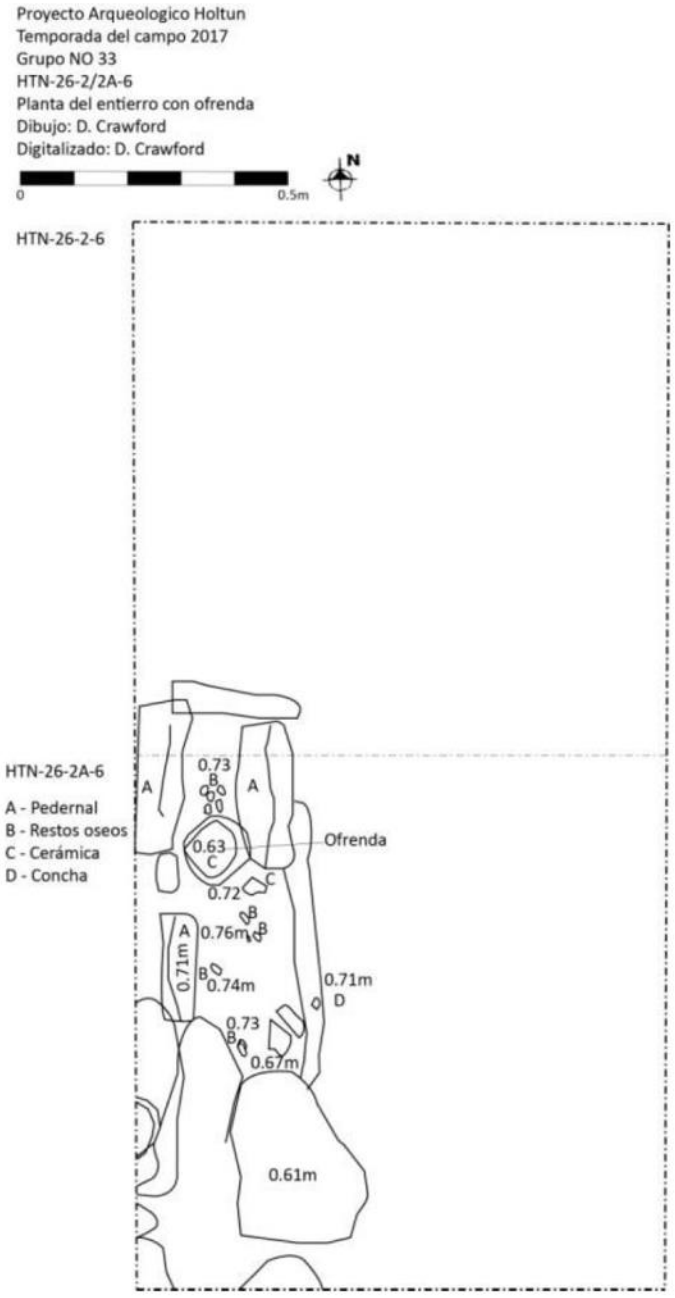

Figure 61 Drawing of HTN.26.2.2A.7 with vessel offering and skeletal elements represented by the letter B (Crawford 2017).

Figure 62 Image of HTN.26.2.2a.7 (Izzo 2017).

Individual 18

Table 43 Profile of Individual 18 (HTN.11.12–12B.4).

Individual/HAP ID #:	Ind. 18/ HTN.11.12/12B.4
Burial ID #:	HTN.11.12–12B.4
Site:	Holtun
Year Excavated:	2017
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No76, Temporada 2017 (p190)
Associated Period/Date:	Early Late Classic
Burial Location:	Group C
Feature Type and Orientation:	Partial Cist; N/S
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics (including a bowl with round sides, flat base, orange slip and red rim; and a plate with three supports, see Cardona 2018:186) and Chert
Preservation:	Complete (>75%)
Age-at-Death Estimation:	Young Adult
Biological Sex Estimation:	Male
Skeletal/Dental Pathology:	Lytic Lesion at Phalanges and Sacrum, Arthritis at Ulnar Notch
Observations:	Interruption Groove, Dental Shoveling, Carabelli's Trait, Groove Patterning and Deflecting Wrinkle present, Ornate Dental Modification

HTN.11.12/12B.4 is classified as a single, primary interment in Plaza C–A (Table 43; Fig. 62). The grave was identified directly below a floor and is a near complete cist (Fig. 63). HTN.11.12–12B.4 was identified with ceramic remains throughout their context that suggest it is from the Early Late Classic period. Associated to this individual were two complete vessels near their lower extremities; including a bowl with round sides, flat base, orange slip and red rim; and a plate with three supports (see Cardona 2018:186). The offerings are similar to the two vessels found in association with Ind.10-13 in Group E and also dating to the early Late Classic period (although these two vessels were too eroded to be classified at the time). The body was placed in

an extended position, oriented from North-South and approximately 90% of HTN. 11.12/12B.4 was recovered in moderately well–preserved condition (Fig. 64). The axial skeleton was represented by numerous vertebral fragments sacral elements, both os coxae with available diagnostic features for sex estimation. The appendicular skeleton of this individual presented large relatively well-preserved long bone diaphyses, no epiphyses were identified. The cranium was cut out of the context for excavation in the lab as it was still intact. The body of this individual was intentionally modified through fronto-occipital cranial shaping and dental inlays made of jade in the labial dentition (Fig. 65 and 66). Sex estimation was performed through primary and secondary sex characteristics including the greater sciatic notch, preauricular sulcus, glabella, supraorbital margin, mastoid process, mental eminence, gonial flaring, ascending ramus, and mandibular shape. All cranial traits examined scored above a 3 and the mandibular shape was identified as "U". However, though these corroborate a male sex estimation, the pelvic traits are the ones that will be primarily used because of the effect that cranial modification may have on cranial traits (Tiesler 2014). The greater sciatic notch was scored as a 2 and the preauricular sulcus was scored a zero indicating that this individual was most likely male. To estimate age, the auricular surface of this individual was used and were each scored as a phase two suggesting that the individual was a young adult between the age of 20-30.

This individual also presented with lytic lesions on the metacarpals, metatarsals, and phalanges of both hands and feet. Lytic lesions were also identified on the sacral fragments present but due to the poor preservation of the rest of the vertebral column no more observations could be made. The articular surface of the ulnar notch presented with rugosity and porous bone degeneration. The dentition present has mild wear on it, and no pathological conditions were identified on the teeth. However, this individual did present with intense shoveling on their

maxillary incisors in addition to the presence of a metacone and hypocone on all three maxillary molars, Carabelli's trait on the first and third maxillary molars, lingual cusps on both mandibular left premolars, groove patterning on all three mandibular molars and lastly, a deflecting wrinkle and hypoconulid on the first and third mandibular molars.

Figure 63 Image of HTN.11.12–12B.4 In-Situ (Cardona 2017).

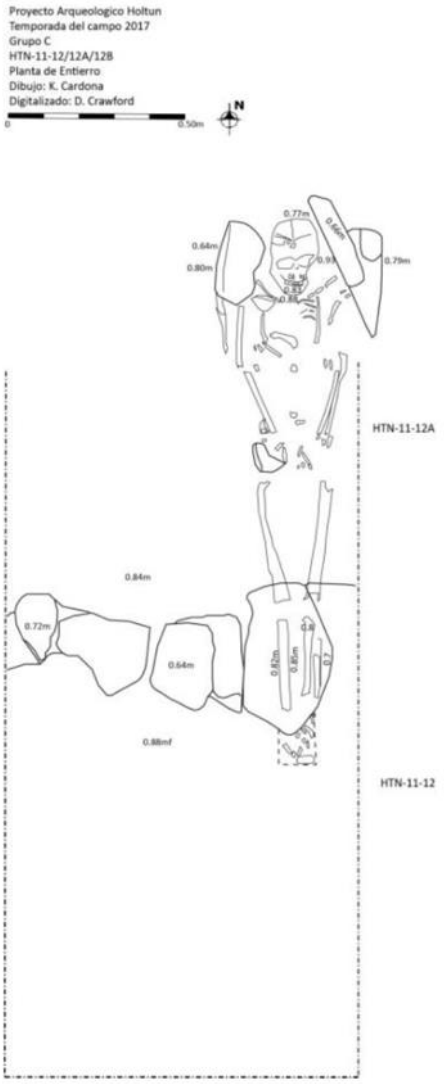

Figure 64 Drawing of HTN.11.12–12B.4 (Cardona 2017).

Figure 65 Image of HTN.11.12–12B.4 with cranial modification (Cardona 2017).

Figure 66 Image of remains of HTN.11.12–12B.4 (Izzo 2017).

Figure 67 Image of dentition of HTN.11.12–12B.4 with dental modification (Cardona 2017).

Individual 19

Table 44 Profile of Individual 19 (HTN.26.3.4.5).

Individual/HAP ID #:	Ind. 19/ HTN.26.3.4.5
Burial ID #:	HTN.26.3.4.5
Site:	Holtun
Year Excavated:	2017
Archaeological Reports:	Proyecto Arqueológico Holtun. Informe No.7, Temporada 2017 (p310)
Associated Period/Date:	Late to Terminal Classic
Burial Location:	Group 33– Plaza
Feature Type and Orientation:	Partial Cist; N/S
Internment Type/Body Position:	Primary; Extended
Associated Artifacts:	Ceramics, Chert, and Shell
Preservation:	Partial (25-75%)
Age-at-Death Estimation:	Adult
Biological Sex Estimation:	Indeterminate
Skeletal/Dental Pathology:	None Observed
Observations:	Mold on cranium

HTN.26.3.4.5 is classified as a single, primary interment in a residential plaza. The grave was constructed as a simple crypt using partially lined stone walls and bedrock as the interior construction of the crypt (Fig. 67). The body was placed in an extended position, oriented from North-South (Table 44; Fig. 67). The associated artifacts include ceramics, lithic materials, and shells. One whole vessel was recovered near the individual. HTN.26.2.2a.7 was recovered in poor fragmentary preservation where only approximately 25% of the individual was present at the time of excavation, likely due to taphonomic processes (Tiesler et al. 2010). The individual is represented primarily by cranial fragments, long bone shafts, and numerous unknown post cranial fragments. Given the presence of a fully formed second molar and fused epiphyseal unions this individual was classified an adult. Both teeth recovered have brown–black tinting and the second molar had evidence of dental calculus and dentin exposure due to a carious lesion. In-

depth analysis was also limited in this individual because after excavation they were exposed to a humid matrix creating mold on the remains.

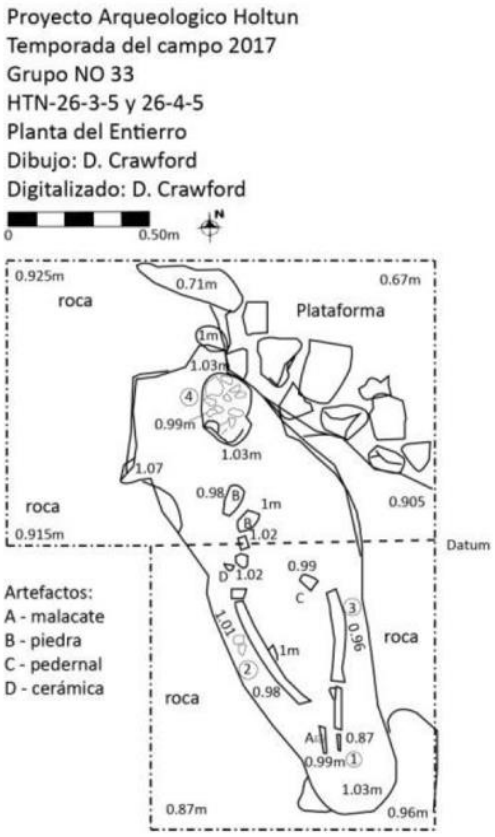

Figure 68 Drawing of burial HTN.26.3.4.5. (Crawford 2017).

Figure 69 Image of HTN.26.3.4.5 (Izzo 2017).

APPENDIX B: SUPPLEMENTARY ARCHAEOLOGICAL CONTEXT

Introduction to Appendix B

Appendix B contains the archaeological context related to where each individual at Holtun was excavated including the individual units of where they were found and a brief description of each group. Images are included of the major grouping where each individual was identified and general archaeological context for the specific group.

Group D

Group D is composed of four different platforms that surround a patio (Fig. 69). Data from excavations suggest periods of occupation during the Middle Preclassic, Late Preclassic, and Late Classic periods at Holtun. HTN.7.1.3 was discovered following the 2011 excavation of two test units inside of the residential plaza of the group. Excavations in these units revealed ceramic sherds dating to the Late Preclassic and Late Classic periods. The results of this excavation revealed that this plaza was initially constructed in the Middle Preclassic period, occupied through the Late Preclassic, and abandoned until its reoccupation during the Late Classic. HTN.7.9.6. was discovered following the excavation of 10 new excavation units in 2014 (Fig. 70). This excavation was aimed at recovering ceramic materials to determine the ceramic and floor chronology of the groups. During the excavation of unit HTN.7.9, burial HTN.7.9.6 was discovered next to a stone lined wall from which three other units were excavated to expose the remains. Ceramics recovered from this unit correspond to the Late and Terminal Classic period.

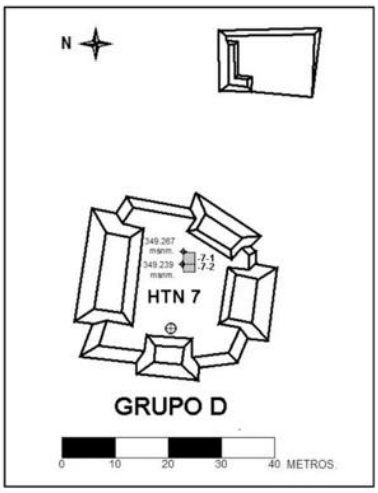

Figure 70 Site plan of Group D showing units HTN 7-1 and HTN 7-2. (Created by R. Guzman 2011).

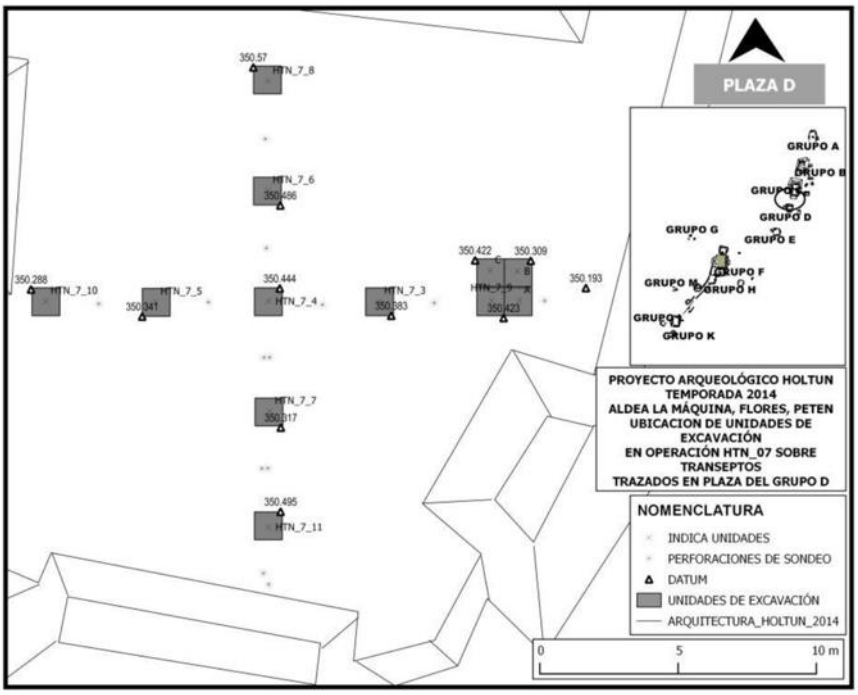

Figure 71 Site plan of Group D showing unit HTN 7-9 were burial HTN.7.9.6 was discovered (Created by R. Guzman 2014).

Group 33

Group 33 is located in a parcel of land near Group 21 at the periphery of the site and is composed of four different platforms that surround a non-elite residential plaza (Fig. 71). The pattern of construction suggests occupation during the Late to Terminal Classic periods of Holtun. HTN.26.2.2a.7 and HTN.26.3.4.5 were discovered following the 2017 excavation of two test units inside of the residential plaza of the group. Excavations at this group revealed and unusually large number of chert and lithic debris suggesting that this area of the periphery may have been a tool production area. In the surrounding outskirts of the group surface collection and a test unit revealed a significant amount of debitage associated with lithic tool making, formal tools, and nodules of stone.

Figure 72 Location of units in the plaza of group 33 (Created by R. Guzman 2016).

Group E

Group E is an elite residential group composed of seven different structures that surround an patio and is located south of Group D and north east of Group F in what would be considered the center of Holtun (Fig. 72). This group has been excavated on three separate occasions. In 1999, Vilma Fialko identified and excavated a Chultun near the south eastern portion of the group. In 2011 the Holtun Archaeological Project excavated a test unit to identify the chronology of the groups. Excavations in this unit revealed ceramic sherds dating to the Middle Preclassic, Late Preclassic and Late to Terminal Classic periods. The excavations of 2016 yielded 6 burials described in further detail below.

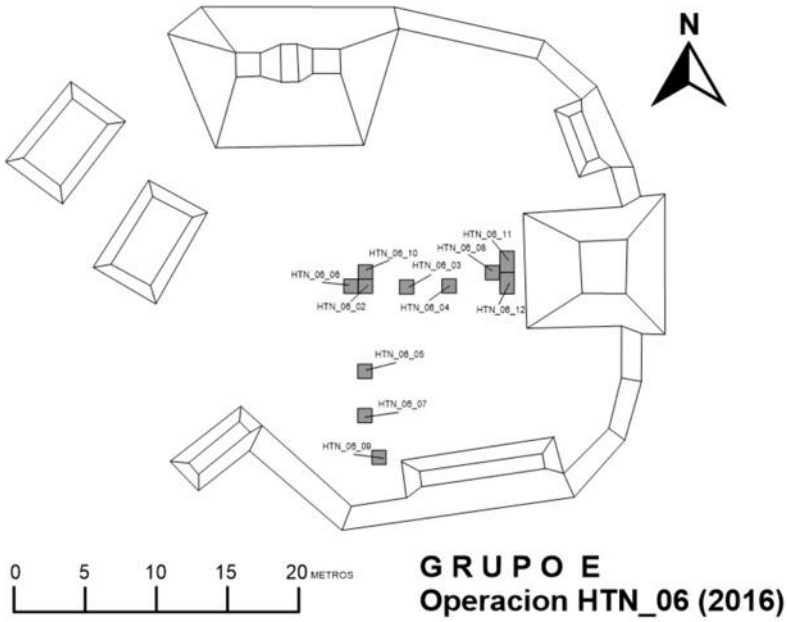

Figure 73 Site plan for Group E and distribution of units (Created by R. Guzman 2016).

Group 10

Group 10 is composed of eight different structures that surround a patio and is located east of Groups 11 and 12 in what would be considered the residential periphery of Holtun and probably a group of lesser status than the epicenter. This group shares its west structure with group 11, however all excavations made were made within the residential plaza that is surrounded by group 10. Individual HTN.23.4.4c.7 was recovered from unit HTN.23.4 which was placed south of the northern structure (Fig. 73). Ceramics at this group correspond approximately to the Late–Terminal Classic period.

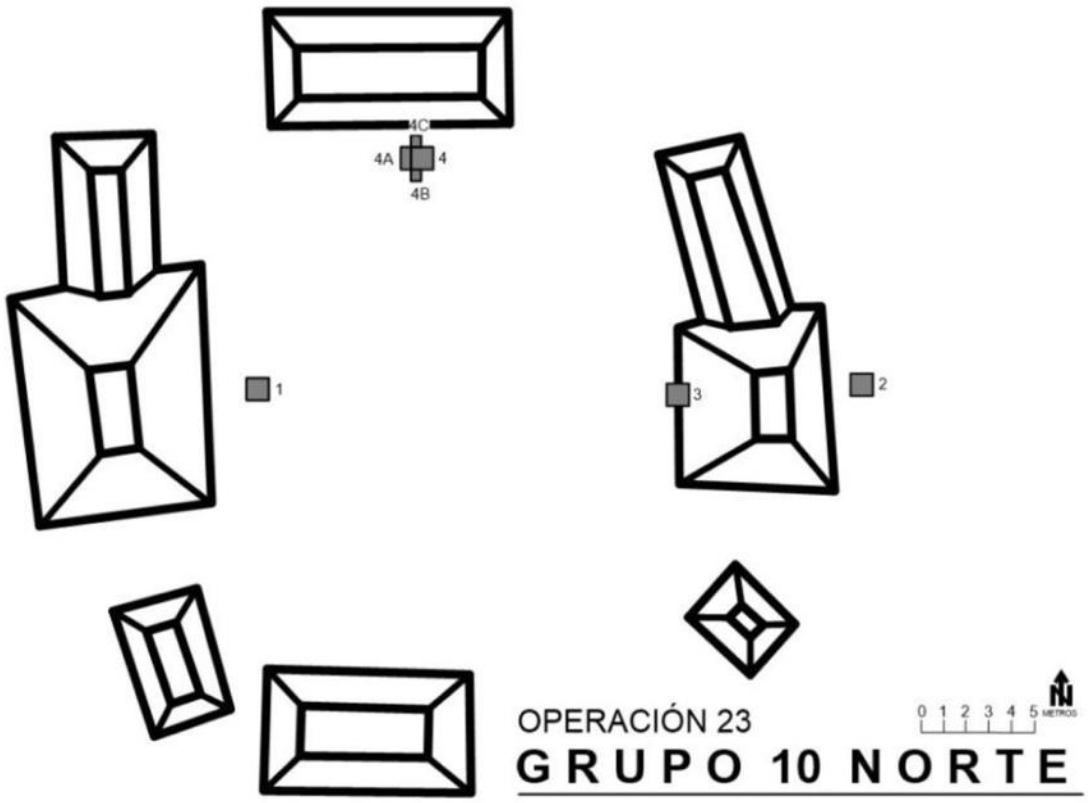

Figure 74 Image of Group 10 and Unit.23.4 (Created by R. Guzman 2016).

Group F

Group F (Fig. 74) is an elevated compound of platforms composed of four different plazas and over 15 structures that delineate and surround each plaza, subsequently identified as plazas F–A, F–B, F–C, and F–D. This group is considered the Middle Preclassic-period ceremonial core of Holtun and is composed of major architectural features including an Preclassic period E–Group surrounding plaza F–B and associated plazas F–A, F–C, and F–D (Fig. 74). In total, 6 burials were recovered from this group, three recovered from Plaza F–A and 3 from the ceremonial area of plaza F–B. All six are discussed in greater detail below.

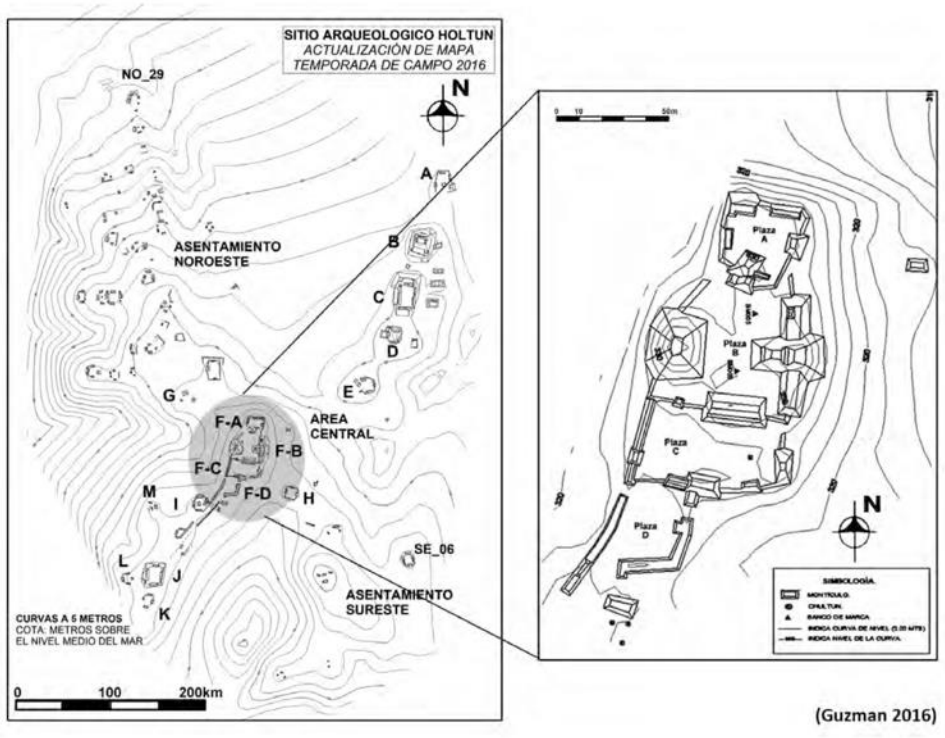

Figure 75 Map of Group F indicating the location of all four plazas (Guzman, 2016).

Group C

Group C is composed of two plazas surrounded by an acropolis formation and an elite residential area near to the Triadic Pyramid located in Group B. Plaza A is where ceremonial activity associated to these structures would have taken place (Fig. 75). The group was occupied from the Middle Preclassic period to the Late to Terminal Classic periods. The plaza was formed by modifying both the bedrock and creating a plaster floor, the basis which formed the initial construction of plaza structures. In 2017, excavations of this plaza were focused on the cardinal axes with the goal of further understanding the chronology and construction phases of the Preclassic period. The excavations of 2017 yielded one burial described below.

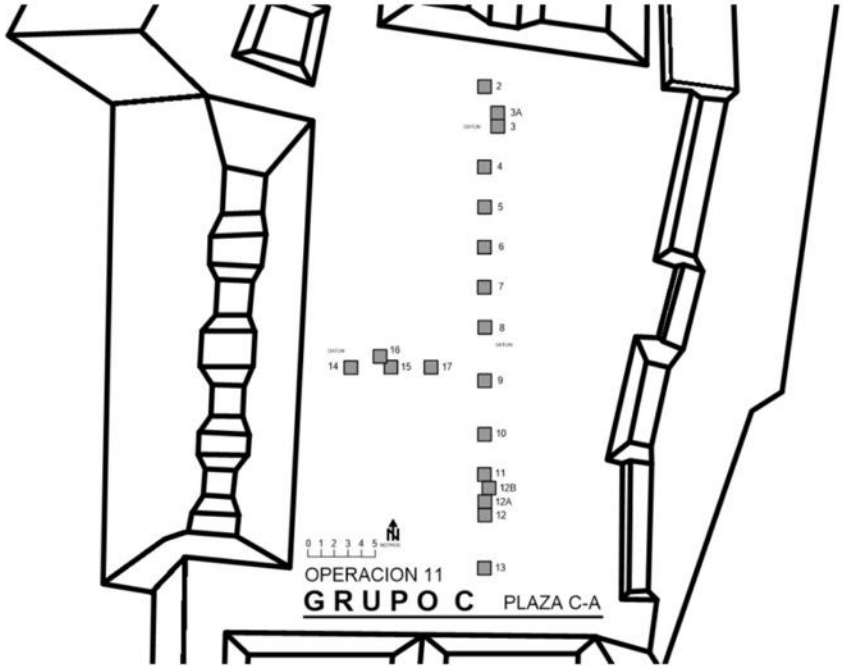

Figure 76 Site plan for Group C and Units 11,12,12A,12B (Guzman 2017).

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