ABSTRACT

MICK, CHARLOTTE BETH. Social Status and Health at the Mississippian Period Averbuch Site. (Under the Direction of Dr. D. Troy Case).

The health of prehistoric populations, as reconstructed from mortuary contexts, is known to be influenced by social status in many past societies. Mortuary analyses aimed at reconstructing social organization can also be supported by data from skeletal materials. Theoretical principles guiding this goal of mortuary analysis emphasize a combination of structural and social traits. For Mississippian chiefdoms, these traits are largely based on Peebles and Kus’ (1977) prescriptions. A test of these prescriptions is performed on the Tennessee Averbuch population, combining burial good mortuary data and the following nutritional health indicators: linear enamel hypoplasia frequencies and the presence or absence of porotic hyperostosis and cribra orbitalia. Applying Goodenough’s (1965) social role theory, burial good data are reconfigured into “diversity scores” which represent the variety of types of goods present. Diversity scores are evaluated to consider if higher social status afforded individuals any protection against nutritional stress under a Mississippian redistributive system. Some nutritional stress was observed across all diversity scores, but the highest social status individuals did not appear affected by the greatest stress levels. The Averbuch population appears to have been in poor health in general, but social status may have offered some defense against extreme nutritional stress. Social and structural organization at Averbuch does not conform to a Mississippian chiefdom designation as it is commonly assessed.
Status and Health at the Mississippian Period Averbuch Site

by
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DEDICATION

For my parents, who have always been more than supportive and encouraging of all of my endeavors.
Charlotte Mick grew up in Marshalltown, Iowa in a large, but tight-knit family. She was always an anthropologist at heart and went on many “archaeological adventures” during her childhood. The realization of her interests occurred only after she was a sophomore at the University of Northern Iowa when she participated in her first physical anthropology class. She quickly switched majors and has not looked back since. During her undergraduate years, her anthropology advisor quickly became a valued mentor, and helped her realize the true potential of her passion. Charlotte graduated from the University of Northern Iowa with honors and a Bachelor of the Arts in Anthropology in 2009. After graduation, Charlotte traveled to North Carolina to pursue a Master’s degree in bioarchaeology at North Carolina State University. She is currently a Master’s candidate under the direction of Dr. D. Troy Case.
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I. Introduction

Throughout history and across cultural divides, social organization has been found to have a strong influence on health and diet (Buikstra and Milner 1991; Cook 1981; Danforth 1999; Gamble et al. 2001; Hatch and Geidel 1985; Katzenberg et al. 2009; Lallo and Rose 1979; Powell 1986). In the Mississippian Southeast, analyses of socio-political organization suggest a chiefdom level society. Mississippian chiefdoms are expected to have participated in a redistributive economic system and an ascribed social system with a variety of different available statuses. They also built large mounded, ceremonial centers, and had maintained regional political influence (Cobb 2003; Peebles and Kus 1977; Schurr and Schoeninger 1995). Mississippian populations are defined largely by maize subsistence as well, which is documented to have negatively affected the nutritional health of these peoples. Compared to their cultural predecessors, Mississippian populations have higher incidences of enamel hypoplasias, porotic hyperostosis, and harris lines and different timing of stressed periods (Berryman 1981; Boyd 1986; Charles 1995; Cook 1981; Duray 1996; Goodman et al. 1984; Powell 1986). In these redistributive systems, the elite residing at the mounded, ceremonial centers are expected to have been given tribute by and controlled resource production in the lesser-elite and non-elite populations (Cobb 2003; Peebles and Kus 1977). A number of studies of the large regional centers, e.g. Moundville and Etowah, have demonstrated that differential access to meat products, in particular, was present in this culture, as revealed through midden deposit analysis, ratios of stable carbon and nitrogen, and trace element analysis (Ambrose et al. 2003; Blakely and Beck 1981; Hatch and Geidel 1985; Schurr 1992;
Welch and Scarry 1995). Although the elite enjoyed a nutritional advantage, it is unclear to what extent, if any, this advantage affected biological health of those favored compared to those without favor.

Research has drawn inconclusive deductions as to the health benefits elite status may have afforded Mississippian populations. Powell (1986) examined Moundville, Alabama and discovered no apparent differences in enamel hypoplasia frequencies or severity between the elite and non-elite populations, but also observed that the non-elite appeared to be affected more often by conditions of anemia. Hatch and Willey (1974) assessed social status and health at a number of Dallas culture sites in Tennessee and discovered that elite males tended to be taller than non-elites. The results of Powell’s (1986) study also indicated that elite male stature was slightly elevated. Cook (1981) identified differences in the frequency and distribution of enamel hypoplasias in high or low status individuals in Middle Woodland populations, a social distinction that may have been accentuated in the more complex Mississippian populations. Parham and Scott (1980) discovered differences in the frequency of porotic hyperostosis between mound burial (5%) and village cemetery subadults (21%), indicating that the elite may have had a health advantage at Toqua, Tennessee. At the large Etowah site in Georgia, Blakely and Beck (1981) determined status to have minimally affected health; when examining a number of health indicators, the study found only smaller numbers of dental pathologies in the elite population. As these examples demonstrate intra- and inter-population differences in health benefits of higher social status are evident in
Mississippian culture. It is unclear, however, if elite status would affect health to a greater extent at sites peripheral to these types of regional centers.

The Averbuch site, located in an environmentally “marginal” area of Tennessee, provides an opportunity to test whether social status affected the distribution of foods within the population, and if the elite gained any health benefit from this arrangement. In a less advantageous environment, the effect of social status on the distribution of foods is expected to be heightened (Ames 2008). The 1st purpose of this research is, thus, to analyze the extent to which Averbuch’s social organization is influenced by vertical (assumingly ascribed) social positions and horizontal (age and sex) social positions. The Averbuch population is hypothesized to exhibit less obvious vertical (ascribed) social status than that which is common in the large, ceremonial Mississippian sites. The 2nd purpose of this research is to test the potential nutritional advantage that elite status may have afforded those of this population, due to the redistributive nature of Mississippian culture. A mortuary analysis following Goodenough (1965) provides social organization data, to which nutritional health is compared. It is expected that elite status will provide protection against developing porotic hyperostosis, cribra orbitalia, and enamel hypoplasias in childhood. The results of this research will provide data on the interaction between health and social organization at a smaller, peripheral Mississippian site, which supplements the health and mortuary studies of the more commonly studied large, ceremonial sites.
II. Background

a. Averbuch Basic Information

The Averbuch site is a Mississippian palisade-fortified site in the outer Nashville Basin of Tennessee situated in Davidson County (see Figure One) (Berryman 1981; Reed 1984a). Two different programs, executed by Dr. William Bass and Dr. Walter Klippel, excavated Averbuch between 1977 and 1978 (Berryman 1981). The products of both seasons, including human skeletal remains, are currently housed at the University of Tennessee in Knoxville. Dendrochronologically corrected radiocarbon dates, as well as pottery styles, coincide with an occupational span of nearly 122 years (Reed 1984b). Site occupation is estimated to have begun between AD 1275 and 1300 although conclusion of occupation is much more difficult to determine due to carbon 14 dating limitations, such as the cost of dating and the large standard deviations of obtained dates (Reed 1984b). Reed (1984b) estimates occupation to have been shorter than the standard deviations of radiocarbon dates, in part because pottery at the site could be identified to specific style periods. Paleodemographic analysis of the Averbuch cemeteries supports an occupation extending over a period of between 25 and 100 years with around 1300 inhabitants (Berryman 1981; Reed 1984b). Although some structures show evidence of rebuilding, the palisade does not, and the midden deposit at Averbuch is relatively thin, further supporting a shorter occupational span (Berryman 1981; Eisenberg 1986). The Averbuch site was likely
occupied for only a short duration, with the most intensive occupation lasting between 25 and 50 years in total.

During excavation, 70 different structures were uncovered as well as a large palisade that surrounded nearly all 11 square acres of the site (Eisenberg 1986). Presence of a palisade or other dividing structure is largely believed to reflect the need for protection during territorial disputes; agriculturally productive land is hypothesized to have been in high demand, and conflict over it a result during the Mississippian era in the Southeast (Peebles and Kus 1977; Eisenberg 1986). A number of structures at Averbuch were also burned although caution must be advised in interpreting the causes of the burning (Eisenberg 1986). An unstable sociopolitical environment, such as is common in Missippian populations, could be demonstrated by the construction of the palisade and presence of burnt structures. Averbuch contains three spatially distinct cemeteries roughly contemporaneous with one another as the site is hypothesized to have been occupied for only a short period (Berryman 1981; Klippel 1984). Cemetery three may be slightly earlier, though, as the palisade bisects part of it while cemetery one and two are both enclosed (Berryman 1981).

The site is considered part of the Mississippian cultural phase of the Southeast. Specifically, Averbuch is assigned to the Middle Cumberland cultural period of the Nashville Basin area (Berryman 1981). As a Mississippian culture site, Averbuch is somewhat unique due to its peripheral location. A number of smaller Mississippian sites found in Davidson County are located closer to the Cumberland River, its floodplains, or other water sources,
than the large Averbuch site (Eisenberg 1986). Averbuch is located four km from the Cumberland River and two from the nearest creek (Berryman 1981). Researchers have hypothesized that population pressure may have driven outward migration and the establishment of Averbuch and surrounding sites in search of fertile agricultural land (Eisenberg 1986; Klippel and Reed 1984). Even so, little is actually known about Middle Cumberland phase settlement patterns and sociopolitical, economic, and subsistence systems (Eisenberg 1986). Most archaeological and/or survey reports of the Middle Cumberland period are from the 19th century, but these do illustrate the extension of settlement and highly dense population of this culture (Bushnell 1920; Dowd 1972; Eisenberg 1986; Ferguson 1972). For example, Thruston (1897) reported on excavation of 3,000 burials from the Noel Farm site in the Nashville area (cited in Eisenberg 1986). This burial sample is nearly twice that uncovered at Averbuch, even though Averbuch is still comparatively one of the largest Mississippian sites to have been excavated in Tennessee (Berryman 1981; Dowd 1972; Eisenberg 1986; Ferguson 1972). Mississippian occupation of Tennessee is estimated to have commenced as early as AD 900 and extended into historic times, but Middle Cumberland culture had disappeared before the 18th century (Berryman 1981; Eisenberg 1986). It is hypothesized that “decreased food availability with increased morbidity may represent factors that contributed to the Middle Cumberland disappearance” (Berryman 1981).
b. Environmental and Locational Data

Davidson County is located in the northwestern area of central Tennessee in what is considered to be a “temperate deciduous forest biozone” (Eisenberg 1986; Reed 1984a). This diverse biozone is made up of mixed hardwood forest and a large variety of different animal species (Eisenberg 1986; Reed 1984a). Modern climate is hypothesized to reflect late prehistoric environmental conditions well. Presently, Averbuch belongs to the “Humid Mesothermal” classification, which is characterized by seasonal temperatures and rainfall based largely on elevation (Eisenberg 1986). Temperatures can range from freezing to 90 degrees Fahrenheit with a growing season of around 200 days (Eisenberg 1986). During early spring, the Outer Basin receives an increased amount of rainfall resulting in oversaturation of the soil whereas, in autumn, aridity plagues this area (Reed 1984a). During either of these times, potentiality of floral production is minimal. Silt levels, considered an important component contributing to soil fertility, are high in the Outer Basin especially in the flood plains of its major rivers: the Cumberland, Harpeth, Duck, and Elk (Reed 1984a). Averbuch is located on Mimosa soils, which have a moderate silt level but short depth before clay deposits (Reed 1984a). Surrounding Averbuch, though, are armour soils that may have increased the value of this site location. Armour soils have a high silt and phosphate content and are high in fertility (Reed 1984a). Walter E. Klippel and Ann Reed (1984) tested the hypothesis that water systems and soil fertility, commonly cited factors for prehistoric Southeastern settlement, may have influenced the location of the Averbuch site and other Mississippian sites found in the Nashville Basin. In contrast, Leslie Eisenberg (1986)
hypothesizes that silt floodplain locations are actually overemphasized by Southeastern archaeologists due a predominance of research focusing on large civic-ceremonial, mound centers found on floodplains (1986). Eisenberg (1986) proposes that smaller centers may have positioned themselves differently to take advantage of a variety of resources (see Figure Two). For example, the Mississippian site of Etowah in Georgia is located on a border of multiple resource zones which Eisenberg believes to have influenced its development as a redistributive center (Eisenberg 1986).

Klippel and Reed (1984) utilized site survey files from the Tennessee Department of Conservation to evaluate site location distributions as a product of these factors. Fertility of Outer Basin soils is considered higher than that of the Inner Basin determined by silt levels and more specifically, phosphate content (Klippel and Reed 1984; Reed 1984a). Differences between phosphate levels are due to the availability of phosphate-rich limestone at increasing elevations. The survey files indicate that 45 of the 48 (93.8%) stone-box tradition Mississippian sites identified were indeed in high phosphate catchment areas (Klippel and Reed 1984). Cluster analysis illustrated that sites were located in areas based on soil fertility more so than chance could explain, thus site placement was not random. Major floodplain environments were still preferred locations for site development, more so than only phosphate-rich locales, which still leaves unanswered questions about Averbuch’s presence on a non-floodplain area (Klippel and Reed 1984). Runoff conditions and fluctuating salinity in areas of the Outer Basin could have affected the fertility of particular areas as well (Eisenberg 1986). Eisenberg’s (1986) theory may prove to be a valuable analytical tool to
understanding Averbuch site development. The Nashville Basin would have provided a
dynamic environment for agriculture, but was adequate for settlement (Klippel and Reed
1984).

c. Subsistence

Interpretations of the subsistence behavior in the Nashville Basin region are tentative
as the moisture, soil, and temperature conditions of this area do not preserve vegetal material
well (Crites 1984a). Even so, evidence of floral remains at Averbuch is surprisingly lacking.
Most plant remains that survived were carbonized, most likely, either by accident or as refuse
during cooking (Crites 1984a). Seasonal variability of foods may play a role in the frequency
they are seen archaeologically as well. Botanical data were taken from all cardinal points in
ten different structures and 60 features, flotation was performed if necessary, and all
specimens sorted, measured, and weighed. Maize contributed to a large portion of all plant
remains excavated while hickory nut shells formed the second largest botanical category
(Crites 1984b). No evidence of squash or beans (the nutritional trio of maize subsistence
systems) was found (Crites 1984b). Even so, the Averbuch paleobotanical record is very
similar to that of other Mississippian sites (Crites 1984b). Other major finds included honey
locust seeds, grape seeds, and domesticated sunflower seeds (Crites 1984b). Crites (1984b),
the principle paleobotanist for the Averbuch site, provided nutritional data for a number of
the food products commonly consumed in the Southeast. Unfortunately, although relatively
high in calories, Southeastern maize provides only trace levels of many essential vitamins
and minerals (Crites 1984b). Hickory nut fruits most likely supplemented the Averbuch subsistence system with high levels of proteins and natural fats, though they are also low in overall nutritional value. Of course, taphonomic processes may affect representation of the nutritional makeup of this subsistence system but the Averbuch population may have been at risk for protein and/or amino acid deficiencies (Crites 1984b). Crites (1984a) asserts that the population would have suffered many nutritional health consequences based on this vegetal diet alone. As a result, Crites (1984a) insists upon a necessary dependence on faunal resources to a large extent as well.

Faunal remains analysis demonstrated high utilization of the local mammal species, which formed nearly 55% of all animal bone found at the site (Romanoski 1984b). Twenty-five species of wild mammals and one species of a domesticated variety were identified. White-tailed deer and elk, both common to the Nashville Basin, largely dominate the mammal remains and are estimated to have provided nearly half of the calculated biomass (Klippel and Reed 1984; Romanoski 1984a; Romanoski 1984b). Many different animal species were taken advantage of, including: rabbits, geese and other waterfowl, beaver, and squirrel (Romanoski 1984a). Freshwater fish bones and mollusk shells also contributed to a good deal of the faunal record at Averbuch. In addition to their use in subsistence, faunal (bone and shell alike) remains were a principle material used to construct tools and clothing, ornaments, and ceremonial items. Interestingly, modified shell and particular forms of modified bone are only found in burials and thus these material types may have been significant ceremonial symbols for these people (Romanoski 1984a).
**d. Technologies and Trade**

A variety of lithic and ceramic materials are demonstrated to have been utilized at Averbuch, in the construction of the structures, burial boxes, and artifacts such as projectile points, metates, bowls, ornamentation, hammerstones, and groundstones (Kline 1984a; Reed 1984b). An examination of Averbuch structures indicates few differences between the construction of and tool use within different buildings, that might suggest craft specialization in each. Lithics and ceramics, except for those found in burials, did not appear to be distributed in a substantial pattern to sub-populations (as defined by structures) that may indicate any specialized use of tools (Kline 1984a; Reed 1984b). Particular lithic categories may be evidence of trade and/or long distance procurement. Dover chert is one example of such a material; little flaking of this material was found which may indicate that it was not worked on site (Kline 1984a). Finished materials may have been traded for, and as evidenced by burial data, may have formed status goods (Eisenberg 1986; Kline 1984a; Reed and Klippel 1984). Specialized artifacts of this type are theoretically related to social organization, especially in relation to a Mississippian chiefdom level society, according to the Binford-Saxe approach to burial analysis (Reed and Klippel 1984).

**e. Cemetery and Burial Descriptions**

Nearly complete excavation was performed on all three Averbuch cemeteries. These cemeteries are considered to be generally contemporaneous but roughly organized temporally, oldest to youngest, into cemetery three, one, and lastly cemetery two (Berryman
Possible patterns of interment are illustrated in the cemeteries. Cemetery three organization is generally haphazard but vaguely circular, cemetery one follows a circular interment pattern, while cemetery two is more linearly organized (Eisenberg 1986). Excavation exposed nearly 645 graves containing approximately 887 individuals. It was estimated that around 400 individuals were not recovered (Berryman 1981). From the cemeteries, 130 graves (estimated at 172 individuals) were recovered from cemetery one, 62 graves (72 individuals) from cemetery two, and 162 graves (190 individuals) from cemetery three (Berryman 1981). Infants and very young children were largely underrepresented in the three cemeteries, which may have affected demographic analyses (Berryman 1981; Eisenberg 1986). The infant subpopulation was most frequently excavated from under house and/or structure floors in the common burial box form or as a pit burial (Eisenberg 1986). For the purposes of this study it is important to note that both sexes, at approximately equal proportions, and roughly all age ranges, were found in all cemeteries, thus differential burial based on these status divisions (age and sex) probably did not occur (Berryman 1981). However, mortuary and health differences between these cemeteries could be apparent on the basis of status. Graves were often reused, thus a system for recording burial location must have been in place, but the reasons for reuse have not been determined (Berryman 1981).

The characteristic stone box burial form of Middle Cumberland culture is overwhelmingly the most common burial type at Averbuch (Berryman 1981). Although there are other kinds of stone box burials in this area of the Southeast, none are as carefully crafted or as numerous as those of the Nashville Basin area (Bushnell 1920). A good deal of variance
in construction of these boxes is observed specifically in types of materials used, the care of construction, depth of interment, number of capstones, presence, absence, and type of floor lining, and size of the finished burial (See Figures 13 and 14) (Berryman 1981). Only rarely, individuals were interred without a stone box (Berryman 1981). Other Middle Cumberland sites exhibited a continuity of specifics of burial construction and presumed social status (in this case based on artifact elaboration and number). For example, the number of capstones, type of floor: soil, ceramic, or stone, and thickness of the side stones all correlated with the number of grave goods in an individual burial (Dowd 1972; Ferguson 1972).

Compared to many other Mississippian sites, burial assemblages at Averbuch are surprisingly lacking (Berryman 1981; Reed and Klippel 1984). Only 34.7% of the burials of all three cemeteries had accompanying grave goods with no significant difference in number between the three cemeteries (See Figures 11 and 12 for examples of burial good artifacts) (Reed and Klippel 1984). Most adult associations can be classified as utilitarian or ornamental, but the percentage of adults with burial goods is small (Berryman 1981). The greatest number of, and most elaborate, goods were located with child or adolescent graves (Berryman 1981). Adult associations may be of particular importance especially due to their relative infrequency. Particulars of ceramic, lithic, bone, and shell materials are found to follow patterns in their grave distributions (Kline 1984a; Reed 1984b; Romanoski 1984b). For example, bone artifacts and lithics are more often found with adult males (Eisenberg 1986; Kline 1984b). Although the dispersion of burial goods could influence the extent of their use for mortuary analysis, symbolic values of certain goods may be found to be
beneficial. Copper was found in a few adult burials, which is associated with higher ranking individuals in some other Mississippian culture sites (Schurr 1992; Welch and Scarry 1995). Modified shell and bone could also prove to have a symbolic value from which to interpret social status as these items were only found in burial contexts (Romanoski 1984a). Relationships among different good types and social distinctions would be useful to examine. For example, as Dowd (1972) commented at the Middle Cumberland “West” site: “the most beautiful artifacts are often found in the most carefully constructed boxes”. It is important to be reminded of the possible interconnection of all aspects of the burial context.

**f. Mississippian Cultural Phase**

Mississippian cultures are defined by large towns, maize agricultural subsistence, complex chiefdoms, and in some instances mound structures (Cobb 2003; Rothschild 1979). Averbuch conforms to many of these criteria for a Mississippian chiefdom society as outlined by Peebles and Kus (1977): the population relied predominately on a maize subsistence system and was a large center but did not have a mound system. Unfortunately, social organization is less apparent at Averbuch than many of the much larger ceremonial-mound sites. There is no architectural data that support an evident separation of social groups (Eisenberg 1986; Reed 1984b). It is hypothesized that agricultural intensification necessitated the increase in social organizational complexity resulting in the chiefdom systems common to Mississippian traditions (Rothschild 1979; Schurr and Schoeninger 1995). This hypothesis suggests that construction of the chiefdom system would have enabled redistribution of
surplus and later tribute goods — a combination of the political and economic spheres (Cobb 2003; Peebles and Kus 1977). In many large Mississippian sites, distinct social hierarchies are visible archaeologically. These social status divisions are illustrated by burial patterns, spatial aspects of living quarter construction, and supported by analysis of consumption patterns (Cobb 2003; Welch and Scarry 1995; Jackson and Scott 2003). Specialization of craft production and large architectural and/or agricultural construction projects that would require organized activities have been defined by researchers as necessary traits of chiefdom societies (Peebles and Kus 1977).

While the large sites of Cahokia and Moundville tend to have obvious examples of both craft specialization and organized labor activities, it may be more difficult to distinguish hierarchy in lesser chiefdom level sites (Cobb 2003). In his analysis of peripheral Moundville sites, Peebles (1978) found status differentiation to be more subtle at smaller sites. As a large but peripheral site, status distinctions at Averbuch may be more difficult to assess. Although excavators report less evidence of craft specialization than expected, Averbuch still had a large population, demonstrated organized building activity in the construction of the palisade, and relied on agriculture subsistence which fulfills archaeological requirements for chiefdom characterization (Klippel 1984; Berryman 1981). Even lacking some traits, cross-culturally, chiefdom level or even “petty hierarchies” exhibit social dimensions in burial construction to a high extent (Carr 1995) and these dimensions may be observable at Averbuch. It is unclear to what “level” of Mississippian chiefdom Averbuch should be allocated.
The less agriculturally productive area of the Nashville Basin, in addition to the intensification of maize production, could have created acute nutritional deficiencies at Averbuch (Schurr and Schoeninger 1995). The dual economic and political role of the Mississippian high status group, if strict social hierarchy is found to be present, may have determined distribution of foodstuffs and thus expressions of nutritionally related conditions. Differences in diet and nutritional health based on status have been observed at Mississippian sites with apparent strict hierarchies (Welch and Scarry 1995; Jackson and Scott 2003; Schurr 1992). Stable isotope analysis at Cahokia, Mound 72, for example, identified a difference in the types of food, whether maize or animal product, and the amount consumed by members of different status groups. Animal products were consumed to a much higher degree by elites, a phenomenon hypothesized to be a product of the tribute and redistribution process of a chiefdom level society (Ambrose et al. 2003). In a society based primarily on maize agriculture, access to a greater amount or choice cuts of meat products in particular, may be symbolic of higher status (Jackson and Scott 2003). Availability of meat products to specific groups is especially important considering the etiology of many nutritional deficiencies.

**g. Bioarchaeological Analysis of the Averbuch Population**

Only a small number of studies have examined the Averbuch skeletal population, despite the vast amount of data that these materials could provide about the otherwise largely unresearched Middle Cumberland culture. Two different doctoral dissertations, by Hugh
Berryman (1981) and Leslie Eisenberg (1986), supply most of the bioarchaeological research pertaining to the Averbuch site and its relationship to the late Mississippian culture of Tennessee. Both dissertations are similar in the fact that they attempt to explain Averbuch cultural, biological, sociopolitical, and community adaptations (Berryman 1981; Eisenberg 1986). A few studies have utilized data from these dissertations and others in order to expand upon a regional approach to skeletal analysis in prehistoric Tennessee (Boyd 1986; Sullivan 1995; Blakely 1971). Chiefdom level organizational systems may necessitate a more comparative approach to fully comprehend complexities within and between the Mississippian sociopolitical, environmental, and biological spheres.

Berryman (1981) investigated the “biological and social adaptations of the Averbuch people to their environment” through possible implications of specific conditions: harris lines, enamel hypoplasias, stature attainment, and paleodemographic analysis (3). Utilizing age ranges, sex, and cemetery number, Berryman (1981) constructed morbidity, mortality, and growth (life expectancy) profiles. Unsurprisingly, the youngest age interval (0-1 year) demonstrates the highest frequency of deaths at nearly 23% which decreases as age intervals increase until young adulthood (Berryman 1981). The 10.5 to 15.5 year age range is found to be the healthiest, with the lowest frequency of death at around 2%, but once young adulthood (15.5 to 20 year range) is achieved, mortality drastically increases again (~7%) (Berryman 1981). During this time, female mortality exceeds male mortality (~9% to ~6%) but during any other age range male mortality is higher (Berryman 1981). Maximum frequencies of mortality are reached during the 20-25 year adult range at nearly 15%. Berryman (1981)
hypothesizes that the high mortality rates shown in the young adult and adult age ranges are
due to childbearing difficulties faced by females and subsistence and warfare related
activities by males.

The mortality curve predicts that by the age range 10.5-15.5 years, slightly over half
(\(\sim 53\%\)) of the original population had become deceased indicating the stress incurred by this
population at young ages (Berryman 1981). A difficult life may be demonstrated by the life
expectancies (at birth) of this population. Males are expected to live only 17.4 years while
females live to 14.6 years. Compared to other Mississippian sites, some located in Tennessee
as well, Averbuch possesses a much lower life expectancy and a higher crude mortality rate
(\(\sim 60\%\)) (Berryman 1981). A comparison of the crude birth rate (\(\sim 40\) to 50\%) and the crude
mortality rate over a 25 year period calculates a growth rate of -10\% for the Averbuch
population (Berryman 1981). There is little substantial difference between life expectancies
or mortality profiles of the different cemeteries. Averbuch does not appear to have been able
to sustain its population, which Berryman (1981) approaches as a factor of the combination
of subsistence abilities and morbidity levels which other populations may not have
experienced to the same degree.

Nutritional disturbances are shown to have been common in the Averbuch
population: numerous enamel hypoplasias, multiple harris lines, and porotic hyperostosis
were all frequent (Berryman 1984b). As would be expected, presence of enamel hypoplasias
coincided with porotic hyperostosis in many cases (Jablonski 1984). Surprisingly, stature
averages for males were estimated to be 5’6” while females were estimated at 5’2” which is
taller compared to many other Mississippian populations (Berryman 1981). This finding
appears inconsistent with the large number of Harris line “stress episodes” manifest in both
males and females of this population. Nearly 93% of all males and 81% of females exhibited
at least one Harris line with the average number of stress episodes being 3.0 and 2.3 for
males and females, respectively (Berryman 1981). A small sample of individuals was
examined for enamel hypoplasias which were present in ~91% of this subgroup (Berryman
1981). Interestingly, no significant difference was found between cemeteries for enamel
hypoplasias, stature, and Harris lines which may indicate that stress levels were generally
stable over time (if slight differences in temporal placement of the cemeteries is accurate.
Berryman (1981) concluded from his skeletal analysis of the Averbuch population that the
high degree of stress exhibited by this population is more consistent with ongoing nutritional
and/or possible disease stress rather than brief periods of stress or epidemic disease. In a
stratified population such as that of the Mississippians, access to positions of prestige and
differential access to resources such as food products may be even more apparent during
environmental stress (Ames 2008).

Nutritional issues appear to have plagued the Averbuch population and may have
been a product of a complex hierarchical society. Berryman (1981) also identified a number
of individuals affected by skeletal traumas during biological analysis of the Averbuch
population. Some men were found with projectile points embedded in skeletal element(s)
and/or associated projectile point traumas while others of both sexes were diagnosed as
victims of scalping (Berryman 1981). Berryman (1981) offers two explanations for these obvious examples of conflict: 1) arable land was especially desirable during the population dense Mississippian phase and provided a motive for community conflict, or 2) that warfare (which may be a product of a number of different factors) was performed secondarily for the purpose of maintaining and gaining social status. Both appear plausible when the population density of the Nashville Basin at the time of Averbuch occupation and Mississippian social organization are taken into account.

Enhancing understanding of the influence of population pressures and their impact on diet and health is the purpose of Leslie Eisenberg’s (1986) dissertation. Eisenberg (1986) describes “disease load”, as an effect of increased population densities in more arable agricultural areas that would tend to increase nutritional deficiencies. Already compromised immune systems are hypothesized to be less able to necessarily react to infectious pathogens or, vice versa, to less than optimal nutritional states. Eisenberg (1986) found that nearly 25% of the Averbuch series exhibited porosity of the cranial vault (porotic hyperostosis and/or cribra orbitalia) which commonly indicates a long-term nutritional disturbance (89). When each condition was examined separately, 35% of children between 3 and 4.5 years, ~32% between the ages of 5 and 14.5 years, and 13% between 15 and 24.5 years showed evidence of cribra orbitalia (Eisenberg 1986). Adults of the ages 15 to 24.5 years demonstrated the highest frequency of all adults, coinciding incidentally with the period of most sociopolitical stress for males and biological stress for females as outlined by Berryman (1981). Porotic hyperostosis affected ~32% of all individuals with adults (15+ years) reflecting the highest
frequency of active lesions (Eisenberg 1986). An examination of infection influenced
Eisenberg (1986) to closer analyze tibiae, due to their greater propensity to display disease,
and found lesions (periostitis or osteomyelitis) in 70% of males and 60% of females. Over
80% of these lesions had been healed at the time of death, which indicates perhaps slight
disease episodes as bodily response to infection had occurred (Eisenberg 1986).

Although most reports from other Middle Cumberland sites do not have the extensive
data on paleopathology and other biological conditions that is available from Averbuch,
some such as the West site (contemporaneous and located near Averbuch along the
Cumberland River) identify dental pathologies frequently and pathological, infectious
conditions infrequently (Dowd 1972; Eisenberg 1986). Porotic hyperostosis and cribra
orbitalia are also reported to have occurred in high frequencies at the Brown site in
Tennessee (Eisenberg 1986). Eisenberg (1986) concludes that disease load, due to sanitation
conditions, crowding, and even exchange networks typical of a larger occupation site, could
have potentially interacted with the expression of the nutritional conditions analyzed, but that
Averbuch is still unusually stressed compared to other contemporary, sedentary populations.
Even so, less populated sites demonstrated numerous cases of nutritional deficiencies which
merits subsistence as a means to better understanding Averbuch health. Frequencies of
porotic hyperostosis, cribra orbitalia, and enamel hypoplasias are also much less at other
Mississippian sites, even those that are even more populous such as Moundville and Etowah,
when compared to Averbuch (Boyd 1986; Cook 1981; Powell 1986). An examination of the
site of Toqua, located in Tennessee as well, also demonstrated unusually high frequencies of
nutritional conditions compared to other contemporaneous sites (Boyd 1986). Differences in maize consumption patterns at each site are thought to have played a role in the development of these (Boyd 1986). Although in many cases, sample sizes and information are lacking for Mississippian sites in Tennessee, a regional approach to understanding prehistoric Southeastern health may be most beneficial.
III. Social Organization and Mortuary Analysis

The analysis of social organization from archaeological cemeteries must be guided by theoretical principles to organize archaeological data and provide an outline of how social status differences (or lack thereof) may have affected the daily lives of the people of interest. In the literature there are generally two approaches to the study of social organization, mortuary analysis and biological analysis, which have a variety of subscripts that are used most often. Cross-culturally, mortuary practices have been found to frequently represent, or be directed by, social dimensions that can potentially be reconstructed from the archaeological record (Carr 1995). The social dimensions most often observed cross-culturally to be reflected in mortuary practices are vertical social position, including rank and age (Carr 1995; Kamp 1998). These categories are also those most directly reflecting prestige, wealth, and power positions, supporting the use of mortuary data as a tool to reconstruct social organization in archaeological populations.

Mortuary analyses that examine social organization begin with a theoretical understanding of the impact of social and cultural complexity on mortuary behaviors. Although categories of social complexity are sometimes criticized, they are useful to understand the variability within and between burial treatments (Carr 1995; Kamp 1998; Saxe 1970). Across cultures, energy expenditure on burial and its forms differ according to social complexity (Binford 1971; Carr 1995; Kamp 1998). Service’s (1962) classifications are used most frequently during organizational archaeological research; the band, tribe,
chiefdom, and lastly, state categories reflect social, economic, and political levels of increasing complexity (Beck 2003; Carr 1995). In the Southeast, complexity categorization is evaluated by Peebles and Kus’ (1977) dimensions of the Mississippian chiefdom, a product of a regional approach to the study of social organization in this area. The definitions of complexity utilized by these studies are usually based on subsistence and the politico-economic structure of the society in question. Generally, hunter-gatherer and pastoralist burial practices emphasize horizontal social positions, such as sex differences, while agriculturalists emphasize vertical social positions, which can become ranked or even stratified statuses in highly complex societies (Binford 1971; Carr 1995; Kamp 1998). All categories of social complexity are expected to possess both horizontal and vertical social positioning, but which is the more prevalent determining factor of social organization is dependent upon the level of complexity (Carr 1995). Vertical social status is largely a product of ascribed authorities and responsibilities based on lineage, but can also include achieved prestige throughout the lifetime (Carr 1995). Therefore, horizontal and vertical social statuses, individually, can be appraised as continuums dependent upon social complexity for their expression. Political authority, access to resources, and wealth — traits consistent with increasing vertical social status — have been strongly associated with increased energy expenditure on burial in many cultures as well (Kamp 1998; Trinkaus 1995). Even so, cultures that are in a state of flux or transition are more difficult to accurately assess for social organization in the archaeological record, due to changes in the relativity of burial treatment reflecting actual social “wealth” rather than factors relating to other systems.
at work in the society (Cannon 1989; Kamp 1998). Mortuary behaviors may be largely indicative of social organization but are by no means simply a direct product of it.

**a. Theoretical Paradigms of Mortuary Analysis**

Mortuary analysis is principally performed to uncover the social-behavioral dimensions of death, how and why the individual and society approach death: spiritually, behaviorally, ideologically, politically, and etc., and secondarily to understand prehistoric social organization (Chapman 2003). Lewis Binford (1971) was one of the first and most prominent supporters of the use of burial data to understand prehistoric social organization. Binford (1971) examined a number of period contemporary societies with differing subsistence programs, as a proxy for cultural complexity, and came to the conclusion that cultural complexity directly affects mortuary practices and the treatment of individual deaths (Beck 2003; Carr 1995; Kamp 1998; Tainter 1978). For example, hunter-gatherer burials should vary in predictable and similar patterns by sex and age, because of organization by achieved statuses, whereas agriculturalists are expected to perform much more elaborate mortuary tasks for some individuals due to ascribed, hierarchical statuses. Vertical social statuses are highly interrelated with political organization, resource control, and social authority (Binford 1971). These traits are expected to be more defined in agricultural societies as subsistence and related activities require more regulation than hunter-gathering. Binford (1971) demonstrated that a number of individual dimensions of mortuary behaviors do vary according to the complexity of a society, and these dimensions are represented in
burial treatments (Tainter 1978). Some have argued that Binford’s (1971) study is flawed, because of his assumption that cultural complexity is well represented by subsistence category. At the same time, many of his conclusions have been substantiated by later ethnographic and archaeological analyses (Carr 1995; Kamp 1998; Saxe 1970; Tainter 1978). Binford’s (1971) adherence to a strictly social approach to mortuary analysis was a product of his distaste for “idealism” as an analytical tool, the driving ideology of processualist work (Chapman 2003). Ideology has since been found to play a relevant role in burial expression (Carr 1995; Tainter 1978).

Binford (1971) and other’s early mortuary analyses made use of sociology’s role theory, which was translated to mean that: the social persona of an individual survives into death, and thus the individual’s death is treated according to the same rules and responsibilities associated with that persona in life (Chapman 2003; Pearson 2000). To simplify, social obligations due the individual during life are still due the deceased individual, and burial expression should reflect these obligations. Role theory, as applied to mortuary analysis, was conceived of by Goodenough (1965) and variations of this theory are the driving force behind mortuary analysis today (Carr 1995; Kamp 1998; Saxe 1970; Tainter 1978). Goodenough’s term “social persona”, representing all roles taken during life in relationship to others in the society, has been loosely interpreted as referring to social status and has become the main analytical unit of mortuary analysis (Saxe 1970; Tainter 1978). A “social identity” is the product of both personal and social identity, its expression dependent on the responsibilities, respect, and rules controlling each party in an “identity relationship”
An “identity relationship” forms when an individual is a part of an interactive social reciprocity. The “social identity” of the individual in each “identity relationship” is dependent upon the relative social identity of the other member(s) of the relationship. Relative horizontal and vertical social statuses construct the social identity that is thus presented during each identity relationship (Goodenough 1965). As such, each individual can possess a large number of different “social identities”. These different social identities are amalgamated into the “social persona” of the individual (Saxe 1970; Tainter 1978). The social persona is assumed to have a restricted continuum of expression based on the number and variety of social relationships available at each level of social complexity. For example, agricultural societies comprise necessarily more complex resource system management which constructs a number of roles that are not found in hunter-gatherer societies. Thus, societies of more complex subsistence, economic, and political organization are expected to have a larger number of and variation in social identities.

In his 1970 doctoral dissertation, Arthur Saxe combined Goodenough’s role theory and social structural theory, in an approach similar to Binford’s, to test the validity of the main assumptions of the theoretical principles of each. Saxe (1970) analyzed the treatment of the dead as reflecting “the rights of the deceased and the duties of others in his various identity relationships” (4). In opposition to Binford, Saxe (1970) employed two categories to describe socio-cultural organization which discriminated between social organization and societal, political, economic, and subsistence complexity. “Type” referred to strictly social organization categories, e.g. egalitarian, ranked, stratified, and etc., whereas “complexity”
referred to structural organization. Structural organization was defined by Service’s (1962) classifications: band, tribe, chiefdom, and etc. In so doing, Saxe (1970) attempted to account for variation in burial treatment within a variety of different social and organizational system combinations. An example of the use of this strategy could be a comparison of burial expression of a more egalitarian chiefdom (simple chiefdom) and a ranked chiefdom (complex chiefdom).

Saxe’s (1970) goal was to demonstrate how social groups utilize mortuary rituals as a method of controlling critical resources, expressing social organization, and maintaining references to ancestral lines (Chapman 2003). For example, Saxe (1970) hypothesized that an infant with a large number of burial goods would not be from an egalitarian society, because such a young age would not allow the development of social relationships that would be necessary for an elaborate burial expression in an egalitarian society (an achieved status). Instead, social structural theory would necessitate that this infant be from a more complex society that practiced an ascribed status system, which emphasizes lineage. Individuals of a young age are assumed to have “shallow social personas”, while age and structural complexity increase the number and type of social identities available and thus allows for more elaborate social personas (Saxe 1970). Those individuals who follow lifestyles opposed to cultural norms are also expected to experience shallow social personas. This has been shown to be accurate in ethnographic studies utilizing the Human Relations Area Files (HRAF) (Saxe 1970; Kamp 1998). Saxe (1970) distinguished between burial disposal types, such as body orientation, interment positioning, and burial good types, and examined
variables of each burial dimension on individual scales. For example, Saxe (1970) constructed the dimension of “orientation”, which was formed by the variables: “north”, “east”, etc. Saxe (1970) then compared each dimension with the others. He ultimately concluded his analysis with the construction of a branching diagram, representing two types of mortuary patterning, that either resembled a “perfect tree” or “perfect paradigm” (49). A “perfect tree” burial pattern is one in which the presence of particular variables influences the appearance of secondary variables, whereas the variables of the “perfect paradigm” are largely unrelated to the expression of others (Saxe 1970). These diagrams represent dependent and independent burial treatment dimensions, respectfully, and thus patterns of mortuary treatments.

Saxe (1970) attempted to test six hypotheses using ethnographic accounts:

1) Different combinations of disposal types and its individual burial treatment components represent social persona. (The particulars of a burial will reflect the individual’s social roles, such as mother, male, elder, warrior, and/or chief, taken during life).

2) The principles that determine the patterns of burial variables reflect the social relations and organization of the society and should confer inequalities in political, social, economic, and/or religious life. (The social roles that determine and are exhibited in burial form will reflect inequalities in status, ideological knowledge or control of knowledge, and material/resource wealth, such as when a
priest’s burial is arranged to demonstrate his/her ties to the supernatural and his/her position of authority in society).

3) Those with fewer social identities (of lower social significance) should have less positive or fewer contributions to disposal components and vice versa. (Infants would not have developed many social identities on their own accord (achieved status), and are expected to thus be treated in a more simple, less varied manner than older individuals).

4) The more complex the social persona, the more likely highly socially significant identities will be expressed primarily, while lesser identities will be less obvious. (A “chief” identity, which is more socially important, is more likely to be expressed in an individual’s burial form instead of their more common identities, such as “father”).

5) High redundancy, or dependence, of mortuary components (tree design) will be found in more stratified societies whereas paradigm designs (independent, low redundancy of components) will be found in more egalitarian societies. (It is more likely that there are ordered, prescribed patterns of burial treatment in stratified societies, corresponding to the multitude of social identities in them, than in more egalitarian societies with lesser numbers of social identities).

6) The simpler the socio-cultural organization, the fewer the patterns and variety of the burial components expected and vice versa. (The highest socially significant “persona” in an egalitarian society, such as an elder male, will be made up of
lesser numbers and less complex individual “identities” than that of a highly significant persona in a chiefdom. This distinction results from the inclusion of additional “identities” due to social/structural dimensions not present in the egalitarian society, which necessitates more variety in burial components to represent these).

7) The simpler the socio-cultural organization, the less distinct social persona burial components will be and vice versa. (For example, differences between age identities are expected to be less obvious in less complex or more egalitarian societies than in complex societies).

8) Lastly, particular social groups, lineages, or groups of social significance will have formal disposal areas. (Those of the elite population may have their own individual disposal area whereas those of the majority may be buried in spatially distinct cemeteries based on association with status and/or other social categories).

The hypotheses presented were largely supported by his analysis. Hypotheses 1, 2, 4, and 8 were strongly supported, illustrating the potential of social organizational reconstructions based on mortuary treatments (Saxe 1970). Hypothesis number 3 and 6 were supported but to a lesser extent while number 5 remained inconclusive. Interestingly, hypothesis number 7 was not supported, but all of these hypotheses might find greater support if applied to a wide variety of socio-cultural complexities. A number of more recent studies have demonstrated the applicability of these hypotheses to a larger range of societies.
and have once again supported initial expectations (Carr 1995; Kamp 1998). In the mortuary analyses of today, this approach is generally referred to as the Binford-Saxe method due to the roughly contemporary development and later synthesis of its components (Brown 1995; Chapman 2003).

These pioneering approaches have warranted continued support, due to tested applicability in discriminating social organization within archaeological populations, but some anthropologists have naturally objected to the lack of influence given to more ideological or religious dimensions, power relationships, and even strictly economic dimensions (Chapman 2003; Charles 1995; Tainter 1978; Trinkaus 1995). Tainter (1978) considered mortuary variability utilizing the same method as Saxe (1970) but attempted to demonstrate the importance of the symbolic nature of particular variables of each burial dimension to the society at hand. Tainter stressed the use of the “perfect tree” and “perfect paradigm”, to standardize criteria for mortuary analyses. Utilizing Tainter’s (1978) reconceptualization of Saxe’s (1970) research, the “perfect tree” is a diagram of mortuary dimensions in which one dimension prescribes others (high redundancy) while the “perfect paradigm” is that in which the expression of each dimension is independent from the others (low redundancy). Mortuary treatment that is highly redundant follows set patterns of expression, considered to represent a condition of “low entropy” and vice versa for high entropy, random patterned mortuary expression (Tainter 1978). Tainter argues that social organization and status positions, Saxe’s hypothesis number 7, is accurate but the specifics that are employed to discriminate these social positions are necessarily different. Grave
treatments and burial goods that may have higher symbolic and/or material value will mark status distinctions, in addition to “quantity and quality” distinctions, in both more egalitarian and hierarchical societies (Tainter 1978). Tainter (1978) adds that group involvement and energy expenditure, in the form of community activity disruption, is an important factor to consider when analyzing mortuary data to reconstruct social organization. Tainter also concludes that although grave goods are important when considering social organization, other aspects of burial treatment may have both social and ideological importance and could be used to understand burial contexts. Tainter (1978) suggests that complexity of body treatment, construction of interment, arrangement of interment and cemetery, and extent of mortuary ritual be taken into account during mortuary study. All of these aspects have been found to be related to mortuary expression of social organization (and philosophical-religious dimensions to a lesser extent) in cross-cultural ethnographic analyses (Carr 1995; Kamp 1998).

Studies of mortuary analysis have also produced theoretical insight into the relationship of landscapes, the role of the living, temporality, historical context, and regional construction with social organization (Ashmore and Geller 2005; Brown 1995; Trinkaus 1995). Many question the theoretical model(s) developed to reconstruct social organization within archaeological contexts due to the complexity of the relationships between these social, political, ideological-philosophical, and economic factors. For example, burial expression may not equate with social organization due to changes in power relationships, or in cases where burial decisions reflect the motives of the living (Brown 1995; Trinkaus
1995). Even so, cross-cultural analysis has frequently demonstrated an authentic connection between burial behaviors and social organization (Carr 1995; Kamp 1998; Saxe 1970). The social dimensions most commonly examined in mortuary analyses, horizontal and vertical social status, are verifiably associated with mortuary treatment as well and are worthy of note when reconstructing past lifeways. In addition, the extent to which cultural “complexity” is associated with mortuary treatment has warranted much debate and has led to the development of regional approaches to mortuary analysis and interpretation of its results. Mortuary analyses of the cultures of the Southeast are an example of such a specialized approach, particularly with regard to social-organizational complexity.

**b. Mississippian Mortuary Analysis and Chiefdom Variability**

The ways in which mortuary data vary based on societal complexity have been especially important in discriminating between social categories of Mississippian settlements. Most general studies of this cultural period of the Southeast have focused on elite vs. non-elite socio-cultural traditions and its relationship to the chiefdom system, and mortuary data are no exception (Jackson and Scott 2003; Rothschild 1979; Schurr and Schoening 1995; Welch and Scarry 1995). The social-structural theoretical paradigms that guide mortuary analysis have also been applied to interpret other material remains of this culture period. The designation of Mississippian as a chiefdom level society, and the assumptions of this level of organizational and subsistence complexity, necessitated the construction of cultural specific mortuary considerations. The most influential of all Mississippian mortuary standards is that
constructed by Christopher Peebles. Peebles and Kus (1977) argue that chiefdoms must maintain levels of hierarchy in order to control and regulate energy, production, and even knowledge. A ritual separation, integrated into many aspects of social life and thus sanctified, is established between those in power (the chiefs) and those who remain (commoners) (Peebles and Kus 1977). This assumption forms Peebles’ first “archaeological correlate” of a Mississippian chiefdom, ascribed ranking of the community (Peebles and Kus 1977).

This assumption relates most directly to the goals of mortuary analysis and its application in Mississippian populations. Peebles argues that there are two distinct social groups that can be observed archaeologically: the “superordinate” which is evident by factors of ascribed statuses and the “subordinate”, formed by achieved statuses which generally relate to age and sex (Pearson 2000; Peebles and Kus 1977). Peebles and Kus (1977) describe these dimensions as evident by the extent of “mortuary ceremonialism”—energy expenditure, symbolism, and other aspects of mortuary treatment, and must remain independent categories. How to establish these dimensions within archaeological mortuary data remains difficult, as the categories of vertical and horizontal social status are often interdependent (Carr 1995; Kamp 1998). Lastly, a paramount social position is hypothesized to include only the most elite individuals, who are usually male (Peebles and Kus 1977). These dimensions are expected to vary according to the level of cultural complexity within the chiefdom system as well, based on its ritual and organizational construction (Peebles and Kus 1977). The remainder of Peebles’ Mississippian chiefdom traits are: 1) a hierarchy of settlement including size, type, and its power relationship to the system; 2) a location of settlement
chosen to maximize subsistence means; 3) evidence of organized production and craft specialization; and 4) resource strategies that are integrated with the entire organizational system (redistribution) (Peebles and Kus 1977).

Many mortuary studies of Mississippian populations are loosely based on these assumptions and directly or indirectly test the “chiefdom” model for this cultural period (Boyd 1986; Cook 1981; Peebles and Kus 1977; Powell 1986). Although useful, Peebles’ system appears overly simplistic for the entirety of Mississippian cultures and some have suggested models that incorporate different types of chiefdoms and/or treatment of power in these societies (Beck 2003; Cobb 2003; Renfrew 1973). Still others believe the construction of more organizational terms only complicates analysis (Tainter 1978). Peebles has also suggested that chiefdom mortuary data be examined on a local and supralocal (regional) basis to discriminate differences at various levels of the chiefdom system which may assist resolution of this problem (Pearson 2000). Even still, mortuary behaviors have been found to pattern with cultural complexity, in terms of subsistence type and social organization, supporting the use of the chiefdom model to describe Averbuch and other Mississippian mortuary data, however simplistic (Carr 1995; Kamp 1998).

c. Applied Mortuary Analysis

Mortuary analysis examines the actual grave context, including grave goods, site location and orientation, and size and construction of burials (Harke 2000). The second approach involves an examination of specific biological conditions and/or traits that may
indicate lower or higher status, commonly with regard to access to resources and nutrition (LeHuray and Schutkowski 2005). Of course, ethnological or ethnohistorical records are also utilized, where possible, as a guiding force in the development of interpretations of mortuary populations (Carr 1995; Gamble et al. 2001; Kamp 1998). No matter how well executed though, mortuary analyses and biological analyses are not useful in the determination of ranked systems unless guided by theoretical principles that regulate how all information will be explained. Thus, analysis of social organization by these means has the potential to be overly simplistic and/or lacking in important details. This issue can be remedied to some extent by combining the two methods of study, mortuary and biological analysis, to provide a more well-rounded view of the subject of interest.

Mortuary analysis, as stated above, involves the examination of the entirety of the burial condition, although much of the research that has been conducted focuses on burial artifacts. The early developments of mortuary analysis techniques largely focused on the quantity of burial goods, disregarding the culture’s subjective value of the objects (Harke 2000). The main assumption guiding the analysis of these goods is the theory that differentiation of the number and types of goods corresponds to social rank of the individual and social organization of the population. Greater numbers and higher values of goods indicate higher social status (Gamble et al. 2001). Ethnographic accounts have reported quantity, variety, and overall energy expended on burial items as largely reflecting social organization rather than ideological beliefs (Carr 1995; Kamp 1998). The correlation between total quantity of goods, without any other factors taken into account, and vertical
Social status is more inconclusive though (Carr 1995). The assumption that quantity of grave goods indicates status may be accurate for a number of mortuary contexts but may not always be a true measure of the status of the individual in society. Wealth during life, assumed to symbolize rank, may not directly correlate with burial value. For example, the Chumash Indians of California would sometimes destroy some of the deceased person’s possessions in a mourning ritual thus altering the interpreted “value” of the burial goods while the actual living wealth was much higher (Gamble et al. 2001; Graziadio 1991). The extent that grave goods actually reflect living status and wealth is limited in archaeological analysis. The western notion of possession of material goods equating with status may be at odds with some of the actual ritual and mortuary behaviors of other cultures, as exemplified by the Chumash Indians.

One of the most difficult tasks in mortuary analysis is the determination of burial good value and its interpretation. Subjective value, or as some anthropologists call it “symbolic value” of objects, is important during interpretation because within a culture certain objects may not be appraised as being as valuable as others while other objects may have culturally and/or economically determined high value (Graziadio 1991). The process of defining the “value” of a funerary object would require knowledge of the culture outside of the burial context in order to infer this subjective worth. For example Gamble and co-researchers (2001), in their analysis of burials of the Chumash people of California, placed greater value on the smoking pipes they unearthed with the burials compared to pottery due to the importance of these objects in social interactions and politics. As would be expected,
Carr (1995) reports that ideological attitudes influence burial behaviors but ideology may also be entwined with social organization and social roles. At the same time, chronological change in the value of certain objects has the potential to undermine efforts to historically determine burial value or even comparisons of burials of the same population during different time periods (Cannon 1989; Harke 2000).

Thus it is necessary to determine the material value “average” of the burial population at large before individual burial values can be analyzed in conjunction with studies of social organization (Harke 2000). The form of burial goods is often a reflection of vertical social position, even more so than quantity of items (Carr 1995). Symbolism and the associated value of an object may also change due to the sex of the burial’s occupant. At Mycenae, military goods appeared commonly with males in many degrees of elaboration while ornamentation was frequent in female burials (Graziadio 1991). In many cultures, horizontal social status and even personal identity can be illuminated in burial treatment, but these dimensions are displayed less often than vertical social status (Carr 1995). Thus, there must be the creation of a system of values placed on each of these separately to accurately analyze the “wealth” of a burial, as such items as personal ornamentation may have a different symbolic value for males of this period than for females. Evaluation of worth is relative to cultural standards of the time period.

Size, quality, and location of the goods are also important in determining value. Grave furnishings have been found to be associated with vertical and horizontal social
position, especially when analyzed in conjunction with energy expended on these materials (Carr 1995). For example, the site of Mycenae revealed a large amount of clay pottery, thus forcing the development of a hierarchy of pottery values based on degree of decoration, size, quality of workmanship, and etc. (Graziadio 1991). The rarity of goods, whether from production limitations or difficulty of obtainment, may also increase the value of seemingly similar goods. In their interpretation of supposedly egalitarian Paleolithic graves, Vanhaeren and d’Errico (2005) illustrated that some degree of social status was established at this period. Although all of the burials that they examined had numerous ornamentations, a few of the burials had beads that were made of material that was non-local and would have to have been obtained through trade, and were thus of higher “cost”. These researchers hypothesized that these exotic objects may actually illustrate membership in a “privileged group”. Cross-cultural ethnographic analyses have also demonstrated that burials of those who are considered wealthier or more socially important were different from most other burials, even in societies that are more egalitarian (Kamp 1998). As another example, the “high status” burials of Mycenae had greater quantities of metal, silver and gold, objects that were also more elaborate than those of middle or lower status burials (Graziadio 1991). This analysis is based on the assumption that the rarity of these fine goods would enable only the most socially powerful, also assumed to be the wealthiest, individuals in society to possess them. To support this claim, Graziadio (1991) found that burials with higher numbers of metal objects also had much greater numbers of the standard burial pottery as well.
Frequencies of particular types of goods are also important in the interpretation of symbolic “value”, apart from the number of and quality of other goods present.

The construction of the burial site, its architecture, spatial organization, and location (inter- and intra-cemetery) are also utilized by archaeologists in the interpretation of social organization or status in mortuary analysis. “The amount of human labor and energy expended on the preparation of a burial is a good indication of the status of the deceased” (Graziadio 1991). Mortuary preparation and burial construction, more specifically the effort and energy invested in these mortuary practices, has been shown to be most closely associated with vertical social status in ethnographic accounts (Carr 1995). Thus simple burials with little effort in their creation, such as shallow earthen graves, are presumed to be of individuals of lower status while the large tomb pyramids of Egypt, for example, are presumed to be for someone of high social status. Burial construction, location within the landscape and within discrete cemetery areas, and even the number of individuals per grave represent social organization to a greater extent than any philosophical and/or religious ideologies (Carr 1995). All of these variables reflect vertical social status most often rather than any other social dimension (Carr 1995). At Mycenae, Graziadio (1991) found that burials with higher overall value of the burial goods also tended to coincide with deeper (thus more time was taken to create them), wider, and more elaborately built burials. Creating “types” of burials and a relative hierarchy of them for periods and/or regions can be overly simplistic though. For example, in their work in the Ayacucho valley of Peru, Valdez and his peers (2006) found a great variety of appearances of burials coinciding with different burial...
values based on population, so conclusions about social status based on burial type may mislead the researcher.

Of course, social status might not be the only factor that determines burial construction and burial goods. At the site of Marayniyoq in the Ayacucho valley many individuals were interred quite differently than normal and are hypothesized to be the victims of a massacre (Valdez et al. 2006). Spatial organization of burials, individual location of the burial, and the construction of separate, discrete cemeteries is hypothesized to possibly reflect kinship groups, territoriality and competition, relationship to landscape, and cosmological worldview in addition to social organization (Ashmore and Geller 2005). Thus, direct linkage of burial patterns and social status must be cautioned against as there may exist additional factors determining burial expression.

A few more important uses of mortuary analysis when looking at social stratification are: the determination of earned status versus hereditary rank and chronological analysis to create a timeline of the development of social stratification. The Chumash burials of California illustrate how the determination of social rank may be inferred from mortuary analysis. In these burials, there was a great variety of different ages and sexes of the individuals in the high ranking, high burial value groups (Gamble et al. 2001). If social status was achieved it would not be likely that young individuals would also be included in the groups with high values of burial goods so hereditary lines of status descent may be more plausible in this particular society (Gamble et al. 2001). The increasing complexity of social
organization and ranking systems can be illustrated by the Mycenae site of the Bronze Age. Among the burials at Mycenae, three time periods were examined and Graziadio (1991) found that the earlier burials were much more simply created and had less variety of burial goods. However, once burials from the later periods were examined it was evident that the effort to construct the burials was greater while the distribution of the grave goods was much more limited in the type and number based on grave elaboration (Graziado 1991). Cannon (1989) has demonstrated the cyclical nature of mortuary behaviors expressing social organization during different historical periods and environments as well. Thus burial context and goods can provide a better understanding of the social organization of the period but can also demonstrate the fluidity of this organization over time.

**d. Biological Applications in Mortuary Analysis**

Although mortuary analysis is a very useful tool to recreate certain aspects of past life ways, there are obviously many limitations to its application. In order to increase the reliability of the researcher’s cultural construction of the social organization, for example, biological analyses can often be combined with mortuary analysis (Jankauskas 2003; Trinkaus 1995). Higher concordance between the two may demonstrate a greater accuracy in the reconstruction of social organization. Just as in mortuary analysis, biological analysis of social organization or ranking involves a number of theoretical principles. In opposition to mortuary analysis, the theoretical principles or assumptions of biological analyses are more often substantiated by modern biological and/or medical research (Jankauskas 2003; Le
Biological analysis of social organization assumes that lower health and higher incidences of pathologies coincides with lower social status while greater health and lower levels of pathologies, coincides with higher social status. The main determinant behind this pattern is thought to be differential access to resources, namely nutrition (Le Huray and Schutkowski 2005). Adequate nutrition obviously strongly influences growth and increases the ability to fight disease and in more complex societies, the wealthy potentially have greater access to good nutrition.

There have been a few different traits or conditions that have been largely used in attempts to reconstruct social organization from skeletal material. Carbon and nitrogen stable isotope analysis has been utilized to a great extent. Stable isotope analysis uses the organic (collagen) part of bone to examine the “relative contribution of dietary components” for an individual (Le Huray and Schutkowski 2005). It is assumed once again that social status would restrict access to resources such as different food products. The population’s general nutritional makeup would then be used as the “rule” by which the others are examined, as well as on an individual to individual basis (Le Huray and Schutkowski 2005). In their examination of Bohemian skeletal populations, Le Huray and Schutkowski (2005) found that males, who also had greater numbers of military grave goods, had greater ratios of N15/N14 which indicated that they consumed more meat than plant products (which contain considerably less nitrogen) (Le Huray and Schutkowski 2005). The majority of other individuals consumed a good deal of plant foods and some meat but not to the degree of these men. These researchers analyzed the stable isotopes in conjunction with mortuary
analysis findings that indicated that military goods were of higher value and these men of
greater social status (Le Huray and Schutkowski 2005). This biological finding then does
support the mortuary analysis and vice versa. As cautioned earlier, this correlation may not
be a factor of social status directly but of sexual divisions of labor as well (Le Huray and
Schutkowski 2005). Therefore, sex of the individual may be an interacting variable in the
effects of status on nutritional access. Although this interaction creates difficulty in the
interpretation, there are issues with the actual application of this procedure that may hinder
its use to a greater extent. The use of stable isotope analysis to examine protein in the diet
more directly requires collagen, which is not well preserved in many bones (Le Huray and
Schutkowski 2005). Bone apatite can also be used to examine general dietary patterns as well
(Le Huray and Schutkowski 2005). Therefore, many skeletal populations would not meet the
requirements to perform such an analysis.

Pathologies may also correlate with hierarchical status and access to nutritional
resources. There are many pathological conditions that relate to dietary patterns and are used
in mortuary analysis of social stratification. One such condition is enamel hypoplasia, which
is a dental defect that occurs during enamel matrix formation as the result of inadequacies in
nutritional intake primarily, but also due to disease or illness that affects the normal
development of enamel (Gamble et al. 2001; Le Huray and Schutkowski 2005). The
Chumash burials, in conjunction with mortuary analysis and historical ethnographies,
illustrate how much more valid social organization interpretations may be with biological
analyses included. The researchers examined numbers of enamel hypoplasias and found that
in these burial grounds individuals who were in the lowest burial “wealth” level also had the
greatest number of hypoplasias (Gamble et al. 2001). The mortuary analysis would place
these individuals at a lower socio-economic status and the biological analysis does as well, if
the assumption of lower status individuals having restricted access to subsistence resources is
thought to be accurate. Not all illnesses can be seen in skeletal materials so only a fraction of
the individual and population’s health can be revealed even with detailed biological analysis
and health conditions more complex than skeletal evidence provides.

Although both mortuary analysis and biological analysis of the skeletal material are
valuable in the comprehension of societies’ social organization, the use of both can better
support a particular interpretation or demonstrate how and where it may be lacking. An
overly simplistic view of the topic of choice can be elucidated from the utilization of only
one approach and may ignore important secondary factors, such as the effect of sex on the
expression of social status or more subtle differences in social organization. Theoretical
principles guide the development of these analyses, such as the assumption that increased
levels of wealth relate to higher social status, and these principles may not always apply
directly or perfectly to every culture. Thus once again, it must be stressed that these analyses
are relative.
IV. Materials and Methods

a. Materials

The Averbuch collection, at The University of Tennessee-Knoxville, is curated by the Frank H. McClung Museum. The university keeps nearly 400 individuals, from the over 800 that were encountered during all years of excavation at the Averbuch site. Of those curated, a sizeable percentage from each cemetery is present. Even so, individuals from cemetery one are present in greater numbers, but the number of representatives from each cemetery is roughly proportionate to the size of the cemetery. Two hundred adult skeletons were selected to be scored for all nutritional indicators based on the condition and completeness of the skeletal and dental elements. Some burials contained extreme fragmentation of the skeletal elements while others were preserved in good condition. The mortuary treatment may differentially influence the taphonomic processes affecting the burial, all individuals in the university’s collection were initially examined for potential and utilized if fragmentation was not excessive. Scores were taken on nearly all conditions of preservation in order not to bias data collected towards individuals related to specific burial forms. Age and sex data were recorded from the original assessment by Berryman (1984b) and sex designation was verified by the researcher. Sex was recorded dichotomously: a 1 indicates male sex and a 2 indicates female sex. Age ranges are presented in the successive numeric categories constructed by Berryman (1984b). Adult ranges utilized by this study are as follows:
Individuals were considered to be “adult” if they were over the age of 15, as the acquisition of the “social adult” role is expected by this age. Life expectancies at birth for males and females were 17.4 years and 14.6 years, respectively (Berryman 1981). Due to the relatively short period of life for many individuals, it is hypothesized that “adult” status would be most likely reached by age 15. Most individuals who were available for scoring belonged to category 19 or higher.

Mortuary data were procured from the original site report’s record for all burials. Every adult burial which had burial goods is included in the analysis, even without corresponding health information, to clarify any patterns within burial good types. Care was
taken during biological analysis to examine all adult individuals available who received burial goods as well as a large number of those who received nothing. The number of individuals in the study from each cemetery was similar to the proportions reported to have been excavated from each. Thus health indicator scores are not biased towards any particular cemetery, but rather are distributed roughly by the proportion of burials represented by each cemetery.

b. Methods

i. Averbuch Mortuary Analysis

Although Peebles’ (1978) superordinate and subordinate dimensions are designed specifically for application to Mississippian populations, a modified version of the Saxe (1970) method of mortuary analysis was utilized for this study. Peebles’ dimensions are considered overly simplistic for a mortuary analysis performed on a population which appears to be less obviously organized into two social dimensions. Peebles’ own research demonstrated the inadequacy of his approach to discriminate social differences within smaller, peripheral sites compared to the large mounded sites of the Mississippian culture (Peebles and Kus 1978). It is hypothesized that social organization at Averbuch may not have included the strict social categories that are necessary to divide the population into superordinate and subordinate realms as in Peebles’ approach. In this study, social roles and the responsibilities and the respect given these roles are examined on a social organizational continuum. Reed and Klippel (1984) carried out a small mortuary analysis in the original site.
A variation of Saxe’s approach to mortuary data was used for analysis in the present study. Both social structural theory, especially with regard to the level of cultural complexity, and Goodenough’s role theory guide the mortuary analysis utilized here. Goodenough’s role theory differentiates “status” and “social identity” conceptually; even so, these categories are believed to be highly integrated with one another (Goodenough 1965). To reiterate, “status” in this approach refers to the duties, responsibilities, and respect owed certain identities (Goodenough 1965). The term, social persona, is made up of all of the social identities that an individual performs during life. Each social persona can include identities which are
ascribed or achieved (Goodenough 1965). These social identities are organized in specific ordered ways. The most prevalent identities are those with a low level of the duties, responsibilities, and social status, while the least prevalent identities are those that are afforded the highest levels of these characteristics (Goodenough 1965). Each individual’s social persona will also include successively lower status identities as well (Goodenough 1965). Thus, social persona is incrementally formed and can be incrementally examined during mortuary analysis.

Some aspects of Tainter’s (1978) theoretical approach are also included during analysis, specifically with regard to the symbolic nature of certain objects that were only found in a burial context. For example, the distribution of shell items to particular individuals, by age, sex, or social status, may be of symbolic interest in the light of their discovery only in burials. Social organization is expected to impact resource availability and thus the expression of these goods within burial treatment. Although factors other than social organization may affect mortuary variability, cross-cultural studies have determined that aspects of ideology that influence mortuary practices within more complex societies are often of a social nature. Beliefs about responsibilities of the dead, status of the person, and the importance of ancestral relationships influence mortuary decisions more in these types of societies (Carr 1995). It is hypothesized that ancestral belief systems become highly integrated with socio-political organization for those in power to maintain control (Carr 1995; Cobb 2003; Peebles and Kus 1978). As a more complex chiefdom society, the possible
ideological implications of the Averbuch mortuary data are avoided due to its probable co-
occurance with social dimensions.

Burial goods were kept in the original categories described in the Averbuch site report, organized by the material used to construct the item, either bone, shell, ceramic, or lithic, and the type of good. Based on the reported distribution of grave goods, the quantity of each type of good was recorded for comparison. A “diversity score” was constructed for each burial based on the number of different *types* of goods found within that particular burial. The burial goods (by material type) contained within any adult burial were tabulated first by quantity of good; secondly, the types (by material) of goods were collated; thirdly, quantities of goods were transformed into a present or absent score (1 or 0); and lastly, the number of present (1) good types were summed into an individual’s “diversity score”. The different types of goods are expected to correlate with the number of different social identities, or roles of social importance, an individual had during life. Thus, an individual’s diversity score is expected to represent the amalgamation of these identities, corresponding with Goodenough’s (1965) “social persona”. The number of different social roles an individual keeps is considered a proxy for social status. Diversity scores are not designed to discriminate between achieved and ascribed statuses, per se, but sex, age, and other patterns of dispersal within the scores can be utilized to assess which type appears to be more influential. Thus, as diversity scores increase in number, an increasingly higher social status is expected. The presence of certain goods has been found to be more representative of social role rather than a strict examination of the quantity of goods, supporting the approach used
here (Carr 1995; Kamp 1998). Also, examination of the number of different social roles through \textit{quantity} of goods may prove some categories to be redundant in the case that the individual has more than one of the same type of good. A curve is thus constructed and thought to represent the dispersal of material and symbolic “wealth”, assumed to be correlated with the complexity of social organization. Whether the burial is a dual one, containing more than one individual, or a single interment was also recorded. The presence or absence of burial partners was included due to the energy differential of the construction of an individual burial compared with interment within a common burial group.

Cluster analysis employing the Between-Group (Average) method was utilized to construct groupings of similar burial treatments within all adult burials that were included in the skeletal analysis, using the presence/absence data for type of burial good. In the Between-Group (Average) method, each case is treated as its own cluster initially and then all of these cases are compared and placed into similarity groups. The most similar cases are added together first, for example case A and case B. Then, additional cases, which are most alike to the “average” of the similarities of both A and B, are allocated to that cluster (Ott and Longnecker 2001). This cluster method is more suited to the data and the hypotheses of the researcher, as other methods calculate similarity to \textit{either} A or B rather than to both. In explanation: suppose A is composed of the factors “projectile point”, “awl”, “disc”, and “figurine”, B is composed of “projectile point”, “disc”, “figurine”, “spear”, and “open pot”, C is composed of “open pot”, “spear”, and “pin”, and D is composed of “spear”, “awl”, and “projectile point”. A and B are most “similar” and will be clustered first, while the second
step of the analysis will include D in the cluster formed by these two. Although C is very similar to B, the between-group method will not include this case into the A-B cluster during the second round because it is not similar to A as well. Case D’s factors are similar to both and it is thus chosen to join the cluster instead. The binary form of the data, presence or absence, necessitates the distance measurement to be the chi-square. This distance measurement determines the “similarity” of variable data to the clusters (Ott and Longnecker 2001). There was no need to standardize data as all variables were measured in this manner. Error that can occur due to diverse types of measurement, for example years versus dollars, is not likely as a result. Cluster membership was not confined to any number of groups as determined by the researcher; clusters were designated by the clustering method alone.

ii. Biological Indicators of Stress

Skeletal indicators of nutritional health, including porotic hyperostosis, cribra orbitalia, and enamel hypoplasias were examined on two hundred adult individuals from the Averbuch site. Indicators of nutritional health conditions were chosen because they may reflect differential access to food based on status and because other health indicators may reflect more population-wide problems (sanitation, disease, etc.) or congenital disorders. Porotic hyperostosis and cribra orbitalia is considered as a group of its own as its etiology appears quite similar (Walker et al. 2009). Cribra orbitalia has been hypothesized to be a less severe, initial expression of porotic hyperostosis or age-related expression of the condition (Walker et al. 2009). Porotic hyperostosis and cribra orbitalia are typically porous lesions of
the cranial and/or orbital vaults as a result of diploe expansion due to marrow hypertrophy (see Figures Seven and Nine). Although once believed to result from iron deficiency anemia, it is now accepted that lack of adequate vitamin intake or genetic conditions affecting the uptake of these vitamins, resulting in anemia, initiates the marrow hypertrophy (Walker et al. 2009). A number of different essential nutrients are implicated in its development, most importantly vitamin B12. This vitamin is commonly obtained from animal products; therefore, means of subsistence may influence its expression (Walker et al. 2009). El-Najjar et al. (1975) demonstrated that resource availability in different environments affected frequencies of porotic hyperostosis and cribra orbitalia in Southwestern populations, although researchers were misguided as to its direct cause. Those groups that were highly dependent on maize (which is low in Vitamin B12) exhibited higher frequencies than those consuming more meat (El-Najjar et al. 1975). Interestingly, populations that are more dependent on maize also tend to be sedentary and live in closer proximity to others than other subsistence types. It has also been hypothesized that the effects of sedentism, especially parasitic activity, may form a synergistic relationship with nutrition to influence the development and manifestation of porotic hyperostosis (Holland and O’Bien 1997; Kent 1986).

Porotic hyperostosis and cribra orbitalia were scored separately as present or absent. Porotic hyperostosis was scored when at least half of the cranium was present, including those fragmented and requiring some reconstruction. Reconstruction of some crania was performed by the researcher while a number of others had been reconstructed by Hugh
Berryman during the initial archaeological investigation for craniometric analysis. Cribra orbitalia was scored when at least one orbit was present. To minimize the number of unscored individuals, a “present” orbit was one which had at least the lateral half of the orbit intact. This half of the orbit was considered to be an appropriate consideration of “presence” to score this trait as cribra orbitalia generally develops first on the lateral aspect of the orbits and is expressed symmetrically (Walker et al. 2009).

Enamel hypoplasias are also indicative of nutritional stress but, unlike porotic hyperostosis and cribra orbitalia, hypoplasias develop only from prenatal and early childhood nutritional stress when the tooth enamel is forming (Goodman and Rose 1990; Malville 1997). Tooth enamel forms from the second trimester of pregnancy to around ten years of age (Goodman and Rose 1990). During this time, nutritional stress and/or parasitic infection (general metabolic stress), localized trauma, and heredity influence the development of enamel defects. Almost all enamel hypoplasias are a product of metabolic stress rather than any other factor (Goodman and Rose 1990). Enamel hypoplasias result when the normal activities of the odontoblasts and ameloblasts, the main components of dental enamel, are altered (Goodman and Rose 1990). The location of enamel hypoplasias on individual teeth can be traced back to specific age ranges as the developmental cycle of dentition is well known (Goodman and Armelagos 1985; Goodman and Rose 1990). Although it was possible to determine age ranges for the development of these defects, this detail was not performed as it would not be directly applicable to the purpose of the study.
Enamel hypoplasia is a defect characterized by a “deficiency in the amount or thickness of enamel” and can be seen as linear enamel hypoplasias—transverse lines seen macroscopically across the enamel of the teeth (Goodman and Rose 1990:64; Malville 1997). Although hypoplasias can be found in the form of a pit or even a vertical groove, the most common expression is the linear groove (Goodman and Rose 1990). As such, linear enamel hypoplasias were examined for this study. Enamel hypoplasias are more likely present and easier to identify on the labial side of the upper central and lateral incisors and canines (Goodman and Armelagos 1985; Goodman and Rose 1990). Enamel hypoplasias are not only indicative of metabolic stress during young life, but may also predict health of the individual during their lifetime as well. The presence and, more importantly, severity of enamel hypoplasias have been found to be correlated with reduced age at death relative to population norms (Duray 1996). The assessment of enamel hypoplasias is an important indicator of health during early growth but may predict health throughout life.

This study noted the presence or absence of linear enamel hypoplasias on the central incisors and lateral incisors using hand magnification (X 10). If present, then the number of linear hypoplasias was noted for each individual. In cases where the teeth were all present scores were also taken on the dentition of the right maxilla. Due to the nature of tooth loss during interment, a number of teeth were missing or loose for most individuals. In this case, central and lateral incisors were identified and scores taken on the maxilla where available. When teeth were largely worn, no scores were taken. As such, there is a high degree of missing values for these two hundred individuals, in either tooth category or both. Analysis
examined enamel hypoplasia scores for each tooth category separately so the possibility of differential scoring, due to tooth loss, would not require statistical compensation as would be necessary on an all inclusive case-by-case basis.

iii. Statistical Methods- Social Roles and Health

To begin, simple cross tabulations were constructed at all diversity scores for all of the health indicators. Statistical analysis utilizing binary logistic regression was performed in SPSS for each skeletal health indicator, porotic hyperostosis and cribra orbitalia, separately. Binary logistic regression is useful to examine the impact of specific factors on the outcome of an event with only two responses. Binary logistic regression calculates the natural odd, the logit, of this certain event occurring (Ott and Longnecker 2001). To do so the following logistic function principle is used: ln (ODDS) = ln[Ŷ/(1-Ŷ)] = β₀ + β¹X (Ott and Longnecker 2001). In this equation, Ŷ equals the predicted probability of the event whereas 1-Ŷ equals the predicted probability of the absence of the event; as used in SPSS, Ŷ refers to the outcome identified with a 1. For both porotic hyperostosis and cribra orbitalia, the presence of the disease was identified as Ŷ, so the logistic regression predicts the likelihood of each health indicator. Lastly, X is our predictor variable which is represented by the diversity scores or the presence-absence data for the categories of burial goods. The -2 Log Likelihood was also calculated to examine the model’s goodness of fit, which is the ability of the regression equation to model the dependent variable well. Two different binary logistic regressions were performed using the maximum likelihood method. In the first case, the
response factors are the presence or absence of each skeletal health indicator while the independent variables are presence-absence data for each category of burial item. The second regressed the constructed “diversity score” onto each of the health indicators. Each health indicator was examined independently from the others. Fisher’s exact tests were also performed for porotic hyperostosis and cribra orbitalia separately. To perform the Fisher’s exact tests, the burial data were necessarily transformed from diversity scores (of a number of categories) to two categories: those who had burial goods and those who did not. The Fisher’s test is best suited for 2*2 analyses (Ott and Longnecker 2001). Pairwise chi-square likelihood ratios were conducted when the data would not conform to a 2*2 analysis.

The variance within the enamel hypoplasia counts and burial data was too compact for the use of other types of logistic regression to study the connection, if any, between these two factors. A Fisher’s test is best suited for data with little range within the variables, but was unable to be performed for the enamel hypoplasia scores (Ott and Longnecker 2001). As a variable which was counted, the enamel hypoplasia scores would not conform to the 2*2 format of the Fisher’s test. A pairwise chi-square test of independence was instead applied to each category of enamel hypoplasias, on either the central and lateral incisors individually, in conjunction with the total diversity score. Diversity scores ranged from 0, which included the majority of adults, to a high of 6. Fisher’s exact tests of independence were also performed to compare porotic hyperstosis and cribra orbitalia incidences to whether an individual belonged to a single or dual burial. The dual burial form was relatively common, in addition to single burials, within all three of the Averbuch cemeteries (Berryman 1981). The decision
to inter an individual in either a single or dual burial may have indicated subtle differences in social status based on differing energy expenditure required for each burial type.
V. Results and Discussion

a. Results

i. Cluster Analysis

Cluster analysis was utilized to draw patterns within the distribution of burial good types. Cluster analysis constructed 48 micro-clusters, 35 of which were represented by only one individual burial. Clusters ranged from those with a single membership to a high of 13 members, except for the cluster with zero goods which had 150 members (see Figure 3). Clusters were not necessarily arranged by burial goods and the individual’s sex or age, as would be expected if achieved status was represented by possession of these goods. Higher diversity scores were not found with older individuals in particular and both sexes were represented in many clusters. Although unexamined here, children’s burials at Averbuch contained burial goods frequently, a trend which also supports the assumption that ascribed statuses dictated burial treatment (Berryman 1981; Saxe 1970).

Each diversity score category contained a variety of different age groups with the greatest range of ages belonging to those with a “zero” diversity score. The number of individuals with a diversity score of zero is much greater than those belonging to successively higher diversity scores, which would be expected if a hierarchical distribution of status is thought to be accurate. In each diversity score category, the number of males was greater than the number of females, although the difference was not statistically significant,
except for the two highest diversity score categories which were equally divided by sex. The distribution of males and females (where sex could be determined), respectively, in each diversity score is as follows: diversity score one: 35 and 24, diversity score two: 20 and 16, diversity score three: 3 and 1, diversity score four: 1 and 0, diversity score 5: 1 and 1, and diversity score six: 1 and 1. It may be that, in general, males had access to positions of higher social status than females. This assumption is supported by biological evidence of differential nutrition demonstrated in male health more so than in female health at other Mississippian societies (Boyd 1986; Powell 1986; Hatch and Willey 1974). Alternatively the patterns indicated in this research could be the result of a biological propensity to be more intensely affected by nutritional stresses and/or a particular sex favored during distribution of foods (Danforth 1999).

Some sex and age tendencies were discovered during cluster analysis, indicative of Peebles and Kus’ (1977) “subordinate” position. A number of overarching patterns emerged as well. Ceramics were associated more often with females, while stone products tended to be associated with males. As would be expected, there were some exceptions to this rule, which will be discussed in further detail by category. Most burial good categories did not appear to be restricted by particular age groupings, but demonstrated a range of possible age associations. Burials good types tended to be more influenced by sex, rather than age, as a horizontal status position. The distribution of shell goods is of particular note, as modified shells were only found in mortuary contexts, and tended to be found with either sex and most ages. The potential symbolism of this type of good is supported by this research as a result.
The distribution of diversity scores and cluster analysis results appear to support the hypothesis that Averbuch conforms to a less apparent version of Peebles’ construction of subordinate and superordinate organizational groupings. The following burial good categories were found to be related to sex (and additionally age, in some cases): unmodified shell, ornamental stone, stone projectile point fragments, stone bi-faces, stone abraders, stone celts, Mississippian projectile points, modified bone, bone tubes, closed bowls, globular jars, and open bowls.

Unmodified shell was found overwhelmingly with males of various age ranges, except burial number 570 (cemetery three). Interestingly, burial number 570 contains a female of age category 22 (25-29 years) and is also the female with the highest diversity score. Ornamental stone tended to be associated with males of a variety of ages, while stone bifaces were found overwhelmingly with this same sex but with the younger age ranges, 17.5-24 years. Stone projectile point fragments oppose the normal distribution of stone objects and were frequently associated with females of a variety of ages. Stone abraders and celts were consistently found with males and with a number of ages. Mississippian projectile points and closed bowls tended to found with males of a young age range, category 21 (20-24 years). Closed bowls were discovered with males of a young age only, comprising the only category of ceramic in which males dominate the distribution. Once again, burial 570 contradicts this tendency and contains a closed bowl as one of its six burial good categories. Modified bone was found in high frequencies with males of age range categories 21-23 (20-34 years). The globular jar and open bowl categories of ceramics were dominated by females.
of a wide age range. Surprisingly, burial number 258, a male of age category 25 (40-49 years), contains both of these items. Burial 258 (cemetery one) also contains one of the highest diversity scores, a five. Lastly, bone tubes were associated with both males and females of a younger age range, 20-22 (18.5-29 years). Other categories of burial good did not appear to follow any particular patterns in accordance with sex and/or age.

The burials with the highest diversity scores were not placed in a common cluster (or clusters). Those with the highest diversity scores also rarely shared burial good categories; if categories were shared usually only one category was held in common and with only one other individual. A total of five individuals had a diversity score of four and above. Of these, there are equal numbers of males and females (n=2 within each diversity score) and one individual of undetermined sex. There is no predominant age range associated with these burials of high diversity scores either. These individuals range from category 22 (25-29 years) to category 26 (50+ years). The highest diversity score found was a six, a position held by one female and one male. Interestingly, these burials (number 101 and 570) are of age category 23 (30-34) and 22 (25-29), respectively, and are the youngest of the high diversity score holders. It is important to note that all burials associated with a diversity score of 3 and above are also single interments, rather than dual interments, which also supports the reconstruction of their higher social status (see Figure 10 for frequency of single or dual burial). As was mentioned, two burials with high scores, number 570 and 258, opposed gender boundaries in the distribution of a number of burial good categories. In both cases, the deviation was in a category which was otherwise exclusive to the opposite sex. High status
may have afforded these individuals access to products not usually possessed by those of their same sex. It could also be alternatively hypothesized that these individuals perhaps belonged to what is commonly known as the “third-sex”, males or females that transcend the norms of both genders or perform gender behaviors of the opposite sex.

**ii. Enamel Hypoplasias**

Enamel hypoplasias were divided into two categories based on tooth type, central or lateral incisor, and these were examined as statistically independent health indicators in order to eliminate error when one or both are missing during analysis. Chi-square data did not discriminate any significant differences between counts of enamel hypoplasias, for both central and lateral incisors, in the different diversity score groups. The mean number of central incisor hypoplasias was 1.15, whereas the mean number of lateral incisor hypoplasias was 0.9 (see Figures 4 and 5). The number of hypoplasias ranged from zero to a high of four on both the central and lateral incisor categories (see Tables 2 and 4).

Only four categories of diversity score were represented in the chi-square utilizing the central incisor and lateral incisor health indicators. For each enamel hypoplasia type, each individual fell into either a diversity score category of zero, one, two, or six. Lack of statistical significance may be the product of a small n (individuals belonging to each category) rather than an absence of an actual relationship between diversity score and enamel hypoplasia counts. Individuals in the analysis belonging to the “zero” diversity score are much greater than those belonging to any of the other groups. Unfortunately, this distribution
complicates statistical analysis unless a very large population can be examined. Even so, trends were found within the distributional frequencies of enamel hypoplasia counts for each diversity score which appear to tentatively support the hypothesis that diversity score is negatively correlated with nutritional health ailments. Those of greater diversity scores are expected to enjoy nutritional benefits that higher status affords them whereas lower diversity score individuals are expected to suffer from nutritional deficiencies to a greater degree (Cook 1981; Powell 1986). Cross tabulation constructed relative proportions of enamel hypoplasias counts in each diversity score. The highest proportion in every diversity score generally belonged to the first three enamel hypoplasia categories, corresponding to a count of zero, one, or two hypoplasias.

As was expected, the Averbuch population was largely affected by nutritional stress as indicated by hypoplasia counts. Among individuals with a diversity score “zero”, 94% were found within these 1, 2, or 3 hypoplasia(s) categories when looking at central incisors. Among individuals of diversity score “one”, 76% were found within 1, 2, or 3 hypoplasia(s) categories, and of diversity score “two”, 92% belonged to these categories as well. The distributional pattern within each of these is most important. In diversity score “two”, the proportion of individuals with no central incisor hypoplasias is 50%, while 25% had one hypoplasia, and 17% had two. As diversity score increases, the distribution of enamel hypoplasias appears to shift more towards zero, but this trend is only slight (see Table 1). A similar pattern emerges when examining the lateral incisor enamel hypoplasia counts (see Table 3). The greatest proportion of each diversity score belongs to hypoplasia categories
zero, one, and two, but its distribution also appears to be concentrated in the lower numbers. No individuals are found within the highest stressed categories when examining lateral incisors (enamel hypoplasia counts of 3 or 4) in any diversity score groups other than zero. When examining the distribution of central incisor hypoplasias, the proportion of individuals with 3 or 4 hypoplasias decreases in association with higher diversity score. Chi-square tests of independence did not demonstrate a significant difference between enamel hypoplasia counts (central or lateral incisor) between those with a diversity score five or greater and those less than five though.

Thus, it appears that the Averbuch population suffered greatly from nutritional stress, in general, as most individuals exhibited at least one enamel hypoplasia. Interestingly, those with the highest diversity scores were not generally found to be included in the greater stress categories, although this difference was not statistically significant. The results presented here are inconclusive; selection bias, a small n, and observer error may contribute to the distributional pattern of enamel hypoplasia counts, but the pattern of less hypoplasia severity with increasing diversity scores is found for both incisors when assessed separately. This may also support the validity of its expression. A larger sample size would be necessary to verify these findings, but is impossible due the limits of the available diversity scores (and burial good data). Health data was obtained from all adult individuals that were available and preserved well enough to be studied, including those who had burial goods and those who did not.
iii. Porotic Hyperostosis and Cribra Orbitalia

Once again, statistical analysis proved inadequate most likely due to the small n in each cross-category, diversity score and porotic hyperostosis or cribra orbitalia presence and absence counts. The inclusion of all categories of burial good type (presence or absence counts) did not significantly alter the constant in the logistic regression formula for porotic hyperostosis or cribra orbitalia. Individual categories also did not appear to be well suited for inclusion in the regression formula and were not significant. Regression of the diversity scores on these health indicators demonstrated an increased significance compared to presence or absence data, but was also not of an acceptable significance level for porotic hyperostosis (p=.442) or cribra orbitalia (p=.501). Although significance levels for both are not near what is ideal, the models constructed by these regressions do tend to support the hypothesis that increased social status may be negatively associated with the propensity to develop these health conditions. For each regression (using the diversity scores), the final model is of a negative slope. Porotic hyperostosis modeled as $y = -1.747 - .22x$, whereas cribra orbitalia modeled as $y = -2.097 - .236x$. The -2 Log statistics for porotic hyperostosis and cribra orbitalia are 150.399 and 109.552, respectively, which demonstrates that the models are well-fitted to the variables (Ott and Longnecker 2001). The large majority of diversity scores are grouped around zero, which may have affected the regression distribution.
A proportional examination of the data demonstrated generally consistent frequencies of these health conditions across diversity scores (see Tables 5 and 7). The only exception to this was for those of the highest diversity scores (score 5 and 6), of which no individuals demonstrated either of these health deficiencies. This finding could be due to selection bias, as there were only one or two individuals who were scored for these categories, but it is interesting that none of these individuals demonstrated either cribra orbitalia or porotic hyperostosis. The lack of positive (affected) scores for either condition in those of the highest diversity score categories could be a true effect of social status as a result. Fisher’s exact tests found no significant difference between those with a diversity score of five or more and those with less than five for either porotic hyperostosis and cribra orbitalia. Although statistical significance was not found, the frequency finding is consistent with that indicated by the enamel hypoplasia data as well; in general, the population was stressed across all social categories but belonging to the very highest categories of social status may have afforded some protection against the greatest nutritional stress levels. This distinction within the highest social status category may be what the regression equations are indicating, which could also explain each health variables’ small influence on the equations.

Porotic hyperostosis was found to be present in 26 out of 188 scored individuals (14%), and cribra orbitalia to be present in 17 of 168 scored individuals (10%) (see Figures 6 and 8). Although each diversity score category did not prove a significant tendency for porotic hyperostosis or cribra orbitalia expression based on social status, the proportion of its presence and absence is different when those with any goods are compared with those with
no goods. Of those with any burial goods, 90% and 10% were scored as unaffected or affected by porotic hyperostosis, respectively. Of those with no burial goods, 85% and 15% were scored unaffected or affected by this condition, respectively (see Tables 6 and 8). The frequency of this nutritional ailment appears to decrease slightly when burial goods are present when compared to those with no burial artifacts at all. The same pattern is demonstrated by the cribra orbitalia data as well. Of those with any burial goods, 93% and 7% were unaffected or affected by cribra orbitalia, respectively, whereas 89% and 11% were correspondingly unaffected or affected of those with no burial goods. Unfortunately, Fisher’s exact tests of independence did not demonstrate a significant difference between either of these health conditions based on the presence or absence of goods. Individual analyses examining the impact of single or dual burial status on incidence of porotic hyperostosis or cribra orbitalia utilizing Fisher’s exact tests of independence demonstrated no significant differences in the frequency of these health conditions in either population. Energy expended on the construction of a single or shared burial may not have reflected social status and/or been related to the nutritional health of the interred individual(s).

b. Discussion and Implications

A qualitative analysis was not preferred, but was necessary to explicate small details in the distributional patterns within the crossed data that were too slight to be detected by statistical analysis. Across the majority of diversity scores, frequencies of porotic hyperostosis and cribra orbitalia and counts of enamel hypoplasias remained relatively stable,
which was unexpected for a Mississippian population. Most subjects were affected by a moderate degree of nutritional stress and a smaller proportion were affected severely. Even so, those with the highest diversity scores (although of a much smaller n) appeared unaffected by these health conditions or by the greater stress levels of them. In general, these findings may be opposed to expectations regarding the social organization of a chiefdom level society and the nutritional benefits social status affords. It appears that only the greatest social status individuals may have been protected against nutritional ailments at Averbuch. As a more “marginal” site, Averbuch’s population may have been largely non-elite, as opposed to some mounded areas in other large Mississippian sites, with one small elite group (Ambrose et al. 2003; Jackson and Scott 2003). As this research examines both biological and social-organizational factors, these findings could also be explained by the inadequacy of either of these realms to explicate health and/or status.

i. Biological Health Indicators

Enamel hypoplasia frequencies and formations have been determined to represent nutritional health disturbances to a much greater degree than any other biological or environmental factors (Duray 1996; Goodman and Rose 1990; Goodman and Armelagos 1985). Porotic hyperostosis and cribra orbitalia etiology is more complicated and may represent a synergistic relationship between nutrition, sedentism, and pathogens (Holland and O’Brien 1997; Kent 1986; Walker et al. 2009). Pathogenic transmission is highly related to sedentary lifestyles, which may have influenced the expression of porotic hyperostosis and
cribra orbitalia in the Averbuch population (Kent 1986). An examination of enamel hypoplasias and porotic hyperostosis throughout the Late Woodland to Middle Mississippian periods reported much higher frequencies of both of these conditions after the transition to maize agriculture (Mississippian) within the large Dickson Mounds’ population (Goodman et al. 1984). If sedentism and its pathogenic response are thought to be largely responsible for occurrences of these health conditions, frequencies should have remained relatively stable across time as this site was populous during Woodland periods as well.

Although this sedentism-pathogen relationship may exist in the Averbuch population, frequencies of these conditions are much higher at Averbuch (utilizing Berryman’s (1984b) data for the whole of the Averbuch population) than other Mississippian sites of similar or greater population density (Boyd 1986; Eisenberg 1986; Powell 1986; Sullivan 1995). A comparison of Mouse Creek phase, Dallas phase, and Middle Cumberland (Averbuch) populations of Mississippian Tennessee concluded that porotic hyperostosis and cribra orbitalia are more frequent in the Averbuch population, as well as a lower life expectancy (Boyd 1986). Reports of these conditions for even larger sites, such as Moundville, have been much lower or nonexistent as well (Powell 1986). Pathogen transmission would be expected to be similar in comparative populations, but even those sites that are located in the same general area and are roughly contemporaneous with Averbuch do not exhibit these poor health indicators to nearly the same extent. Research has concluded that although pathologies may have contributed to the development of these conditions, differences in subsistence, primarily maize dependence, remains a principle factor (Boyd 1986; El Najjar et al. 1975;
Holland and O’Brien 1997; Walker et al. 2009). It appears that the Averbuch population was likely to have been highly nutritionally stressed and perhaps more dependent on maize consumption than other contemporaneous populations.

**ii. Social Organization and Nutritional Health**

As these conditions are thought to accurately reflect nutritional health, the error, influencing the results of this research, likely lies with the theoretical and/or applied construction of Mississippian social organization and its correlation to nutrition. Possible explanations are as follows:

1) The mortuary analysis construction may not represent social organization well, particularly the subordinate and superordinate positions of status.

2) Differential access to food resources was not severe enough to affect nutritional health at Averbuch.

3) Status afforded choice cuts or shares of food resources, but the *amounts* of each food types remained similar across status boundaries.

4) The Mississippian redistributive system and strict social organization may not have been practiced at the Averbuch site, thus leaving differential distribution of food stuffs unaffected.
iii. Implication Number One

The construction of mortuary analyses is directed by theoretical principles, which have been tested by ethnographic accounts, but must still be applied carefully in archaeological research (Kamp 1998; Carr 1995; Saxe 1970). The subordinate refers to status afforded sex, age, and achievements whereas the superordinate contains all other ascribed statuses and roles (Pearson 2000). It is expected that in an archaeological population, grave goods attributable to the superordinate should be distributed in a pyramidal fashion; a large number of individuals should have few or no goods and a small number of individuals should form the group with a high number of goods (Pearson 2000). This expectation is fulfilled during mortuary analysis of the Averbuch burial good distribution; a number of goods followed sex/age allocation expectations, but many good types did not, and the distribution followed a pyramid fashion with the majority of individuals falling at the very low end of the scale. Importantly, those with a diversity score of three or more were all single burials, which may also demonstrate increased energy expenditure on their interment (and thus social status). Although unexamined in this research, infants and children also received burial goods, which corresponds to an expectation of ascribed status (the superordinate) as well (Goodenough 1965; Saxe 1970). Interdependency of the superordinate and subordinate positions, and the subjective typologies of burial goods created to represent these, could also influence the usefulness of mortuary analysis in archaeological research (Pearson 2000; Trinkaus 1995). Some believe that mortuary analyses may be limited as only “overt rank” is ritualized in mortuary behaviors, whereas “masked rank” may influence economics and
social and political relationships without corresponding material evidence (Trinkaus 1995). Thus, social organization and status may not always be well exemplified by mortuary good distributions and may have affected the accuracy of this research’s social reconstruction.

**iv. Implication Number Two and Three**

The common expectation for Mississippian societies’ subsistence resource system is its redistributive nature, a discriminating correlate of the chiefdom level society of the Southeast (Peebles and Kus 1977). Based on ethnographic analogy, Mississippian redistributive systems (economic) are hypothesized to reinforce and reflect political and/or social power in which the elite control the dispersion of many types of resources, primarily subsistence products (Cobb 2003; Hatch and Geidel 1985; Peebles and Kus 1977; Welch and Scarry 1995). Through such control, elites are presumed to maintain access to meat and other subsistence products to a greater extent than commoner populations. In so doing, the nutritional health of the non-elite may suffer while the elite enjoy some buffer to nutritional ailments particularly during times of scarcity (Hatch and Geidel 1985).

Welch and Scarry (1995) examined types of pottery found at the decidedly “high status”, site of Moundville, and “low status” sites of the surrounding farmsteads, to determine patterns of serving versus preparation at each. As was expected, high status areas exhibited significantly higher ratios of serving to preparation pottery types whereas low status sites exhibited a reversed ratio. Welch and Scarry (1995) also found that evidence of plant by-products also decreased at high status sites, which they attributed to non-elite tribute of
prepared food products. Maxham (2000) performed a similar pottery type test on Moundville and surrounding smaller sites and reported the same results. Maxham’s (2000) study revealed, though, that the diversity at smaller farmstead sites may follow this pattern, but larger, periphery sites acted more as community centers for the commoner populations and were surprisingly more variable than expected. At Moundville as well, Jackson and Scott (2003) discovered that elite (mound) residents consumed more choice cuts of meats, generally the most substantial hindquarters. A greater variety of meat products, including the rare turkey and venison, were also associated with high status populations of Moundville as well. At the smaller Mississippian site of Toqua in Tennessee (of the Dallas culture), Bogan (1980) did discover differential patterning of meat cuts and variety of animals consumed similar to that found at these larger sites, but Toqua is also a mounded site and considered to be a ceremonial center (Bogan 1980; Schroedl 1998). Unfortunately, most evidence of the redistribution system examine very large, ceremonial sites compared to very small farmsteads, restricting this model’s application to large sites of more obvious chiefdom organization. Although redistribution appears to have affected the most elite (of the elaborate ceremonial centers) favorably, this phenomenon may not affect the elite of more peripheral sites. This assumption may be especially potent if the perspective of a regional hierarchy of sites and power positions within it, as has been proposed for Mississippian populations, is accepted (Autry 1983; Pauketat 2003; Peebles and Kus 1977). In addition, even if more favorable cuts of meats appear to be provided to those of higher social status, the actual amounts of both maize and meat products may be similar in both status categories.
Although the tangibility of a redistributive system in many Mississippian populations is supported by archaeological lines of evidence, actual consumption proportions of maize (C14) to meat (N15) are more variable across the Southeast. Isotopic and trace element analysis may provide additional support for the hypothesis of differential consumption of food resources in elite and non-elite populations. Ambrose et al. (2003) examined C13 and N15 isotopic values in both mortuary-defined high status and low status individuals, based on burial location relative to ceremonial mound areas at Mississippian period Cahokia. Research demonstrated that the high status individuals had consistently higher levels of N15 and lower levels of C13 than those of low status. C13 levels were high across all status distinctions as well, indicating a high reliance on maize production as the primary mode of subsistence (Ambrose et al. 2003). Bender et al. (1981) also found lower C13 values for high status compared to low status individuals at the Aztalan site in Wisconsin. These results are not always consistent; the Middle-Mississippian Angel site, a mounded, semi-regional complex in Indiana, demonstrated no significant differences in carbon and nitrogen isotope composition between adults of high or low status as reconstructed from mortuary behavior (Schurr and Schoeninger 1995). The expression of nitrogen and carbon ratios in many of these Mississippian populations appears dependent on socio-political complexity, and the possibility of more regional differences in subsistence types-in the same site complex and surrounding systems.

Trace elemental analysis reconstructing Mississippian period diet has been inconclusive. Comparative analysis has been conducted on Mound C burials and the village
cemetery of the Etowah, Georgia site. No significant differences were found between the elite and non-elite populations (Blakely and Beck 1981). Importantly though, Blakely and Beck (1981) established the possibility of a single ruling family with different consumption patterns. These mound burial individuals had the highest level of copper and zinc (concentrated in animal products) and lower levels of strontium and magnesium than any of the other mound or village burials (Blakely and Beck 1981). The same individuals were buried with the most elaborate and largest numbers of burial goods. A similar social organization may have been possible at Averbuch, a small number of individuals may have belonged to a particularly high status group. Of the high diversity score individuals who were available for skeletal analysis, all belonged to the less stressed categories of nutritional stress indicators rather than the great stress categories that were seen in the population majority. It could be possible that Averbuch followed a generally egalitarian food distribution with the exception of the highest status individuals, perhaps of the chiefly lineage.

Trace element analysis examining manganese, strontium, vanadium (higher concentrated in plant foods), and copper and zinc was conducted at the Tennessee site of Toqua (of the Dallas culture) to investigate the paleodiet of both its high status and low status populations (Hatch and Geidel 1985). Interestingly, Hatch and Geidel (1985) examined mound burials versus other Dallas village burials, rather than a comparison of the mound burials to small farmsteads or residential areas within the site, as is common with many analyses of this type. Hatch and Geidel (1985) reported higher levels of the elements associated with plant products and lower levels of the elements associated with animal
products in village subadults than mound subadults. Adult males also demonstrated this same pattern, whereas adult females did not. This study may be more directly applicable to understanding the Averbuch site’s nutritional composition as a non-ceremonial site with less distinct social status as evident by village cemetery burials. Averbuch may have also been more dependent on maize and other plant products rather than meat products similar to that of the Dallas villages. Averbuch’s high incidence levels of porotic hyperostosis and cribra orbitalia compared to Toqua and other Tennessee late Mississippian sites could be explained by inter-site dependence on agriculture (Boyd 1986).

Although variable, status related differences of the consumption of meat and maize products have been demonstrated for a number of the aforementioned sites and remains a theme in Southeast archaeology. Unclear in much research though is whether these status-related differences in nutrition affected the biology of the individual strongly enough to influence the development of health conditions such as porotic hyperostosis, cribra orbitalia, and enamel hypoplasias. If the assumption that status did indeed affect the distribution of foods within the Averbuch population is maintained, then the results of the study indicate that the differences in this distribution did not have a strong impact on the development of nutritional health conditions. The severity and frequency of all health conditions investigated remained relatively similar across most reconstructed status categories (diversity scores), except for those of the highest social status. Even so, the increased frequencies of porotic hyperostosis and cribra orbitalia in the population with no goods (compared to those with any) may be evidence of differential nutritional health. Whether this difference is a product
of a redistributive system, statistical chance, or another factor is unknown. Although
differential food ratios have been evaluated as present at Moundville, Powell (1986)
discovered no consistent difference in enamel hypoplasia frequencies or severity. The
Moundville population was surprisingly healthy compared to other contemporary
Mississippian period sites and also exhibited much lower rates of porotic hyperostosis and
criba orbitalia than these (Powell 1986). Other analyses in the Southeast have demonstrated
status-specific differences in nutritional stress, when considering enamel hypoplasias, which
have also been linked to individual and population-wide mortality demographics (Boyd
1986; Cook 1981; Duray 1996). The results of this research appear similar to that discovered
for Moundville, most individuals were nutritionally stressed in some manner and were
unlikely to have enjoyed any status-based protection against this stress. The exception to
these results is expressed by those of the very highest status, who may have enjoyed a
privileged position in the redistributive system.

v. Implication Number Four

The mortuary analysis constructed for this research indicates that there are a number
of artifact types that are associated with the subordinate categories of age, sex, and possibly
also achievement, but there are also some that appear to cross-cut these boundaries. These
artifact types may demonstrate a status-based distribution reflecting social organization.
Many large, ceremonial Mississippian sites tend to have a much more expansive collection of
burial good quantities and varieties and degrees of elaborate construction, illustrating a more
strict hierarchical organization (Ambrose et al. 2003; Blakely and Beck 1981; Maxham 2000; Welch and Scarry 1995). “Consolidation” of these sites into a regional system is hypothesized to facilitate access to resources, including agricultural ones, and to labor sources (Beck 2003; Cobb 2003; Peebles and Kus 1977; Renfrew 1973). Many studies, such as the above, have utilized farmstead or more peripheral sites relative to these mounded centers as “non-elite” control or comparison sites as an attempt to reconstruct a regional hierarchical system. Regional control though, must be maintained through a socio-political system at each progressively smaller community site (Autry 1983; Beck 2003; Pauketat 2003). Analyses of some Mississippian regional systems have discovered intra- and inter-cemetery (elite and otherwise) burial construction and good distinctions (Autry 1982; Brown 1995; Pauketat 2003; Milner 1984; Sullivan 1995). It is possible that representatives of the elite are present in the non-elite surroundings, and that social prestige is awarded them in their community in more complex regional systems. Averbuch resembles a less strictly ranked site (most similar to a non-elite site), if the assumption of a regional system is supported. Averbuch exhibits many individuals of low status, a few of higher status, and one family that perhaps bore an elite status due their relationship to the regional elite.

Within the regional system, site organization and hierarchy is generally executed by an examination of site size and population, presence or absence of mounds or ceremonial areas, type, location, and variety of burials of cemeteries, and the distribution of produced goods (Autry 1982; Cobb 2003; Milner 1984; Peebles and Kus 1977; Sullivan 1995). In Mississippian Tennessee, Autry (1982) identified a four-tiered system which he hypothesizes
reflects chiefdom behaviors characteristic of Middle Cumberland culture. These tiers, from more elite to less elite, are considered to be: moundcenter, village, hamlet, and farmstead. Autry (1982) ascertained an exchange system of goods (particularly Dover chert) and a defined clustering of settlements (and size of these) to support this reconstruction. Similar to the highly structured large chiefdom systems, regional mortuary behaviors also reflected social organizational patterning. Burials of the mound centers were the most diverse, tended to be located near structures of ceremonial importance, had larger quantities of non-local, “exotic” goods, and well constructed stone boxes (Autry 1982). As smaller sites in the clusters were sampled, the trend in mortuary behaviors emphasized burials near residential structures with no burial goods (Autry 1982). In this system, Averbuch conforms to traits common of a village, in which some distinctions of status are recognizable in the variety of mortuary behaviors and correspond with both ascribed and achieved statuses. Although chiefdom type mortuary patterns existed for Middle Cumberland culture, Autry (1982) distinguished a temporal shift towards less structured (non-redundancy) mortuary behaviors during later periods. This shift was recognized as an evolution to a culture which emphasized ascribed status less in social organization (Autry 1982). Middle Cumberland culture sites are thought to be only loosely structured as chiefdom systems as a result (Autry 1982).

Reconstruction of social, political, and economic organization may be much more difficult in less distinctively elaborate chiefdom systems. For example, in a comparison of the Woodland period Indian Knoll site and the Mississippian Dickson Mounds site, Rothschild (1979) discovered social organization to conform less to strict distinctions
between non-chiefdom and chiefdom level societies as is assumed in socio-structural theory. In other regions, lack of elaborate or valuable objects at sites has been hypothesized as indicative of either lower status within a large system or even full lack of participation in one (Pauketat 2003). The Mississippian Southeast is wrought with variability in chiefdom organization and complexity (Cobb 2003; Milner 1984; Peebles and Kus 1977; Schurr and Schoeninger 1995).

A number of theoretical approaches are proposed for less distinct socio-political organization, which may be applicable to understanding Averbuch. Steponaitis’s (1978) typologies are most often cited in description of Mississippian chiefdom socio-political organization. Two forms of chiefdom are accepted: a simple chiefdom or a complex chiefdom (Steponaitis 1978). A simple chiefdom is one in which only one level of superordinate is present while a complex chiefdom includes a multiple level status hierarchy within this superordinate (Steponaitis 1978). Most of the large, extensive mounded sites examined in the previous paragraphs (Moundville, Etowah, etc.) are considered to be “complex chiefdoms”, but Averbuch’s socio-political system, evident in site construction and mortuary behaviors, is dissimilar to these centers. Averbuch does not appear to be a ceremonial center, due to lack of mound or other ceremonial related structures. Mortuary behaviors also indicate that most of the population did not hold an elite status, but that a small proportion of individuals may have held a position distinguished from the majority. Averbuch could possibly be considered a part of a simple chiefdom, but in response to Autry’s (1982) analysis of the regional system, it is unclear whether this minority actually
maintained any redistributive power in society, a conventional trait of a chiefdom “superordinate” population (Peebles and Kus 1977). Biological analysis tentatively supports the assumption that this minority did practice some redistributive behaviors; the elite may have been provided with nutritional resources slightly more so than the general population.

The results of this mortuary analysis conclude that strict social organization, as is commonly attributed to Mississippian cultures, may not have been present in the Averbuch population, except in a small proportion of the population (Peebles and Kus 1978). Rather, some degree of vertical (and horizontal) social differentiation is present, but may include both ascribed and achieved status. Renfrew (1973), evaluating chiefdoms as an adaptive system, divides chiefdoms further into two types: group-oriented or individualizing chiefdoms. Group-oriented chiefdoms maintain social and economic ties and perform communal activities but do not demonstrate significant differences in “wealth” distributions, whereas individualizing chiefdoms are defined by hierarchical “wealth” (Renfrew 1973). In Middle Cumberland culture, differential “wealth” allocation is present across the regional system, but within individual sites differences are not considerable (Autry 1982). In addition, the inter- and intra-site patterns became more similar over time (Autry 1982). The situation at Averbuch appears most consistent with being part of a group-oriented chiefdom as a result.
VI. Conclusion and Future Research

In conclusion, Averbuch could potentially be considered part of a simple, group-oriented chiefdom, but most likely not a regional center. It may have practiced some resource redistribution. The Averbuch population is highly stressed, but biological evidence may cautiously support the presumption that the most elite enjoyed access to a greater variety and/or larger amount of food products. Mortuary analysis demonstrated a number of consistencies within the distribution of burial goods by age and sex, but also maintained some goods that appeared symbolic of an alternative status distinction. The latter burial good distribution is more likely a product of loosely ascribed statuses in the most elite rather than achieved statuses, as those who possessed the greatest variety and number of goods were not necessarily from older age groups. Averbuch appears to have one level of possible superordinate status, while the majority of social organization is determined by subordinate traits.

It is of particular interest that two of the individuals with the greatest variety and quantity of burial goods also tended to be those who could transcend the gender boundaries that dictate the distribution of burial goods. This phenomenon is especially important when the diversity score patterns by sex are taken into account; males were favored in each diversity score except for the two highest categories, in which the sex proportions were more equal. If a normal distribution of the cemetery populations is accurate, which Berryman (1981) believes valid, the equality of the highest diversity score categories may be
determined by membership in an elite (kinship?) group. High social status may have also afforded these individuals more gender freedom, or vice versa in which the manipulated gender identity afforded these individuals increased status. An investigation of this type of “third gender” within Mississippian populations and the role it may have in social organization may prove valuable.

It would be highly informative to analyze other health indicators, such as long bone lengths, in future research as a possible function of social organization as well. Although it was outside the interests of this research, an examination of the status-health role divided into sex and/or cemetery categories may demonstrate patterns within its expression. Ideally, a regional approach to health and status studying relatively contemporary sites in the Nashville Basin should be employed. Research investigating the status-health link within other populations (and cultures) in Tennessee have revealed some influence of social organization on health, and also made clear the much higher nutritional stress levels of this area compared to many other large Mississippian sites (Boyd 1986; Hatch and Willey 1974). A mortuary and health analysis of the regional system(s) Autry (1982) proposes for Mississippian Middle Cumberland culture, in particular, may prove worthwhile to explicate the more subtle differences in mortuary behaviors and health based on the size and possible function of the sites.
**VII. Tables**

Table One: Frequencies of Enamel Hypoplasias on the Central Incisors in reference to Diversity Scores

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<td><strong>6%</strong></td>
<td><strong>18%</strong></td>
<td><strong>8%</strong></td>
<td><strong>0%</strong></td>
<td><strong>8%</strong></td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>0%</strong></td>
<td><strong>6%</strong></td>
<td><strong>0%</strong></td>
<td><strong>0%</strong></td>
<td><strong>1%</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79</strong></td>
<td><strong>17</strong></td>
<td><strong>12</strong></td>
<td><strong>2</strong></td>
<td><strong>110</strong></td>
</tr>
<tr>
<td><strong>% Within Diversity Score</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Table Two: Comparative Frequencies of Enamel Hypoplasias on the Central Incisors in the Population with Zero Burial Goods and those with Any Burial Good(s)

<table>
<thead>
<tr>
<th># of Enamel Hypoplasias</th>
<th>n of Individuals with Zero Burial Goods</th>
<th>n of Individuals with Any Burial Good(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>26</td>
<td>9</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>23</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>31</td>
<td>110</td>
</tr>
</tbody>
</table>

% within each Burial Category:

- 0: 33%
- 1: 32%
- 2: 29%
- 3: 6%
- 4: 0%
- Total: 100%
Table Three: Frequencies of Enamel Hypoplasias on the Lateral Incisors in reference to Diversity Scores

<table>
<thead>
<tr>
<th># of Enamel Hypoplasias</th>
<th>Diversity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>39%</td>
</tr>
<tr>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>39%</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>16%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>4%</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>74</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>100%</td>
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</table>
Table Four: Comparative Frequencies of Enamel Hypoplasias on the Lateral Incisors in the Population with Zero Burial Goods and those with Any Burial Good(s)

<table>
<thead>
<tr>
<th># of Enamel Hypoplasias</th>
<th>n of Individuals with Zero Burial Goods</th>
<th>n of Individuals with Any Burial Good(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>29</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>39%</td>
<td>36%</td>
<td>32%</td>
</tr>
<tr>
<td>1</td>
<td>29</td>
<td>10</td>
<td>34</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>39%</td>
<td>36%</td>
<td>31%</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>16%</td>
<td>29%</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>4%</td>
<td>0%</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>74</strong></td>
<td><strong>28</strong></td>
<td><strong>110</strong></td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Table Five: Frequencies of Cribra Orbitalia in reference to Diversity Scores

<table>
<thead>
<tr>
<th>Diversity Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cribra Orbitalia Not Present</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>89%</td>
<td>95%</td>
<td>89%</td>
<td>100%</td>
<td>100%</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Cribra Orbitalia Present</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>11%</td>
<td>5%</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>126</td>
<td>20</td>
<td>19</td>
<td>1</td>
<td>2</td>
<td>168</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table Six: Comparative Frequencies of Cribra Orbitalia in the Population with Zero Burial Goods and those with Any Burial Good(s)

<table>
<thead>
<tr>
<th></th>
<th>n of Individuals with Zero Burial Goods</th>
<th>n of Individuals with Any Burial Good(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cribra Orbitalia Not Present</td>
<td>112</td>
<td>39</td>
<td>151</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>89%</td>
<td>93%</td>
<td>89%</td>
</tr>
<tr>
<td>Cribra Orbitalia Present</td>
<td>14</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>11%</td>
<td>7%</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>42</td>
<td>168</td>
</tr>
<tr>
<td>% within each Burial Category</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table Seven: Frequencies of Porotic Hyperostosis in reference to Diversity Scores

<table>
<thead>
<tr>
<th>Diversity Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porotic Hyperostosis Not Present</td>
<td>119</td>
<td>22</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>162</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>85%</td>
<td>92%</td>
<td>86%</td>
<td>100%</td>
<td>100%</td>
<td>86%</td>
</tr>
<tr>
<td>Porotic Hyperostosis Present</td>
<td>21</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>15%</td>
<td>8%</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>24</td>
<td>21</td>
<td>1</td>
<td>2</td>
<td>188</td>
</tr>
<tr>
<td>% Within Diversity Score</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Table Eight: Comparative Frequencies of Porotic Hyperostosis in the Population with Zero Burial Goods and those with Any Burial Good(s)

<table>
<thead>
<tr>
<th>Porotic Hyperostosis Not Present</th>
<th>n of Individuals with Zero Burial Goods</th>
<th>n of Individuals with Any Burial Good(s)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>% within each Burial Category</td>
<td>85%</td>
<td>90%</td>
<td>86%</td>
</tr>
<tr>
<td>Porotic Hyperostosis Present</td>
<td>15%</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

| Porotic Hyperostosis Not Present | 119                                     | 43                                       | 162   |
| Porotic Hyperostosis Present     | 21                                      | 5                                        | 26    |
| Total                            | 140                                     | 48                                       | 188   |
Table Nine: Distribution of Burial Goods among Adults

<table>
<thead>
<tr>
<th>Burial Good</th>
<th>Age</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified Bone</td>
<td>M</td>
<td>Middle Adult</td>
</tr>
<tr>
<td>Unmodified Shell</td>
<td>M</td>
<td>Any</td>
</tr>
<tr>
<td>Ornamental Stone</td>
<td>M</td>
<td>Any</td>
</tr>
<tr>
<td>Stone Biface</td>
<td>M</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Stone Pr. Pt. Frag.</td>
<td>F</td>
<td>Any</td>
</tr>
<tr>
<td>Stone Abrador</td>
<td>M</td>
<td>Any</td>
</tr>
<tr>
<td>Stone Celt</td>
<td>M</td>
<td>Any</td>
</tr>
<tr>
<td>Miss. Pr. Pt.</td>
<td>M (one female)</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Closed Bowl</td>
<td>M</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Globular Jar</td>
<td>F</td>
<td>Any</td>
</tr>
<tr>
<td>Open Bowl</td>
<td>F</td>
<td>Any</td>
</tr>
<tr>
<td>Bone Tubes</td>
<td>M/F</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Bone Pin</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Unmodified Bone</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Bone Awl</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Bone Needle</td>
<td>M? (only one)</td>
<td>Older Adult</td>
</tr>
<tr>
<td>Poss. Mod. Shell</td>
<td>M?</td>
<td>??</td>
</tr>
<tr>
<td>Shell Spoon</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Shell Earplug</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Shell Beads</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Ceramic Earplug</td>
<td>F?</td>
<td>Young Adult?</td>
</tr>
<tr>
<td>Misc. Worked Stone</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Tabular Stone</td>
<td>M?</td>
<td>??</td>
</tr>
<tr>
<td>Stone Discoidal</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Stone Core</td>
<td>F? (only one)</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Stone Cobble</td>
<td>M?</td>
<td>Any</td>
</tr>
<tr>
<td>Non-Miss. Pr. Pt.</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Ceramic Bottle</td>
<td>M/F</td>
<td>Any</td>
</tr>
<tr>
<td>Ceramic Pipe</td>
<td>F? (only one)</td>
<td>Young Adult</td>
</tr>
<tr>
<td>Ceramic Disk</td>
<td>M/F?</td>
<td>Any</td>
</tr>
<tr>
<td>Ceramic Trowel</td>
<td>F?</td>
<td>Older Adult</td>
</tr>
</tbody>
</table>
VIII. Figures

Figure One: Map of the Nashville Basin and Location of Averbuch
Taken From: Berryman 1981.
Figure Two: Map of Terrestrial, Aquatic, and Subterranean Regions and Sub-regions of Tennessee

Taken From: Tennessee Department of Environment and Conservation.
Figure Three: Dendrogram of Between-Group Cluster Analysis

Note: (Figure only includes burials with any goods)
Figure Four: Frequencies of Central Incisor Enamel Hypoplasia Counts

Figure Five: Frequencies of Lateral Incisor Enamel Hypoplasia Counts
Figure Six: Frequency of Absence or Presence of Porotic Hyperostosis

Figure Seven: Burial 374, Porotic Hyperostosis
Figure Eight: Frequency of Absence or Presence of Cribra Orbitalia

Figure Nine: Burial Number 19A, Cribra Orbitalia
Figure Ten: Frequency of Single or Dual Burial

Figure Eleven: Globular Jar Artifacts
(Courtesy of the Frank H. McClung Museum)
Figure Twelve: Stone Discoidal Artifact

Figure Thirteen: Stone Box Capstones

Figure Fourteen: Stone Box Floor

(Courtesy of the Frank H. McClung Museum)
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Charles, D.K.

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Crites, G.

Crites, G.


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