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## Social Stratification and Health in Dynastic Egypt: The Differential Effect of Disease Among the Elite and Working Classes

Jerilyn Hansen  
*Utah State University*

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**SOCIAL STRATIFICATION AND HEALTH IN DYNASTIC EGYPT**  
**The differential effect of disease among the elite and working classes**

by

Jerilyn Hansen

Thesis submitted in partial fulfillment  
of the requirements for the degree

of

**DEPARTMENT HONORS**

in

**SOCIOLOGY, SOCIAL WORK & ANTHROPOLOGY**

**Approved:**

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Department Honors Advisor

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Director, Honors Program

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**2003**

Social stratification in Dynastic Egypt between the elite and working class is suspected to have created differential health conditions for these two social classes. It is hypothesized that due to differing living conditions, resulting in varying levels of exposure to infectious pathogens, workloads, and quality of diet, the elite and working class will have dissimilar health conditions. Specifically, it is expected that the working class of Dynastic Egypt suffered ill health more often, and more severely, than the elite. The health conditions of the elite and working class were measured by the prevalence of the density-dependent disease tuberculosis, the workload-related disease osteoarthritis, and the diet-related dental caries. Analysis of these three diseases revealed that the elite and working class suffered from tuberculosis equally, due to similar living conditions. The working class was shown to have suffered more from osteoarthritis, due to lifetimes of heavy labor. However, the elite were shown to have suffered more from dental caries resulting from their diet rich in refined foods and sweets.

Status levels in a society create different opportunities for individuals from the elite and working classes. Elite individuals often have access to better opportunities, jobs, and housing when compared to individuals from the working class. Status differences also tend to create disparity in the health of individuals. Whether due to overcrowded housing creating a breeding ground for infectious pathogens, an unduly heavy physical workload, or meager diet, the working class' health often suffers more than the health of the elite.

The social structure of Dynastic Egypt (approximately 3100 – 330 B.C.E.) was highly stratified – it basically consisted of the pharaoh, his queens, their priests, and everyone else who worked to support the elite (Strouhal 1992). The purpose of this paper is to explore whether this social stratification translated into health differences between the elite and members of the working class. Did working class people always suffer more severely from disease? The living conditions, workload, and quality of the diet of the elite and working class in Dynastic Egypt will be compared to test the hypothesis that the lower classes were more heavily afflicted with disease.

The infectious disease tuberculosis, the workload-related disease osteoarthritis, and the diet-related dental caries will be used as proxy measures of the effect social stratification had on the health of ancient Egyptians. These three diseases were chosen because they can provide insight into social conditions and evidence of their presence is preserved osteologically. In Dynastic Egypt, it is hypothesized that the working class will suffer more from these three diseases due to their overcrowded living conditions, heavy workload, and insufficient diet when compared to the elite.

## *Tuberculosis*

Tuberculosis is a respiratory (pulmonary) disease resulting in a primary bacterial infection of lung tissue by the bacillus *Mycobacterium tuberculosis*. The genus *Mycobacterium* contains many different species, such *Mycobacterium bovis*, *Mycobacterium tuberculosis*, and several nonpathogenic, free-living soil species that have been observed to contaminate buried human tissues (Salo et al. 1994). Tuberculosis is usually spread human-to-human by breathing in airborne microbes carried in droplets introduced by the coughing or sneezing of an affected individual. Such a mode of transmission makes tuberculosis a density-dependent disease (Larsen 1997), requiring a large number of individuals living in close contact with each other to sustain it. In Dynastic Egypt, it is apparent from uncovered ruins of workmen's villages that the working class lived in such conditions, making them prime candidates for infection with tuberculosis. If the elite lived removed from the working class villages, it is expected that they would suffer less infection from tuberculosis because they would be protected from the close human contact that facilitates the spread of the disease. If, however, the social classes of Dynastic Egypt were not so clearly separated in their housing, similar affliction of tuberculosis would be expected between the elite and working classes.

If not treated, tuberculosis can produce a secondary infection of the hilar lymph nodes. Tuberculosis can then spread, over a number of years, to the skeletal tissues via the circulatory system. Once in the skeletal system, tuberculosis tends to settle in the bones with the greatest marrow production, such as the vertebral bodies, long bones, crania, sternum, and ribs due to the rich blood supply present in these particular bones. Tuberculosis has also been known to attack the innominates. In addition, the infection can penetrate underneath the

sheath of the psoas muscle in the lower abdomen and create an abscess within the muscle tissue (Nunn 1996). Tuberculosis can affect any bone or joint in the body, but it is important to note that cases of skeletal tuberculosis are very rare – approximately only 1-9% of *Mycobacterium tuberculosis* infections manifest in the bones. In fact, many individuals can be infected with the tubercular bacilli and never show any symptoms due to a better state of overall health (Larsen 1997).

Skeletal tuberculosis progressively destroys bone tissue through erosive lesions. It is most commonly expressed as destructive lesions in the bodies of the thoracic and lumbar vertebrae (Figure 1). Extensive destruction of the vertebral bodies results in Pott's disease, named for Sir Percivall Pott who first described the condition in 1779 (Larsen 1997). The vertebral bodies collapse due to the extensive erosive damage caused by the tuberculosis bacilli in an individual with Pott's disease, resulting in a "hunchback" spinal deformity (Salo et al. 1994), referred to as kyphosis (White 2000). A 5th Dynasty wooden statuette found at Sakkara depicts a deformity of the spine similar to that caused by Pott's disease (Hamada and Rida 1972) (Figure 2). Artistic representations of what appear to be cases of Pott's disease are important to the analysis of health among the social classes when there is not a large volume of human remains to study.

Tuberculosis greatly impacts the overall health of an individual. The infection stresses the body due to the energy required by the immune system to attack the invading pathogen. The resulting exhaustion limits physical activity and creates a general state of malaise. Advanced tuberculosis leads to dramatic weight loss (Roberts and Manchester 1995). If the tuberculosis infection spreads to the bones, severe skeletal deformity can

follow, which would limit physical activity and general mobility even further and cause great discomfort, eventually leading to total immobility and death.

### *Osteoarthritis*

Osteoarthritis is the most common form of arthritis in humans (Rothschild and Martin 1993) and it is present in all human populations (Larsen 1997). It is primarily caused by age and stress on the joints of the body. Osteoarthritis is not a communicable disease, like tuberculosis; instead, osteoarthritis is classified as a degenerative disease of the synovial joints. Osteoarthritis is characterized by the destruction of cartilage in the joints (White 2000) and the development of bony overgrowths around the edges of the joint surfaces, referred to as osteophytes (Rothschild and Martin 1993) (Figure 3). Osteophytes develop as a result of trauma to the bone surfaces due to the reduction in cartilage and the cushioning it provides between two bones. This trauma to the bone stimulates new bone growth and continues as long as the disturbance to the joint surfaces continues. Individuals who have occupations where lifting and bending are routine, such as the working class of Dynastic Egypt, will often exhibit osteoarthritis in the knees, lower vertebrae, and hips (Larsen 1997) (Figure 4). Osteoarthritis in the joints of the hands is often indicative of individuals who were weavers or spent their lives in occupations that required repetitive hand movements. It is important to remember that the occupational stresses of a lifetime do not always result in the development of osteophytes and osteoarthritis. Osteophytes have been observed to develop as a result of the aging process and not solely as a result of osteoarthritis (Roberts and Manchester 1995). However, the correlation between occupation and the presence of osteoarthritis in specific areas of the body is strong enough to provide general insight into behavioral patterns of individuals and their health (Larsen 1997).

Osteoarthritis creates severe joint pain and stiffness. Continued use of an arthritic joint eventually destroys the cartilage and, when coupled with the ongoing formation of osteophytes, can create a situation where the joint may fuse, severely decreasing mobility. This becomes a serious problem when the vertebrae are affected. If osteophyte growth continues to the point where the vertebrae become fused, the affected individual can become partially or totally incapacitated, depending on how many vertebrae in the spinal column are affected.

### *Dental Caries*

The most common form of dental disease, dental caries is an infectious disease process that results from bacteria present in the mouth, such as *Lactobacillus acidophilus* and *Streptococcus mutans*, feeding on sugars in the diet and secreting a by-product of acid. (Roberts and Manchester 1995). The acids produced by the bacteria demineralize the enamel of the teeth and can create carious lesions over time (Roberts and Manchester 1995). Carious lesions can range from opaque spots on the crown of a tooth to gaping cavities (White 2000) (Figure 5). A disease of civilization, dental caries rarely occurred in pre-dynastic Egypt. However, as the civilization developed and new foods resulting from the domestication of plants and animals began to be incorporated into the diet, the incidence of dental caries steadily increased (Janssens 1970).

The causes of dental caries can often be divided into several areas: the presence of the disease-causing bacteria, sugars in the diet, trace elements such as fluoride in food and water, oral hygiene practices, and the shape and structure of the teeth (Roberts and Manchester 1995). The correct combination of these factors will create a situation where dental caries can occur. The pits and crevices of molars create prime areas for carious lesions to develop,



especially if an individual eats a diet high in sugars and has inadequate dental hygiene.

Without correct dental hygiene, the sugars and bacteria collect in the pits and crevices of molars and quickly lead to the erosion of the enamel of the teeth creating carious lesions.

If left untreated, the continued infiltration of bacteria into the tooth cavity through carious lesions will destroy the softer pulp of the tooth. This hollowing out of the interior of the tooth can cause severe pain as the nerve of the tooth is exposed. In addition, the infectious process can move into the jawbone and develop into abscesses and eventually lead to tooth loss and even death (Figure 6). With the loss of teeth, an individual would have difficulty eating. If the disease progresses to the point of complete tooth loss, an individual could die due to the inability to maintain nourished through the consumption of solid food.

#### **HYPOTHESES TO BE TESTED**

By observing the frequency and intensity of diseases present in individuals, the general health of one social class can be compared to that of another. The information gained by such comparisons is a useful tool for reconstructing the lives of ancient people.

The density-dependent infectious disease tuberculosis has a documented early presence in ancient Egypt, and is known to have been present in early Dynastic Egypt, beginning approximately 3000 B.C. (Zimmerman 1979). Archaeological evidence shows the working class of ancient Egypt lived in crowded and confined quarters. The human-to-human contact this type of living condition required created the correct environment for tuberculosis to spread among individuals. Hence, it is expected that the working class would have suffered more from tuberculosis than the elite. The elite are traditionally believed to have lived in secluded residences away from the working class and their squalor. Therefore,

by being removed from close contact with commoners, the elite are expected to suffer fewer tuberculosis infections.

Osteoarthritis, caused by mechanical stress on the joints of the body, is generally reflective of an individual's cumulative life's work (Larsen 1997). Considering osteoarthritis is caused in large part by physical stress on the body, it is expected that the working class of Dynastic Egypt, with their heavier workload, will exhibit more cases of the disease than the elite, who performed far less intense physical labor during their lifetimes (Strouhal 1992).

Dental caries is found more commonly in archaeological populations than any other dental disease. In addition, because teeth preserve extremely well, any evidence of disease that affects the dentition will also be preserved, thereby providing information about the lifetime experiences of individuals. The presence of dental caries in an individual is usually reflective of that person's diet and dental hygiene. In Dynastic Egypt, it is expected that the working class would suffer more from dental caries than the elite mainly due to insufficient dental hygiene.

The social stratification in Dynastic Egypt between the elite and working class would have created differences in health and the frequency of disease affliction. With crowded living conditions, a heavier workload, and a diet that is suspected to have been deleterious to dental health, the working class of ancient Egypt is expected to suffer in greater numbers from infectious disease, workload-related joint degeneration disease, and diet-related dental disease when compared to the elite.

## **DISCUSSION**

The working class' burden of overcrowded housing, workload, and diet with insufficient dental hygiene practices is expected to affect health conditions negatively when

compared to the elite. It is anticipated that the cases of tuberculosis, osteoarthritis, and dental caries will be greater in the working class than the elite due to this hypothesis.

### *Infectious disease*

To survive and spread in a population, tuberculosis requires a high concentration of individuals coming into close contact with each other. It is expected that cramped, ghetto-type housing would be what the working class of Dynastic Egypt lived in. Archaeological evidence for this type of housing comes from Amarna, where a workmen's village was discovered. The houses of the village were tightly crowded together with very little space and light (Filer 1996). This situation would have created conditions suited to the spread of tuberculosis. Tuberculosis also spread among several generations of a family due to multigenerational households. This would result in young children exhibiting advanced tuberculosis as well as the older individuals due to an early age of exposure (Zimmerman 1979). Substandard living conditions and a meager diet create a synergistic health dynamic – a diet lacking the appropriate nutrition weakens the immune system of an individual and when this is combined with overcrowded living conditions, the opportunity for infection from pathogens like tuberculosis becomes more probable. Hence, one might expect that the working class of Dynastic Egypt would suffer with ill health more often than the elite.

However, from the limited material on tuberculosis in Dynastic Egypt, it appears that the elite and the working class suffered similarly from tuberculosis, with no apparent delineation between social classes. An important fact to point out at this juncture is that the elaborate and isolated temple complexes usually associated with the elite class in Dynastic Egypt were not used for living quarters – they were strictly ceremonial centers. In many settlement areas, the living quarters of the elite and the working classes were not entirely

separated due to an absence of zoning. The elite of Dynastic Egypt lived in the same areas as the working class but in larger residences (Strouhal 1992). This would have resulted in the rich being exposed to and contracting tuberculosis just as often as the poor (Zimmerman 1979). Instead of being isolated from the close human contact necessary for the spread of tuberculosis, the elite appear to have resided alongside the working class so when tuberculosis infected the working class households, the disease could have easily spread to the neighboring residences of the elite. This statement is supported by the evidence from mummified remains that shows the disease crossed class boundaries. Also, the severity with which the elite and the working class suffered with tuberculosis is similar, as exhibited by the comparable cases of skeletal and pulmonary tuberculosis present in both classes. For example, the 21st Dynasty Egyptian mummy of Nespaheran, a priest of Amun, has been described as suffering from Pott's disease, resulting from the destruction and collapse of the last four thoracic and first lumbar vertebrae (Janssens 1970) (Figure 7). Also present in Nespaheran's mummy is the characteristic psoas-abscess that occurs in many cases of pulmonary tuberculosis. It is clear from the physical evidence that this member of the Dynastic Egyptian elite suffered extensively from both pulmonary and skeletal tuberculosis.

The mummified remains of a priest named Khuyankh show another case of tuberculosis that affected the elite of Dynastic Egypt. Also afflicted with Pott's disease, the last four thoracic and first lumbar vertebrae of Khuyankh's spine were collapsed, resulting in the severe hunchback profile (Strouhal 1992).

The suffering from tuberculosis of the elite class priests parallels that of a mummified five-year old ancient Egyptian child found buried in Upper Egypt on the road to the Valley of the Kings and suspected to be a member of the working class. The child's spine was

markedly curved and the still intact lungs were adhered to the chest wall, which is indicative of pulmonary tuberculosis. Microscopic examination of vertebral bone revealed the presence of tubercular bacilli (Zimmerman 1979).

Additional cases of tuberculosis that appear to be in the working class of Dynastic Egypt include eight cases of spinal tuberculosis that have been found in Nubia and a case of tuberculosis in the hips from a 5th Dynasty mummy buried near the Pyramids (Hamada and Rida 1972). A depiction of a gardener showing a marked hump of the back is considered to be spinal tuberculosis (Filer 1996) (Figure 8). Four Late Period mummies of working class individuals found in the Kharga oasis southwest of Luxor also show the osteological signs of tuberculosis infection (Davis and Archbold 2000).

It is important to remember that many individuals infected with the tuberculosis bacteria never show any signs of the disease (Larsen 1997). However, despite the limited number of individuals from which to draw conclusions, it would appear that due to dense living conditions for both the elite and working classes, a higher social status did not protect an individual from contracting the disease in Dynastic Egypt.

#### *Joint degeneration due to workload*

Osteoarthritis appears to clearly follow social class lines, with the working class suffering more from this disease than the elite, as would be expected. There are a few cases of elite-class individuals with osteoarthritis in the literature, such as the published case of the mummy of Asru, an upper-class woman from the 25th Dynasty. Her mummy indicated that she suffered from what appeared to be osteoarthritis in her hands, as shown by a severely deformed left middle finger (David and Archbold 2000). However, with no other indications

of osteoarthritis present in this woman's skeleton, it is difficult to conclude that what this individual suffered from was indeed the joint degenerative disease.

In contrast to the elite class, a large number of the 60 + mummies of working class individuals found in the Kharga oasis southwest of Luxor suffered from spinal arthritis. This was undoubtedly due to hard labor and the carrying of heavy loads, most likely on the head (David and Archbold 2000). It can also be inferred from the many scenes on tomb walls of workers lifting heavy stones, stone masons and sculptors, butchers, smelters, carpenters, and farmers bending over to tend their fields that the working class of Dynastic Egypt would have suffered much more from osteoarthritis than the elite class; the elite are depicted lounging and partaking of the bounty produced by the Egyptian working class (Strouhal 1992). In the working class, osteoarthritic involvement of the vertebrae and knees were common, whereas the elite were affected minimally, as shown by the suspected osteoarthritic finger joint of the elite woman from Asru (David and Archbold 2000). It is evident from this limited information that the working class suffered to a greater degree than the elite from degeneration of the joints due to workload.

#### *Diet-related dental disease*

Finally, in contrast to the original hypothesis of this paper that the working class would suffer to a larger extent from dental caries due to their diet and insufficient dental hygiene, dental caries appears to have ravaged the elite class of Dynastic Egypt. The great pharaoh Ramesses II suffered from a dental abscess so advanced that it is considered a likely contributor to his death (David and Archbold 2000). Computer imaging of the mummy of Djedmaatesankh, an elite-class woman from the 22nd Dynasty, revealed she had such an extremely large dental abscess on the left side of her jaw that it distorted the bone and most

likely the left side of her face (David and Archbold 2000). Again, this abscess likely resulted from carious lesions in one or more of Djedmaatesankh's teeth. An abscess as large as Djedmaatesankh's would have introduced a massive amount of infection into her body and it is suspected to have been the cause of her death (David and Archbold 2000).

Specific cases of dental caries among the working class were difficult to find, whereas examples of dental caries from the elite class of Dynastic Egypt were many and detailed. The suggestion offered for this dichotomy is that the elite class had available to them a diet of softer, more refined foods (Larsen 1997). The elite class also had access to expensive sweet luxuries, such as honey (Filer 1996) and meat. Softer foods tend to leave residue on the teeth and, along with the sugars in honey, would have provided food for bacterial growth. Meat, which is not cariogenic by itself, has a tendency to lodge in the teeth and create additional places for bacteria to collect and grow. There is evidence from ancient Egyptian texts that the elite often washed their mouths with natron dissolved in water, referred to as "cleansing of mouth and teeth" (Strouhal 1992). However, this basic dental care apparently did not protect the elite from dental caries.

The working class had a diet of uncooked, hard foods that tended to scour the teeth clean of any residue that might have provided a food source for bacteria (Janssens 1970). They could not afford to add honey to their meager diet; instead, the diet of the working class usually consisted of cereal foods, bread, vegetables, fruit, and legumes. Meat was rarely consumed, except on special occasions, and there is no textual evidence that the working class practiced any type of dental hygiene (Strouhal 1992). However, the working class diet of less processed, coarser foods and few, if any, sweets and meats protected their teeth from the carious lesions that affected the elite class to such a degree.

## CONCLUSION

The marked status differences of Dynastic Egyptian society influenced workload, exposure to infectious pathogens, and the diet of the elite and working class. This, in turn, affected the health of individuals composing the different social classes. However, this study reveals that the working class did not always suffer more than the elite.

From the evidence available, infectious disease appears to have affected the elite and working classes with comparable severity. Due to the density-dependent nature of tuberculosis and the archaeological evidence of the crowded living quarters of the working class and their close proximity to the elite, the apparent wide reach of tuberculosis in Dynastic Egypt is understandable.

Osteoarthritis and dental caries, on the other hand, affected the elite and working classes of Dynastic Egypt differently. Osteoarthritis appears to have affected the working class to a greater degree than the elite. This asymmetrical affliction of the classes is due to workload – the working class in Dynastic Egypt performed all the heavy manual labor while the elite lounged and enjoyed the fruits of the working class' efforts. Those individuals who worked for a living were affected more by osteoarthritis than those who governed the workers.

Dental caries, a disease process influenced by the presence of sugars in the diet, was found to have affected the elite of Dynastic Egypt more often than the working class. With a diet lacking the expensive dietary luxuries, such as honey, and composed of coarser foods that cleaned the teeth, the individuals of the working class suffered a much lower incidence of dental caries and painful dental abscesses. On the other hand, the elite feasted on a diet of



sweets, meats, and refined foods, then paid a high price for their excesses with painful carious lesions and abscesses.

The stratification of the social classes in Dynastic Egypt did not entirely protect the elite from ill health, as was hypothesized at the beginning of this paper. In fact, judging from the limited examples present in the literature used for this paper, the elite suffered with health problems as often, if not more, than the working class. A richer diet and living conditions similar to those of the working class created a situation where the elite of Dynastic Egypt suffered from worse dental health than the working class and contracted infectious diseases, such as tuberculosis, with comparable frequency. However, the much heavier workload of the working class tended to predispose them to a higher incidence of osteoarthritis when compared to the elite. What this shows is that social stratification does create differential health conditions for individuals of a population. However, it cannot always be assumed that the lower social classes always suffer from worse health.

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## FIGURE CAPTIONS AND ACKNOWLEDGEMENTS

- 1 Lesion destruction of vertebral bodies caused by tuberculosis, resulting in collapse of vertebrae.  
From Larsen, Clark S., *Bioarchaeology: Interpreting behavior from the human skeleton*, figure 3.9.
- 2 5th Dynasty wooden statuette depiction of suspected Pott's disease.  
From Roberts, Charlotte, and Keith Manchester, *The Archaeology of Disease*, figure 7.8
- 3 Osteophyte development around vertebrae body margins, resulting from the development of osteoarthritis.  
From Larsen, Clark S., *Bioarchaeology: Interpreting behavior from the human skeleton*, figure 5.1.
- 4 Osteoarthritic knee joint.  
From Filer, Joyce, *Disease*, figure 51.
- 5 Carious lesion in molar.  
From Roberts, Charlotte, and Keith Manchester, *The Archaeology of Disease*, figure 4.1.
- 6 Dental abscess in jawbone resulting from dental caries in molar.  
From White, Tim D., *Human Osteology*, figure 18.16.
- 7 21st Dynasty mummy of Nespaheran, exhibiting Pott's disease.  
From Filer, Joyce, *Disease*, figure 44 (right).
- 8 Portion of tomb panel showing a gardener with hunchback deformity typical of spinal tuberculosis.  
From Filer, Joyce, *Disease*, figure 12.

FIGURES



Figure 1.



Figure 2.



Figure 3.



Figure 4.

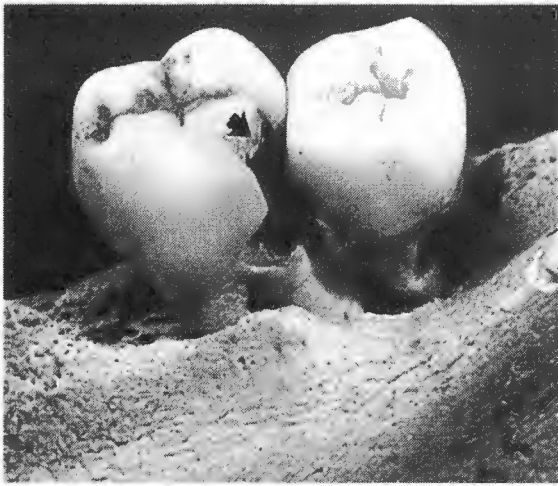


Figure 5.



Figure 6.



Figure 7.



Figure 8.